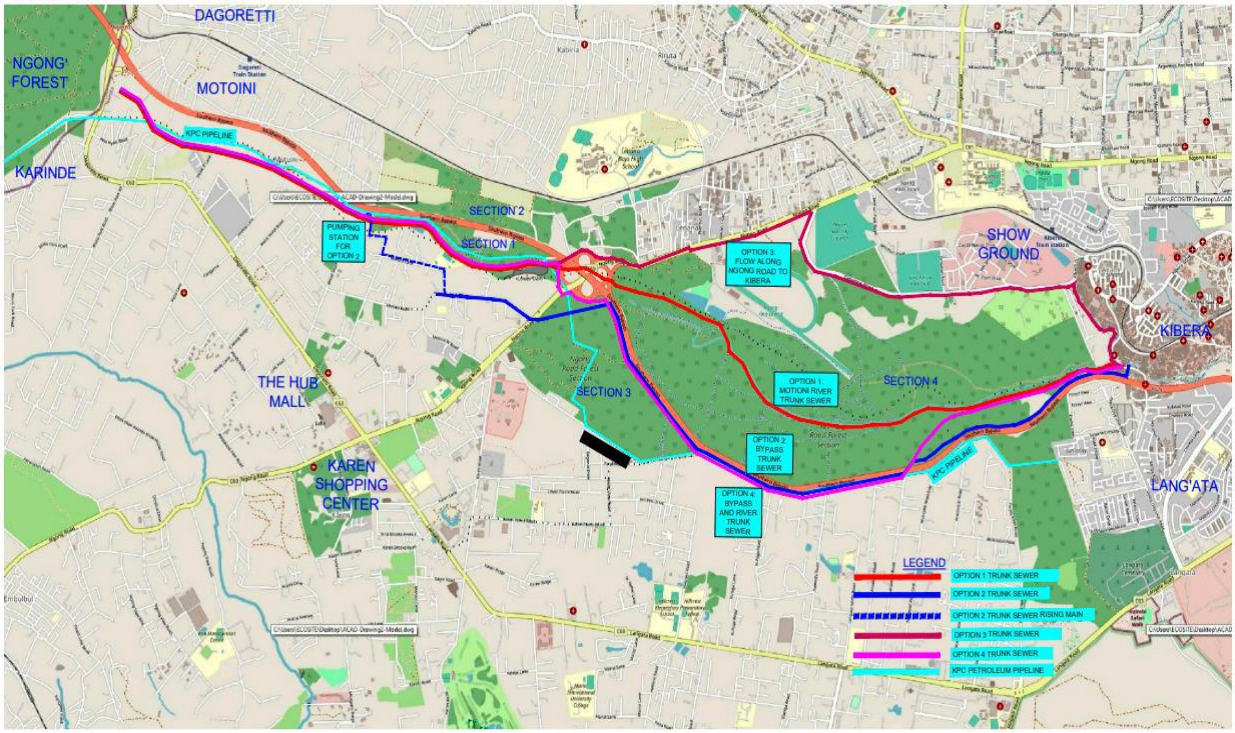
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT COMPREHENSIVE PROJECT REPORT FOR THE EAST AND WEST OF NAIROBI RETICULATION SEWERS

NAIROBI RIVERS SEWERAGE IMPROVEMENT PROJECT PHASE II (NaRSIP II):

PROPOSED MOTOINE TRUNK SEWER



PREPARED BY:

Hankuk Engineering Consultants
H. E. C

In Joint Venture with

Ecosite Development Consultants Ltd

AUGUST 2022

CERTIFICATION

This ESIA Report has been prepared in accordance with the Environmental Management and Coordination Act (EMCA) Amendments (2015 and 2019) and the Environmental (Impact Assessment and Audit) Regulations 2003 for submission to the National Environment Management Authority (NEMA).

The report has been prepared and compiled by:

Hankuk Engineering Consultant in JV with Ecosite Development Consultants Limited

PO Box 56075-00200, Nairobi.

Tel. +254(020)8001055, Cell. 0707-062727

E-mail: ecositeconsultants@gmail.com

Expert Name	**Designation**	**Reg. No.**	**Signature**
Eng. William M. Kamau	Lead Expert	0312	
Loise Nyambura Mugo	Lead Expert	11681	

Proponent/Client: Athi Water Works Development Agency

Name:……

Signature:…… Date:…….

Designation: .....

Disclaimer:

This Environmental & Social Impact Assessment Report is confidential to Athi Water Works Development Agency and any use of the materials hereof should be strictly used in accordance with the contractual agreement between Ecosite Development Consultants Limited and the Proponent. It is, however, subject to conditions spelt out in the Environmental (Impact Assessment and Audit) Regulations, 2003.

LIST OF ACRONYMS

A.M	Before Noon
AfDB	African Development Bank
AIDS	Acquired Immune Deficiency Syndrome
ASK	Agricultural Society of Kenya
ASL	Above Sea Level
AWWDA	Athi Water Works Development Agency
BOD	Biological Oxygen Demand
BS EN	British Standards European Norms
CoC	Code of Conduct
CPR	Comprehensive Project Report
EA	Environmental Assessment
EDC	Ecosite Development Consultants Ltd
EHS	Environment Health and Safety
EMCA	Environmental Management and Coordination Act
ESIA	Environmental and Social Impact Assessment
ESMMP	Environment and Social Management & Monitoring Plan
ESMP	Environment and Social Management Plan
FIDIC	International Federation of Consulting Engineers
GoK	Government of Kenya
HDPE	High-Density Polyethylene
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technology
ISO	International Standards Organization
JV	Joint Venture
KENHA	Kenya National Highways Authority
KENPHIA	Kenya Population-based HIV Impact Assessment
KFS	Kenya Forest Service
KNBS	Kenya National Bureau of Statistics
KPC	Kenya Pipeline Company
KPHR	Kenya Population and Housing Report
KS	Kenyan Standards
KShs.	Kenyan Shillings
KURA	Kenya Urban Roads Authority
KWS	Kenya Wildlife Services
L/H/D	Litres Per Capita Per Day
L/S	Litres Per Second
M	Meters
M^3/D	Cubic Meters per Day
MM	Millimeters
MWI	Ministry of Water and Irrigation

NARSIP	Nairobi Rivers Sewerage Improvement Project
NCWSC	Nairobi City Water and Sewerage Company
NEMA	National Environment Management Authority
NEP	National Environment Policy
O&M	Operation and Maintenance
OS	Operation Safeguards
P.M	After Midday
PAPs	Project Affected Persons
PCC	Pre-Cast Concrete
PPP	Private Public Participation
RAP	Resettlement Action Plan
SDGs	Sustainable Development Goals
SEA	Sexual Exploitation and Abuse
ToR	Terms of Reference
uFW	Unaccounted For Water
uPVC	Un Plasticised Poly Vinyl Chloride
UTM	Universal Transverse Mercator
WHO	World Health Organisation
WRA	Water Resources Authority
WSP	Water Service Provide

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXES

EXECUTIVE SUMMARY

Background Information

The Government of Kenya through the Athi Water Works Development Agency (AWWDA) is implementing the Nairobi Rivers Sewerage Improvement Project (NaRSIP II) and is being financed by the African Development Bank (AfDB). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source for the communities downstream and upstream centres. The Rivers in the Nairobi Basin include the Nairobi River, Ngong River, Mathare River, Kiu River, Riara River, Ruiru River, and Gatharaini River.

NARSIP is implemented under sub-projects also called Lots:

1. Construction Works for Rehabilitation of Dandora Estate Sewerage Treatment Plant (DESTP) (Lot 1)

2. Construction of Kahawa West, Githurai 44 & 45, and Kahawa Sukari reticulation Sewers (Lot 2)

3. Construction of Mwiki & Clay works reticulation Sewers (Lot 3)

4. Construction of East and West of Nairobi reticulation Sewers (Lot 4)

5. Construction Works for Extension of Water and Sewerage Intervention for Informal Settlements (Lot 5)

Overview of the Project

As part of the utilization of the uncommitted funds under the program, AWWDA is implementing the sewerage infrastructure project in the East and West of Nairobi (as Lot 4) including Karinde, Mutuini, and Karen areas. Lot 4 comprises the Construction of:

- 126km of reticulation sewers with diameters ranging 160mm-600mm.
- 3000 nr Household sewer connections
- Securing of Karen Waste Water Treatment Plant and site ancillary works.

During the design review of the project, an additional trunk within the Karen area was proposed. This trunk was not part of the initial ESIA report thus necessitating this ESIA comprehensive report. The proposed trunk sewer is known as Motoine Trunk Sewer which is approximately 11.85km along the Motoine River with pipes ranging from 400-600mm in diameter, Laterals Sewers of diameters 250mm and 300mm, and household connections along the constructed sewers.

The sewer routes have been established taking cognizance of the following;

- Natural drainage patterns and ground slopes
- Utilities wayleave and reserves
- Other existing underground services.

The main Motoine Trunk Sewer has been provided at the lowest natural drainage levels in as much as it's permissible to enable ease of connections from both sides of the valleys.

Scope of the ESIA Study

The study has been conducted to evaluate the potential and foreseeable impacts of the proposed development. The physical scope is limited to the proposed site and the neighbouring environment as it may be affected by or may affect the proposed project. Any potential impacts, (localized or more generalized) are also evaluated as guided by EMCA, Amendments (2015 and 2019).

The objective of the ESIA study report includes the following:

- Identify potential impacts/concerns of the project and assess their significance in detail and recommend mitigation measures.
- Generate baseline data that will be used for monitoring and evaluating how well the mitigation measures will be implemented during the Project cycle.
- Review the Environmental and Social policies, legislation, and regulations relevant to the project.
- Conduct project alternatives analysis.
- Promote stakeholders' engagement and public participation in the reporting process.
- Design an Environmental and Social Management Plan.

Approach and Methodology of ESIA Assessment

The approach and Methodology adopted in carrying out the ESIA were based on the following Stages:

- Environmental and Social Screening
- Scoping on the critical issues of focus during the assessment.
- Desktop study
- Site visit to the project area to assess site baseline conditions and the environmental status
- Public engagement was undertaken in form of interviewing the community and administration representatives, stakeholder engagement meetings, and questionnaires.
- Environmental and Social Impact Management Planning Stage
  An Environmental and Social Management Plan (ESMP) was developed outlining key environmental aspects, appropriate action plans, responsibilities, time frames, monitoring indicators to ensure project components remain in conformance with applicable standards and mitigation measures are effectively addressing predicted impact.

Project Justification

Socio-Economic Environment

A very small section of the Karen project area, around the Karen Shopping Center, is served by a sewerage system of approximately 1.16km serving about 1.72% of the project area. The rest of the Karinde, Mutuini, and Karen areas are served by on-site sewage management systems like septic tanks and pit latrines. This has led to the pollution of rivers and underground water sources.

Problems with the existing wastewater management system in project areas include, but are not limited to, the following;

- The area is characterized by poorly drained black clayey soils not suitable for onsite sewage treatment practices commonly used all over the project area.
- A rapid growth in housing density has necessitated the need for a municipal sewerage system.
- A large number of shopping malls, schools, public and private universities, hospitals, museums, and government institutions are located in the area. Sewage from these establishments would best be managed through a municipal sewerage system.
- The existing Karen Sewage Treatment Plant is located in the middle of a residential and commercial centre and generates a lot of odour, especially during the daytime.
- Effluent from the onsite sewage treatment methods in practice in the area drains into the nearby water bodies polluting water dams inside the Nairobi National Park are used as watering points for the wildlife.

Water Demands

The Nairobi population is projected to grow exponentially. With the burgeoning population, the water demand is expected to increase and consequentially an increase in the rate of wastewater generated. Athi Water Works Development Agency is currently undertaking a water supply project in the area. As such, with improved water supply services, wastewater generation rates are expected to increase requiring an improved sewage management system. It is therefore imperative to implement the proposed Motoine Trunk sewer as a measure of mitigating potential environmental degradation.

Table 0.1: Water Demand Estimates

	Water Demand (m^3/day)		
	2025	**2035**	**2045**
Residential	11,581.58	15,869.56	21,121.20
Institutional	1,158.16	1,586.96	2,112.12
Commercial	1,737.24	2,380.43	3,168.18
Non-Revenue Water	5,501.25	6,744.56	7,920.45
Total	**19,978.23**	**26,581.51**	**34,321.95**

Improved Sanitation and Public Health

Implementation of the proposed project will have a significant impact on the sanitation, public health, environment, and economic value of the project area.

- The project will provide an improved sewer network coverage that will collect the raw waste, and generally that which is currently discharged in open channels and nearby rivers, thus resulting in cleaner rivers and improved groundwater quality.
- Health risks associated with exposure of residents to improperly drained sewage and water-related health issues in their surroundings will be significantly reduced.
- The project will benefit the PAPs by eliminating the use of septic tanks and their associated cost.
- There will be improved living conditions that would contribute to alleviating poverty conditions through employment opportunities in the operation phase of the project. Economic benefits will also be felt by saving money that would otherwise have been used on healthcare expenses from improper sewerage systems.
- Improved state of sanitation and hygiene in the target areas will have overall effects on acceptable habitation and an aesthetic environment.

Project Location and Route

The project location is in Nairobi, the administrative and commercial capital of the Republic of Kenya and the seat of the Government. Nairobi borders Kiambu County to the North and West, Machakos County to the East, and Kajiado County to the South. The three major rivers traversing Nairobi include the Nairobi River, Motoine/ Ngong River, Ruaraka, Getathuru, and Mathare River. The project area is located in the South-West direction of the City's central business district.

The total length of the Motoine Trunk Sewer is 11.85km. The alignment of the trunk sewer is as described below:

i. 1.630km DN600mm. This section is partially in Kibera Informal settlement and section 4 Ngong Road Forest. It carries all flows from the entire project area
ii. 5.844 km DN500mm. This section is in section 4 of the Ngong Road forest up to the Ngong Road-Southern Bypass Interchange.
iii. 3.947km DN400mm. This section is approximately half in Section 1 of the Ngong Road Forest and the rest on the riparian reserve along the Motoine River up to Karinde.
iv. 429m cross-road from section 1 at the interchange to Sanctuary Section and from Sanctuary to Section 4.

Construction Materials

HDPE pipes are recommended for the proposed sewer project taking into consideration availability, durability, and cost. Steel pipes are recommended for all river aerial crossings, Class A and B road crossings, rail crossings, and deep sewers. Different pipe bedding types will be used depending on the nature of the ground. Pre-cast concrete manhole rings of various diameters will

be used with their spacing and sizing selected in accordance with the Nairobi City Adoptive Standards for Sewers.

Policy, Legal and Institutional Framework

The preparation of this ESIA Report was guided by relevant national and international policies, legislation, and institutional frameworks. These included:

Table 0.2: Policy, Legal and Institutional Framework

Statute Category	**Specific Statute**
Policy Provisions	The Kenya Vision 2030
	The National Environment Policy (NEP), 2013
	The National Biodiversity Strategy, 2007
	The National Policy on Gender and Development Policy, 2019
	Big 4 Agenda
	National Land Use Policy, Sessional Paper No. of 2017
	Kenya Youth Development Policy, 2019
	National Water Policy, 2012
	National Climate Change Response Strategy, 2010
	Public Health (Prevention, Citation. Control, and Suppression of COVID-19) Rules, 2020
	The National Environmental Sanitation and Hygiene Policy-July, 2007
	National Policy For Prevention And Response To Gender Based Violence (GBV), 2014
	National Gender and Development Policy, 2019
Acts of Parliament	Constitution of Kenya, 2010
	The Environmental Management and Coordination (Amended) Act of 2015
	The Water Act 2016
	The Employment Act, 2007
	The Occupational Health and Safety Act (OSHA 2007)
	The Public Health Act, (Cap.242)

	The Forest Conservation Management Act, 2016
	The Wildlife Conservation and Management Act, 2013
	The HIV and AIDS Prevention and Control Act, 2006
	County Government Act No.17 of 2012 Revised 2017
	The National Construction Authority Act, 2011
	Physical and Land Use Planning Act, 2019
	The National Museums and Heritage Act, 2006
	The Standards Act Cap 496
	Traffic Act Cap. 403 and The Traffic (Amendment) Act, 2022
	Environment and Land Court Act, 2011
	Labour Relations Act 2012
	HIV/AIDS Prevention and Control Act No. 14 Of 2006 Revised in 2012
	Sexual Offences Act, 2006
	Children Act, 2022
	Climate Change Act, 2016
	National Gender and Equality Commission Act, 2011
	Work Injury Benefits Act (WIBA), 2007
	Energy Act, 2019
	Penal code CAP 63
	Employment and Labour Relations Court Act, 2011
	Sustainable Waste Management Act, 2021
	Eviction Wayleave and Rehabilitation Bill, 2014
	The Land Act, 2012
The African Development Bank Group's Integrated Safeguards System-Policy Statement	OS 1: Environmental and Social Assessment
	OS 2: Involuntary Resettlement, Land Acquisition, Population Displacement, and Compensation
	OS 3: Biodiversity and Ecosystem Services

and Operational Safeguards	OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials, and Resource Efficiency
	OS 5: Labour Conditions, Health, and Safety.

Project Construction Team

Table 0.3: Project Construction Team

Employer :	Chief Executive Officer, Athi Water Works Development Agency
Engineer:	Chief Manager, Water, and Sanitation - Athi Water Works Development Agency
Engineer's Representative:	Hankuk Consulting Engineers in Joint Venture with Ecosite Development Consultants
Contractor:	China Road and Bridge Corporation

Project Alternatives

The selection of the "No Action Alternative" Option with respect to the Proposed Project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. However, if the project is not implemented, the objective of reducing water-borne diseases and other preventable diseases by a measure of improving sanitation, will not be met. This would mean the living standard for the targeted beneficiaries would remain at a status quo and continue to deteriorate with the burgeoning population. If the site is left undeveloped, this would imply economic loss to the proponent, local and national economies in terms of financial commitments already made in the design and planning of the project. This would mean a lost opportunity for residents to earn an income.

Other waste disposal methods were considered including onsite sewerage management systems like the use of septic tanks and pit latrines method. However, these methods are concluded not to be sustainable. Four alternative alignment routes were identified and analyzed. These included:

a. OPTION 1: Use of the Motoine River Riparian Reserve River (from Karinde area to Kibera Trunk) through Ngong Road Forest.

b. OPTION 2: Use of the Southern By-Pass, Ngong Road, and Miotoni Roads Reserve.

c. OPTION 3: Diverting Some Flow along the Ngong Road Reserve then through Ngong Road and outfall at Kibera Trunk Sewer.

d. OPTION 4: Use both the Motoine River Riparian Reserve and Southern By-Pass Road Reserve through the Ngong' Road Forest.

Option 1: Use of the Motoine River Riparian Reserve River (from Karinde area to Kibera Trunk) through Ngong Road Forest was adopted as the most viable. It will ensure a big area is covered by the project, and that the intended outcome of serving as many people as possible in a cost-effective manner is met. The identified disadvantages related to loss of vegetation shall be mitigated by limiting the width of the trenches and working areas as well as ensuring that a reforestation program is immediately commenced.

Consultations and Public Participation

Six interviews with the Karinde and Mutuini community chairpersons, Ngong Road forest representative, and local administration officers representing Karinde, Mutuini, Karen, and Kibera were undertaken; Twelve (12) stakeholders consultation meetings were conducted and 116 questionnaires were administered to various stakeholders to gather the information relevant to the proposed project.

The table below provides a schedule of stakeholder consultation meetings held.

Table 0.4: Schedule of Public Consultation Meeting

	Target Group	**Date**	**Venue**	**Male**	**Female**	**Total**
1.	Karen- Langata District Association (KLDA)	30/08/2021	KLDA Office	6	5	11
2.	Karen Residents	09/09/2021	Kenya School of Law, Karen	23	13	36
3.	CFA Group	4/11/2021	Kenya Forest Service (KFS) Office, Lenana Road	13	7	20
4.	KFS/CFA Group and General Public	15/11/2021	KFS Office, Lenana Road	17	10	27
5.	Mutuini Community Group	18/11/2021	Saigon Field, Mutuini	19	8	27
6.	Karinde Community Group	23/11/2021	Bush Park Hotel, Karinde	12	5	17
7.	Ngong Road Forest Association	16/12/2021	Karen Chief's Office, Karen	13	12	25

	Target Group	**Date**	**Venue**	**Male**	**Female**	**Total**
8.	KFS and CFA	24/01/2022	AWWDA Office, Muthaiga	16	7	23
9.	Kenya Forest Service and Stakeholders	03/02/2022	Kenya Forest Service Office/ Proposed Alternative Routes/ Ngong Road Forest	12	4	16
10.	Kibera Administration and Project Affected Person	07/02/2022	Ngong River at Soweto, Kibera	8	2	10
11.	Kenya Forest Service Technical Committee	14/02/2022	Kenya Forest Service Office, Lenana Road.	12	7	19
12.	Kenya Forest and Stakeholders	16/06/2022	Ngong Road Forest- Section 1	11	4	15
Total Number of Stakeholders Consultation Meetings			12	162	84	246

Chapter 6 cover the public consultation process for the study report.

Issues raised during consultation and public participation meetings included but were not limited to the following:

Table 0.5: Summary of Issues/Agreements Raised by KFS

	Issue/Concern	How to Respond/Main Agreement Reached
1.	Type of species that would be affected.	An inventory of species affected along the alignment route will be taken. This will be done by KFS in collaboration with the supervising engineer.
2.	A need for a special license use for the project.	A negotiation meeting was held on 27/04/2022 to agree on the term. (Annex 10) provides the details.

3.	Reinstatement of work	A restoration program will be conducted immediately in collaboration with the KFS and CFA who will identify the trees to be planted. Damaged nature trails will be reinstated to their original form. Photographs will be taken before construction work that will be used as a reference during the reinstatement of works.

Table 0.6: Summary of Issues/Agreement Raised by Ngong Road Forest

	Issue/Concern	How to Respond/Main Agreement Reached
1.	Project activities should be undertaken until an ESIA report has been shared and submitted.	A study report was done and a draft of the ESIA report was shared with the various stakeholders for their input.
2.	Impact on eco-tourism and damage to the infrastructure.	It was agreed that project activities and the workers will be restricted at the alignment corridor to avoid disturbing people who use the forest for their various activities. The contractor will remove his equipment from the forest when not in use.
3.	Security during the project activities.	The contractor will provide security for their machines. The workers will put on personal protective equipment with the logo of the company for easier identification.
4.	Alternative routes should be analyzed.	The consultant identified four alternative routes (details are in Chapter 5) that were analyzed in consideration of the gravity flow of the sewerage, cost-benefit analyses and sustainability during the construction and operation of the project, environmental impacts from the project, displacement and compulsory acquisition of the

		wayleave and the number of people projected to benefit from the project. It was recommended that Option 1: Use of the Motoine River Riparian Reserve River (from Karinde area to Kibera Trunk) through Ngong Forest was more viable.

Table 0.7: Summary of Issues/Agreements Raised by Residents/Community Groups

	Issue/Concern	How to Respond/Main Agreement Reached
1.	Concerned about the vegetation lost during the construction phase	The community will be involved in the restoration program. Representatives of the community group will be part of the committee that will be formed to ensure the mitigation measures are adhered to.
2.	Concern that some areas may not be connected with the sewer system.	The supervising engineer will ensure that large areas are covered as the gradient factor will allow. The majority of the buildings will be connected under the household connection component provided. An estimated 2,298 households will benefit from this proposed trunk sewer extension and related reticulation sewers. The total population to be served is therefore 7,314 persons and is projected to increase to 14,466 persons by 2045.
3.	Issues of payment of project-affected persons were raised.	It was noted that most of the project components will be laid within the public right-of-way. Any private property that will be affected will be compensated in line with the Land Act, 2012, and AfDB guidelines.
4.	Employment opportunities	The engineer representative stated that the community residents will be considered a priority when hiring casual workers.
5.	Concerns on how fast the project can be implemented.	The Motoine trunk sewer is scheduled to be laid within a time frame of six months. However, the commencement would begin once the various

		authorities including NEMA have approved the project and issued relevant licenses.

Project Area Baseline Information

Physical Environment

The topography of the Motoine River basin is of relatively high relief in the West reaching an elevation of 1,950 m a.s.l near the Motoine swamp also referred to as Riu swamp near the Dagoretti forest and falling to 1,820 m a.s.l at the Bridge on the main Ngong road. The elevation falls further to 1,525 m a.s.l at the confluence of the Nairobi River (Krhoda, 2002). The upper part of the Athi catchment flows over the Upper Athi volcanic is porous and permeable thus allowing percolation and as a result, recharging the Motoine River. The Lower Athi volcanic further downstream of the study area weathers into clay materials and therefore less conducive as an aquifer

The Motoine River flows through part of the Nairobi area covered by deep soils and gravel. Areas underlain by ironstone soils with lithosols, the soils are gravelly whose clay content ranges from 60 % to 70%. Areas underlain by vertisols and vertic gleysols soil are composed of cracking clay, dark brown to very dark greyish brown soil, mottled and poorly drained (Kenya Soil Survey (KSS, 2013).

The source of the Motoine River is the Motoine swamp in Dagoretti. The flow of the river is mainly sub-surface through the Ngong Forest. The Motoine river tributary runs from Dagoretti forest and joins the Ngong tributary within Kibera slums. From this point of confluence, the river then flows into Nairobi Dam, through Nairobi West area as Ngong River, across Mombasa Road it traverses through the Industrial area before joining Nairobi River. Motoine river runoff is slow due to the undulating nature of its water head. Discharge of the river varies from one point to another along its course (Monene, 2014). The flow of the Motoine river varies between seasons and flash floods, rising and falling rapidly after a rainfall event.

Biological Environment

The area of interest is dominated by scattered trees and shrubs due to the rocky ground. Trees identified in Section 1 of the Ngong Road forest include Oleaceae species (323 stems), croton megalocarpus (285 stems), podocarpus (6 stems), Juniperus procera (4 stems), Mauritius thorn (518 stems), Gliricidia sepium (1412 stems), Bamboo (46 stems), Panicum Trichocladum (44) (Ngong Road Forest Bio-data Inventory, KFS, 2021). Section 4 of the Ngong Road Forest (Santuary) is majorly composed of Acacia Xanthopholea, Clausena Anisata (157 stems), Croton megalocarpus (1232 stems), Olea (641 stems), Bamboo (40) which occupies a large swathe of the proposed alignment corridor (Ngong Road Forest Bio-data Inventory, KFS, 2021). Riverine vegetations identified are mainly Typha and Cyperus sp with Napier grass in the surrounding drainage canals that are harvested and used as fodder for stall-fed animals and as construction materials (Monene, 2014).

The forests act as habitats for many species of mammals and birds. Some of the common mammals found within the Ngong Forest include African hare, black-faced vervet monkey, bushbuck, dik-dik, sykes monkeys, hyenas, unstripped ground squirrel, black-tipped mongoose, and white-tailed mongoose and other mammals are found sparsely within the forest (Nature Kenya, 2004).

Socio-Economic Environment

Nairobi City has a population of 4,397,073 (male 2,192,452: female 2,204,376) with a population density of 6,247 per kilometer square. The Motoine Trunk Sewer and related reticulation sewers serve parts of the following two (2) sub-location within the Nairobi City County. About 59% of Mutuini Sub-Location in Dagoretti Sub-County. The current (2022) population to be served in this area is estimated to be 5,133 persons and is projected to increase to 10,151 persons by the project design's ultimate year (2045). About 36% of Lenana Sub-Location in Lang'ata Sub-County with a current population estimate of 2,181 persons and is projected to increase to 3,270 persons by 2045.

Solid waste management in the project area is the responsibility of the County Government of Nairobi. All the municipal waste is normally collected by the County Government of Nairobi whilst all the domestic waste from residential areas is collected by private garbage collectors licensed by the County Government. After collection, the waste is transported to the Dandora dumpsite in Dandora, Nairobi for safe disposal. Whereas the waste should be managed by the County Government in partnership with private garbage collectors, incidences of inappropriate waste disposal are common in the area as waste is disposed of along the roads, open spaces, and the rivers or through open burning.

The majority of the residents and business communities in the area are not connected to a sewer system. The most commonly used form of sanitation is the onsite systems such as pit latrines for disposal of human waste and septic pits which are exhausted as need be. An overflow of the pit latrines renders the wastewater flowing on surface area and in some cases drained into the rivers. The insufficient sanitation services justify the need to implement the proposed Motoine Trunk Sewer. It is expected that any waste generated throughout the project cycles should be managed as per the guidelines of the County Government and NEMA waste regulations.

The project site ownership for the proposed pipe alignment corridor was verified during the consultation where the community agreed that the proposed route is a public wayleave

The project area is entire in Nairobi County. The targeted beneficially traverses two sub-location that is Mutuini Sub-Location in Dagoretti Sub-County and Lenana Sub-Location in Lang'ata Sub-County. The areas are sub-served by chief administrations and police posts including Mutuini police station, Karen police station, and Karen-Lang'ata chief camp.

The project area has good communication, telecommunication, and road network. The water supply in the project area is by Nairobi City Water and Sewerage Company water (NCWSC) which is supplemented by us boreholes and shallow wells that are sunk in the area. However, due to the increase in population, space for putting up shallow wells has been reduced due to the possible

contamination from pit latrines and septic tanks. Energy sources used include biomass, fossil fuels, and electricity.

The project has four major hospitals including Karen hospital, Mutuini health center, Dagoretti sub-county, and Mutuini hospital also locally referred to as CDF that offer both in-patient and out-patient services. There are, however, numerous private health facilities within the project area.
The project area has elementary schools (5), secondary schools (2), and tertiary academic institutions (5).

Project Impact

The environment and social impact identification and analysis were done using the Leopold matrix, a qualitative environmental impact assessment method developed in the year 1971 and used to identify the potential impact of a project on the environment and consequentially prepare a proper mitigation plan. The matrix is a grid that is used to identify the interaction between project activities, which are displayed along one axis, and environmental characteristics, which are displayed along the other axis. The identified impacts were analyzed to determine the impact probability, duration, timing, significance, the stakeholders and/or values affected, and the overall rating. This enabled us to develop appropriate and justified measures to mitigate negative impacts and enhance positive identified impacts. Details of the environmental and social risks identified are provided in Chapter 7.
The matric for the assessment is shown in the table below.

Table 0.8: Impact Assessment Matrix

Item	**Impact Criterion**	**Effect consideration on the Environment**	**Classification of Impact**	
			Expression	**Description of Impact**
	Type of Impact	Will the impact be positive or negative?	Positive	A positive impact
			Negative	A negative impact
	Likelihood of Occurring	Is the occurrence of the associated impact certain?	Certain	Will occur
			Unlikely	Unlikely
	Duration	What time frame will the impact be felt or last?	Permanent	Permanent
			Medium	Beyond the construction period but not permanent

			Short term	It will end at the end of the construction period.
	Timing	At what stage will the impact occur or be felt?	Immediately	Will occur upon starting project activities
			Near future	Near future
	Significance	How severe will the impact be?	Insignificant	Little impact
			Moderately Significant	Moderate impact
			Significant	High impact
			Very Significant	Very high impact
	Extent	What is the area extent or coverage of the impact?	Project area	Effect confined to project area
			Surrounding Environs	Effect to be felt by surrounding areas
			Beyond Surrounding Environs	Effect to be felt within surroundings and beyond environs
	Overall rating	How important is the impact in project design?	Insignificant	The impact is not substantial and needs no mitigation.
			Low	Impact of little importance and needs limited mitigation
			Moderate	The impact has influence and requires mitigation.

			High	Impact of great importance and mitigation is a must

Table 0.9: Identified Environment and Social Impact Assessment and Mitigation Measures

Environmental/ Social Impact	**Proposed Mitigation Measures**	**Responsibility for mitigation**	**Performance indicator**	**Verifiers (Sources/Means of Verification)**	**Estimated Cost (Kshs)**
Pre-Construction Phase					
Approval from NEMA and other Agencies for ESIA report	The Proponent shall ensure that all pertinent permits, certificates, and licenses have been obtained prior to any activities commencing on-site and are strictly adhered to.	Implementation: Proponent/ Contractor Monitoring: NEMA	- EIA/ No of EIA Permits obtained	Copy of ESIA certificate	500,000.00
Setting out and clearance of project route	Demarcation of riparian reserves by the Water Resource Authority (WRA).	Implementation: WRA Monitoring: WRA	-Visibly marked riparian reserve by WRA.	WRA marked peggings.	200,000.00
	Joint setting with KFS of the area to be cleared	Implementation: Supervising Engineer/KFS Monitoring: KFA in collaboration with CFA.	Visibly marked alignment corridor with white pegging.	Pipe laid along the identified alignment corridor.	
Construction Phase					
Impact on Flora	• Obtaining special use license is as agreed with KFS.	Implementation: Proponent Monitoring: KFS	• Special Use License (SUL)	• Copy of the SUL	10,000,000 .00

	• Clearing of vegetation and project activities will be restricted within the proposed sewer alignment corridor • Revegetation of recommended species by KFS on cleared areas.	Implementation: Contractor Monitoring: Supervising Engineer in collaboration with KFS and CFA	• Pipe laying at a relatively 6m corridor. • Number of types of permits. • Number of trees planted.	• Photos of rehabilitated area.	No Cost
Impact on Fauna	• Manage waste in a way that prevents the poisonous types from being accessed by wildlife. • Restoration of the alignment corridor with appropriate species recommended by KFS.	Implementation: KFS/Supervising Engineer Monitoring: KFS in collaboration with CFA.	• Implementation of proper waste management. • Number of trees and restoration of alignment corridor with appropriate species recommended by KFS.	• Inventory of solid waste collected. • Record of type of species planted along the alignment corridor. • Photos of restored alignment corridor with appropriate vegetation species.	500,00.00
Soil erosion and contamination	• Construction machinery will be restricted to designated areas to avoid	Implementation: Contractor	• Number of risks and Corrective	• Photos of reinstatement work using	No Cost

	soil compaction within the project site, while any compacted areas will be ripped to reduce run-off. • Topsoil removed during excavation will be stored separately and used for reinstatement. • Vegetation disturbance shall be minimized by using established access routes.	Monitoring: Supervising Engineer in collaboration with NEMA/KFS	action assessments. • Workers wearing protective gear. • Monitoring of the stream nearby.	appropriate material. • Inventory of number and types of species planted along the alignment corridor. • Records of vehicle maintenance.	
Air pollution	• Adherence to speed limit of 20km/h to reduce dust particles emission. • Use of environmentally friendly fuels such as Low Sulphur diesel. • Ensuring wastes are well disposed of in approved designated areas. • Providing PPEs such as nose masks to the workers in dusty areas on the site.	Implementation: Contractor Monitoring: Supervising Engineer / County Public Health Officer	• Proportion of workers with requisite PPEs including respirators, nose masks, and earplugs used by workers.	• Inventory list/invoices of procured PPEs. • Records of vehicle maintenance and collection of waste. • Minimal dust on the plant leaves.	No Cost

Noise and excessive vibrations	• Construction works will be carried out only during the specified time of 0800-1800hrs. • Regular machinery maintenance • Use of PPEs • Implementation of Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.	Implementation: Contractor Monitoring: Supervising Engineer / County Public Health Officer	• Service, maintenance, repair, or replacement records of faulty machines. • Records of PPEs procured and issued to the workers.	• Records of workers' sign-in and Sign out a time sheet. • Records of type of PPEs issued to workers	150,000.00
Oil pollution	• Proper storage, handling, and disposal of new/used oil and related wastes. • Maintained construction machinery, equipment, and vehicles to avoid leaks.	Implementation: Contractor Monitoring: Supervising Engineer / NEMA	• Records of vehicle maintenance services at the campsite garage.	• Records of machines/ vehicle maintenance	No Cost
Waste generation	• The contractor or the proponent shall work in hand with NEMA licensed waste handlers for proper disposal of waste at NEMA approved dump site.	Implementation: Contractor Monitoring : Supervising	• Weekly waste collection inventory	• Copy of licensed waste handlers • Waste disposal records	No Cost

	• Waste management bins shall be provided at strategic places within the worksite. • The waste shall be managed in accordance with the provisions of the Waste Management Regulations, 2006.	Engineer / NEMA		• Number of waste receptacles • Waste management plan in place	
Health and safety of Workers	• Adherence to the Occupational Safety and Health Act, 2007 safety rules and regulations. • Maintenance and inspection of all machinery and equipment to prevent failure or unanticipated accidents. • Only skilled employees will operate equipment or machinery. • All site workers shall be provided with full protective gear. • A fully equipped first aid kit shall be provided within the site. The contractor shall maintain a	Implementation: Contractor Monitoring : Supervising Engineer / DOSH	- Records of remitted statutory requirements (NSSF/NHIF). - Contractor's existing valid insurance covers. - Availability of existing sanitary facilities. - Visible emergency contact numbers.	• Valid copies of statutory requirements under OSHA,2007 • Occupational accidents register • Lost workday cases • Training certificates	No Cost

	valid insurance cover for all his workers. • Adequate sanitary facilities will be provided and standard cleanliness maintained by the contractor. • Food handlers will have food handling certificates. • The speed of vehicles in and around the project site will be controlled. • The construction crew at the site will be sensitized to negative social issues such as drugs, alcohol, and infectious diseases. • Visible emergency contact numbers will be made available at the site which all can access. • The contractor shall make prior arrangements with health care facilities to accommodate any affected worker. • Reports and records of health, safety and environmental incidences		- Stocked first aid kits. - Inspect workers' PPEs. Records of incidents or accidents.		

	shall be kept in chronological order as required by law.				
Eco-tourism	• Areas affected by vegetation clearing will be re-vegetated with suitable tree and vegetation species in liaison with the stakeholders. • Careful site planning of the construction program will help reduce the amount of vegetation clearing.	Implementation: Contractor Monitoring: Supervising Engineer in collaboration with NEMA/KFS and CFA	- Project activities within the alignment corridor. - Removal of construction materials after completion.	• Storage of equipment at the designated area. • Implementation of the revegetation program.	2,000,000.00
Social Conflict	• Use of a grievance redress mechanism where arising matters and resolutions made will be registered. • Local community members are given consideration during the employment of labour. • Laborers are above 18 years of age to avoid child labour. • Consideration of gender distribution in employment opportunities.	Implementation: Contractor Monitoring: Supervising Engineer	- Records of training programs conducted. - Records of filed grievance forms.	• Number of workers employed from local community. • Employment of adults above the age of eighteen. • Employment slots for women. • Training certificates	500,000.00

	• Workers will be sensitized to cultural sensitivities and public health including HIV/AIDS, and communicable and sexually transmitted diseases.				
Operation Phase					
Environmental/ Social Impact	**Proposed Mitigation Measures**	**Responsibility for mitigation**	**Performance indicator**	**Verifiers (Sources/Means of Verification)**	**Estimated Cost (Kshs)**
Sewage/ wastewater spillage	• Regular inspection and maintenance of the internal sewer system. • Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. • Monitor water quality, both in the river and in the conveyance system	Implementer: Nairobi City Water and Sewerage Company (NCWSC)	- Regular inspection and maintenance - Quality of water downstream. - Periodic water test.	• Records number of inspections	100,000.00
Suffocation due to hydro-sulfide	• Gas masks during inspection and maintenance of internal sewer system.	Implementer: Nairobi City Water and Sewerage Company (NCWSC)	- Accidents report register	• Training certificates • Evidence of emergency response	No Cost

	• Implement fire and explosion prevention measures.			mechanism plan.	
Decommissioning Phase					
Environmental/ Social Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Performance indicator**	**Verifiers (Sources/Means of Verification)**	**Estimated Cost (Kshs)**
Solid Waste Generation	• Where recycling/reuse of the removed materials and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site.	Implementation: Contractor Monitoring: Supervising Engineer	- Amount of generated waste and stockpiles	• Inventory waste collected by NEMA licensed handler	No Cost
Degeneration of vegetation at the demolition site	• Implement an appropriate re-vegetation program to restore the site to a better status.	Implementation: Contractor Monitoring: Supervising Engineer	- Number of trees planted. - Biomass volume present	• Record of trees planted.	No Cost
Socio-economic impact	• Offer advice on alternative income-generating ventures to workers • Redeploy workers where opportunities avail.	Implementation: Contractor Monitoring: Supervising Engineer	- Number training offered to affected staff	• Record of redeployed workers	No Cost Expected

The summary of the impact assessment identified is shown in the table below.

Potential Environmental Impact	**Impact Criterion**							
	Positive or Negative Impact	**Likelihood of Occurring**	**Duration**	**Timing**	**Significance**	**Extent**	**Project Phase**	**Overall Impact Rating**
Environmental Issue								
Flora	-ve	Certain	Medium	Immediately	High	Project Area	Construction	High
Fauna	-ve	Possible	Short	Immediately	High	Project Area	Construction	High
Soil Erosion	-ve	Certain	Short	Immediately	High	Project Area	Construction	High
Air Quality	-ve	Possible	Short	Immediately	Low	Surrounding Environs	Construction	Moderate
Noise Pollution	-ve	Certain	Short	Immediately	Medium	Surrounding Environs	Construction and Demolition	Moderate
Waste Generation	-ve	Certain	Short	Immediately	Medium	Project Area	Construction/ Demolition	High
Eco-Tourism	-ve	Possible	Short	Immediately	Medium	Project Area	Construction	Moderate
Soil and Land Contamination	-ve	Unlikely	Medium	Near Future	High	Project Area	Operation	Moderate
Social Economic and Cultural Issues								
Social Tension and Conflict	-ve	Possible	Short	Immediately	Moderate	Project Area	Construction	Moderate
Employment Opportunities	+ve	Certain	Medium	Immediately	High	Surrounding Environs	Project Cycle	High
Skill Transfer	+ve	Certain	Long	Immediately	High	Project Area	Construction	High
Gender Mainstreaming	+ve	Certain	Short	Immediately	High	Project Area	Construction	High
Child Labour and Exploitation	-ve	Unlikely	Short	Immediately	High	Project Area	Construction	High

Potential Environmental Impact	**Impact Criterion**							
	Positive or Negative Impact	**Likelihood of Occurring**	**Duration**	**Timing**	**Significance**	**Extent**	**Project Phase**	**Overall Impact Rating**
Sexual Exploitation and Abuse	-ve	Possible	Short	Immediately	High	Project Area	Construction	Moderate
Increase in transmissible diseases	-ve	Possible	Short	Immediately	Medium	Project Area	Construction	Moderate
Increase in National Economic Growth	+ve	Certain	Long	Near Future	High	Beyond Surrounding Environs	Operation	High
Increase in Local Economic Activities	+ve	Certain	Long	Near Future	High	Surrounding Environs	Construction	High
Health and Safety								
Occupational Health and Safety	-ve	Possible	Medium	Immediately	High	Project Area	Project Cycle	High
Dust Pollution	-ve	Certain	Short	Immediately	Medium	Project Area	Construction	Moderate
Health Risks Associated with Burst Sewers	-ve	Unlikely	Medium	Near Future	High	Surrounding Environs	Operation	High

Project Cost

The estimated cost of the proposed project based on Option 1 is Ksh. **111,142,465.32** (Kenya shillings one hundred and eleven million, one hundred and forty-two thousand, four hundred and six five and thirty-two cents). the client will hence pay 0.1% of this amount to NEMA Ksh. 111,142.47 (Kenya shillings one hundred and eleven thousand, one hundred and forty-two and forty-seven cents) being part of the EIA license application fee.

Conclusion and Recommendation

The implementation of the proposed Motoine Trunk Sewer project will improve sewer network coverage that will collect the raw waste, and generally that which is currently discharged in open channels and nearby rivers including the Motoine/Ngong River. This will in turn contribute to attaining the objective of the Nairobi Rivers Sewerage Improvement Project (NaRSIP)- Phase II by improving access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensuring that the vital Athi River Basin remains sustainable as a water source for the communities downstream and upstream centres.

The Motoine Trunk Sewer and related reticulation sewers will serve 59% of the Mutuini Sub-Location in Dagoretti Sub-County with a current estimated population of 5,133 persons and projected to increase to 10,151 persons by the project design ultimate year (2045); and 36 % of Lenana Sub- Location in Lang'ata Sub-County with a current population estimate of 2,181 persons and projected to increase to 3,270 persons by 2045. The total population to be served is therefore 7,314 persons and is projected to increase to 14,466 people by 2045.

During the preparation of this ESIA report for the proposed sewerage infrastructure development, identified environmental and social aspects that are likely to be impacted by the proposed project were assessed in detail. It was observed and established that the proposed project would have negative and positive impacts. Mitigation measures were recommended. From the foregoing analysis, the social and economic rating for this project is highly positive.

- The proposed project will lead to the improvement of livelihoods in the area. This will be through direct and indirect employment of skilled, semi-skilled, and unskilled personnel.
- The project is vital for the improvement of public health and sanitation in the project area. Access to proper sanitation is a right for all citizens.
- The proposed ESMMP is adequate to mitigate the potential negative environmental impacts identified and those that would arise in the project cycle.
- The proposed project will not compromise the well-being of the neighbouring communities.
- The project should be allowed to commence and activities managed within the provided ESMMP in cooperation with the various actors identified in the report and who will have diverse responsibilities depending on the stage of the project.
- The proposed project is a viable public investment that should be given due support.
- It is recommended that the proposed project be implemented in compliance with all the relevant legislation and planning requirements of Kenya.

The study for the proposed project is recommended for approval by the National Environmental Management Authority (NEMA) and issuance of an EIA license subject to adherence to the environmental management and monitoring plan proposed in this report and an annual environmental audit during the operational phase.

CHAPTER 1: INTRODUCTION

1.1 Background

The Government of Kenya through the Athi Water Works Development Agency (AWWDA) is implementing the Nairobi Rivers Sewerage Improvement Project (NaRSIP II) and is being financed by the African Development Bank (AfDB). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source for the communities downstream and upstream centres. The Rivers in the Nairobi Basin include the Nairobi River, Ngong River, Mathare River, Kiu River, Riara River, Ruiru River, and Gatharaini River.

NARSIP is implemented under sub-projects also called Lots:

1. Construction Works for Rehabilitation of Dandora Estate Sewerage Treatment Plant (DESTP) (Lot 1)
2. Construction of Kahawa West, Githurai 44 & 45, and Kahawa Sukari reticulation Sewers (Lot 2)
3. Construction of Mwiki & Clay works reticulation Sewers (Lot 3)
4. Construction of East and West of Nairobi reticulation Sewers (Lot 4)
5. Construction Works for Extension of Water and Sewerage Intervention for Informal Settlements (Lot 5)

In October 2017, AWWDA prepared an Environmental and Social Impact Assessment (ESIA) Report for the Proposed Nairobi Sewerage Improvement Project (NaRSIP) Phase II. The report was submitted to NEMA and an Environmental Impact Assessment License Ref. NEMA/EIA/PSL/5318 was issued on 7th May 2020. The Scope of the ESIA Project Report included:

1. Construction of 81 Km trunk sewers. This will include:
   - Duplication of Dandora Box Culvert from Gatharaini Junction to Njiru Junction - 3km.
   - Reconstruction/Upgrading of Uhuru Highway Trunk Sewer to Mater Hospital - 2km.
   - Duplication of Mombasa Road Enterprise Trunk Sewer - 3km.
   - Extension of Mombasa Road Enterprise Trunk Sewer – 2km.
   - Reconstruction of Kirichwa Kubwa Trunk Sewer - 4km.
   - Duplication of Nairobi River/ Eastleigh Trunk Sewer from Eastleigh to Kariobangi and Extend to the Confluence of Gitathuru and Nairobi River- 10km.
   - Duplication of Parklands Trunk Sewers - 4km.
   - Extension of Parklands Trunk Sewers - 2km.
   - Extension of Karen Trunk Sewer - 8km.
   - Gitathuru Trunk Sewer Extension/Duplication to Kitusuru - 4km.
   - Ruiruaka River Trunk Sewer Extension to Ruaka - 3.5km.

- Old Airport Road (Utawala Area) Trunk Sewer Extension -5km.
- Upgrading Milimani Chiromo Trunk Sewers - 8km.
- Extension of Umoja Trunk Sewer from Umoja to Saika -5km.
- Riruta South Trunk Sewer Extension - 3km.
- Mathare River Trunk Sewer Extension - 3Km.
- Extension of South Nairobi Dam Trunk Sewer – 2km.
- Ngara Trunk Sewers – 10km

2. Construction of 190 Km lateral and reticulation sewers. This will include:

- Karen Reticulation - 10km.
- Dagoretti - 5km.
- Embakasi Reticulation - 10km.
- Mihango Reticulation - 10km.
- Embakasi Reticulation - 20km.
- Mihango Reticulation -10km.
- Kilimani Reticulation – 10km.
- Kileleshwa Reticulation – 10km.
- Upper Hill – 10km
- Westlands Sewer Upgrade – 10km
- Eastleigh Sewer Upgrade – 10km
- Tassia 1 & 2 Reticulation – 10km
- Umoja Innercore Reticulation – 10km
- Kariobangi South – Umoja III – 10km
- Kangemi Reticulation – 5km
- Mathare North and Huruma Reticulation – 10km
- Thome / Garden Estate- 10km
- Babadogo / Lucky Summer – 10km
- Maili Saba – 10km
- Marurui – 10km
- Mountain View – 5km
- Marura – Kariobangi North – 10km
- Satellite Reticulation – 5km

3. Construction of anaerobic, facultative, and maturation ponds at DESTP site to convert Kiu River pumping system to Ponds.

As part of the utilization of the uncommitted funds under the program, AWWDA is implementing the sewerage infrastructure project in the East and West of Nairobi (as Lot 4) including Karinde, Mutuini, and Karen areas. Lot 4 comprises the Construction of:

- 126km of reticulation sewers with diameters ranging 160mm-600mm.
- 3000 nr Household sewer connections
- Securing of Karen Waste Water Treatment Plant and site ancillary works.

During the design review of the project under this Lot 4 on the sub project; Construction of East and West of Nairobi reticulation Sewers, an additional trunk within the Karen area was proposed. This trunk was not part of the initial ESIA report thus necessitating this ESIA comprehensive Project report. The trunk sewer is known as the Motoine trunk sewer which is approximately 11.85km along the Motoine River with pipes ranging from 400-600mm in diameter, Laterals Sewers of diameters 250mm and 300mm, and 3000 household connections along the constructed sewers.

In line with the requirements of the Environmental Management and Coordination Act, Amendments (2015) and (2019), this Environmental Impact Assessment (EIA) study was undertaken to identify the possible impacts that would arise as a result of the activities of the proposed construction of the Motoine Trunk Sewer and associated lateral sewers and household connections on both the natural and social environment and to design measures that would mitigate the impacts.

1.2 Project Proponent

The project is being implemented by the Athi Water Works Development Agency (AWWDA) herein referred to as the Proponent.

AWWDA is one of the nine Water Agencies under the Ministry of Water, Sanitation & Irrigation created to bring about efficiency, economy, and sustainability in the provision of water and sewerage services in Kenya.

1.3 Project Justification

1.3.1 Socio-Economic Environment

A very small section of the Karen project area, around the Karen Shopping Center, is served by a sewerage system. The network is approximately 1.16km serving about 1.72% of the project area. The rest of the Karen area is served by on-site sewage management systems. This has led to the pollution of rivers and underground water sources.

Problems with the existing wastewater management system in Karen areas include, but are not limited to, the following;

- The area is characterized by poorly drained black clayey soils not suitable for onsite sewage treatment practices commonly used all over the project area.
- A rapid growth in housing density has necessitated the need for a municipal sewerage system.
- A large number of shopping malls, schools, public and private universities, hospitals, museums, and government institutions are located in the area. Sewage from these establishments would best be managed through a municipal sewerage system. Institutions such as the National Defence University, African International University, Karen Christian College, Nairobi Waldorf Schools, Mutuini Primary School, and West Nairobi School; and

the Karinde high-density area will be served through this proposed Motoine River trunk sewer. An effective sewerage system for Nairobi will assure the city place as an international social, administrative, cultural, and economic centre amongst other great cities of the world.

- The existing Karen Sewage Treatment Plant is located in the middle of a residential and commercial centre and generates a lot of odour, especially during the daytime.
- Effluent from the onsite sewage treatment methods in practice in the area drains into the nearby water bodies polluting water dams inside the Nairobi National Park that are used as watering points for the wildlife.
- Athi Water Works Development Agency is currently undertaking a water supply project in the area. As such, with improved water supply services, wastewater generation rates are expected to increase requiring an improved sewage management system.

1.3.2 Project Water Demand and Wastewater Generation Rates Estimates

The Nairobi population is projected to grow exponentially. With the burgeoning population, the water demand is expected to increase and consequentially an increase in the rate of wastewater generated. It is therefore imperative to implement the proposed Motoine Trunk sewer as a measure of mitigating potential environmental degradation.

The estimates of the water demand and the sewage flow in the various design horizons are as shown in the following tables;

Table 1.1: Water Demand Estimates

	Water Demand (m^3/day)		
	2025	**2035**	**2045**
Residential	11,581.58	15,869.56	21,121.20
Institutional	1,158.16	1,586.96	2,112.12
Commercial	1,737.24	2,380.43	3,168.18
Non-Revenue Water	5,501.25	6,744.56	7,920.45
Total	**19,978.23**	**26,581.51**	**34,321.95**

Table 1.2: Average Dry Weather Sewage Flow Estimates

	Sewage Flows (m^3/day)		
	2025	**2035**	**2045**
Flows from Residential	9,844.34	13,489.13	17,953.02
Flows from Institutional	926.53	1,269.56	1,689.70
Flows from Commercial	1,389.79	1,904.35	2,534.54
Flows from NRW	3,850.88	4,721.19	5,544.32
Infiltration/Inflow	2,401.7	3,207.6	4,158.2
Total	**18,413.3**	**24,591.9**	**31,879.8**

1.3.3 Improved Sanitation

The number of households is estimated to be 2,298 households to benefit from this proposed trunk sewer extension and related reticulation sewers. The project will improve the sanitation in the project area by providing an improved sewer network coverage that will collect the raw wastewater, and generally that which is currently discharged in open channels and nearby rivers. This will result in a significant reduction of water-related health issues.

The project will have significant inherent environmental benefits by reducing the amount of untreated sewerage discharged into the environment and Nairobi rivers, thus contributing to improving sanitation. This will result in cleaner rivers and improved groundwater quality. The project will benefit the targeted area by eliminating the use of septic tanks and the associated cost.

1.3.4 Reduction of Waterborne Diseases Health Risks

Health risks associated with exposure of residents to improperly drained sewage in their surroundings will be significantly reduced. Waterborne diseases resulting from possible microbial pollution of drinking water obtained from contaminated shallow wells, or through suction of contaminated water with sewerage in water supply pipes will be drastically reduced.

1.3.5 Improved Standards of Living

There will be improved living conditions that would contribute to alleviating poverty conditions through employment opportunities in the operation phase of the project. Economic benefits will also be felt by saving money that would otherwise have been used on healthcare expenses from improper sewerage systems.

Improved state of sanitation and hygiene in the target areas will have overall effects on acceptable habitation and an aesthetic environment.

1.4 Scope of the ESIA Study

The study has been conducted to evaluate the potential and foreseeable impacts of the proposed development of the Motoine Sewerline. The physical scope is limited to the proposed site and the neighbouring environment as it may be affected by or may affect the proposed project. Any potential impacts, (localized or more generalized) are also evaluated as guided by EMCA, Amendments (2015 and 2019), and the Environmental (Impact Assessment and Audit) Regulations 2003.

1.5 Methodology

1.5.1 Screening

The project was screened in line with EMCA and the Environmental (Impact Assessment and Audit) Regulations 2003. Pursuant to Legal Notice 31 of 2019 amending EMCA, waste disposal works including sewerage works are classified as high-risk projects. Therefore, as required by Legal Notice 32 of 2019 (the Environmental (Impact Assessment and Audit) regulations, 2003) the new regulation 7 provides for the preparation and submission of Comprehensive Project Reports (CPR). Further in line with the funding agency AfDB, NarSIP II is categorized as a Category 1 project i.e., likely to induce significant and/or irreversible adverse environmental

and/or social impacts or to significantly affect environmental or social components that the Bank or the borrowing country considers sensitive, thus requiring an ESIA, and leading to the preparation of an ESMP.

1.5.2 Scooping Stage

Scoping was undertaken to decide on the critical issues of focus during the assessment. This stage mainly involved a review of relevant data and identification of possible areas of impact and recipients, project alternatives methodologies relevant to the project as well as who to consult. Accordingly, existing data including geological maps and infrastructure development reports of the project area and any other relevant information were reviewed. The identified issues were scrutinized against the available data.

1.5.3 Desktop Study

This included a documentary review of the nature of the proposed activities, project documents, design policy, and legislative framework as well as the environmental setting of the area among others.

1.5.4 Baseline Conditions

Both primary and secondary data were collected on physical, biological, and socio-economic baseline conditions within which the impacts of the Project were assessed. A site visit to the project area was undertaken to assess site characteristics and the environmental status of the surrounding areas to validate the baseline information obtained at scoping stage and determine the anticipated impacts. The general setup of the proposed project area, infrastructures, and socio-demographic characteristics were evaluated. Maps of the Project area were created and an inventory of the biological resources along the alignment corridor was collected and analyzed. The baseline information was gathered by a team comprising of physical, biological, and social experts in collaboration with the Kenya Forest Service foresters. The stakeholders including the community forest association and local administration were engaged in this process.

1.5.5 Public Consultation

Legislation on ESIA processes requires that members of the public be adequately consulted. To ensure adequate public participation in the ESIA process, stakeholder engagement meetings were held with various stakeholders and project-affected persons. Questionnaires were administered to several stakeholders within the project area including Karinde, Mutuini, and Karen, and the outcome from the responses received was subsequently synthesized and incorporated into the ESIA project report. Evaluation exercises on identifying various pipe alignment alternative routes were done together with the various stakeholders. The table below provides a schedule of stakeholder consultation meetings held.

Table 1.3: Schedule of Public Consultation Meeting.

	Target Group	**Date**	**Venue**	**Male**	**Female**	**Total**
1.	Karen- Langata District Association (KLDA)	30/08/2021	KLDA Office	6	5	11
2.	Karen Residents	09/09/2021	Kenya School of Law, Karen	23	13	36
3.	CFA Group	4/11/2021	Kenya Forest Service (KFS) Office, Lenana Road	13	7	20
4.	KFS/CFA Group and General Public	15/11/2021	KFS Office, Lenana Road	17	10	27
5.	Mutuini Community Group	18/11/2021	Saigon Field, Mutuini	19	8	27
6.	Karinde Community Group	23/11/2021	Bush Park Hotel, Karinde	12	5	17
7.	Ngong Road Forest Association	16/12/2021	Karen Chief's Office, Karen	13	12	25
8.	KFS and CFA	24/01/2022	AWWDA Office, Muthaiga	16	7	23
9.	Kenya Forest Service and Stakeholders	03/02/2022	Kenya Forest Service Office/ Proposed Alternative Routes/ Ngong Road Forest	12	4	16
10.	Kibera Administration and Project Affected Person	07/02/2022	Ngong River at Soweto, Kibera	8	2	10
11.	Kenya Forest Service Technical Committee	14/02/2022	Kenya Forest Service Office, Lenana Road.	12	7	19
12.	Kenya Forest and Stakeholders	16/06/2022	Ngong Road Forest- Section 1	11	4	15

	Target Group	Date	Venue	Male	Female	Total
Total Number of Stakeholders Consultation Meetings			12	162	84	246

Chapter 6 cover the public consultation process for the study report.

1.5.6 Impact Assessment Methodology

The environment and social impact identification and analysis were done using the Leopold matrix, a qualitative environmental impact assessment method developed in 1971 and used to identify the potential impact of a project on the environment and consequentially prepare a proper mitigation plan. The matrix is a grid that is used to identify the interaction between project activities, which are displayed along one axis, and environmental characteristics, which are displayed along the other axis. The identified impacts were analyzed to determine the impact probability, duration, timing, significance, the stakeholders and/or values affected, and the overall rating. This enabled development of appropriate and justified measures to mitigate negative impacts and enhance positive identified impacts. Details of the environmental and social risks identified are provided in Chapter 7.

The impact assessment matrix used is as tabled below.

Table 1.4: Impact Assessment Matrix

Item	**Impact Criterion**	**Effect consideration on the Environment**	**Classification of Impact**	
			Expression	**Description of Impact**
i.	Type of Impact	Will the impact be positive or negative?	Positive	A positive impact
			Negative	A negative impact
ii.	Likelihood of Occurring	Is the occurrence of the associated impact certain?	Certain	Will occur
			Unlikely	Unlikely
iii.	Duration	What time frame will the impact be felt or last?	Permanent	Permanent
			Medium	Beyond the construction period but not permanent
			Short term	It will end at the end of the construction period.

iv.	Timing	At what stage will the impact occur or be felt?	Immediately	Will occur upon starting project activities
			Near future	Near future
v.	Significance	How severe will the impact be?	Insignificant	Little impact
			Moderately Significant	Moderate impact
			Significant	High impact
			Very Significant	Very high impact
vi.	Extent	What is the area extent or coverage of the impact?	Project area	Effect confined to project area
			Surrounding Environs	Effect to be felt by surrounding areas
			Beyond Surrounding Environs	Effect to be felt within surroundings and beyond environs
vii.	Overall rating	How important is the impact in project design?	Insignificant	The impact is not substantial and needs no mitigation.
			Low	Impact of little importance and needs limited mitigation
			Moderate	The impact has influence and requires mitigation.
			High	Impact of great importance and mitigation is a must

1.5.7 Environmental Management Planning Stage

Recommendations on appropriate mitigation measures were drawn, based on the key impacts identified, through discussion, experiences from past similar projects, and assessment of land-use and socio-economic factors. An environmental management plan (EMP) was developed outlining key environmental aspects, appropriate action plans, responsibilities, time frames and monitoring indicators to ensure project components remain in conformance with applicable standards and mitigation measures are effectively addressing the predicted impact.

1.5.8 ESIA Report

In line with the requirements of the Environmental Management and Coordination Act, Amendments (2015 and 2019), an Environmental Impact Assessment (EIA) study was undertaken to identify the possible impacts that would arise as a result of the activities of the proposed projects on both the natural and social environment and to design measures that would mitigate the impacts.

The ESIA study report was prepared with a constant briefing with the client, the financier (AfDB) and the project committee inclusive of the stakeholders. The report will be submitted to NEMA as required by the law. The ESIA study report contains the following contents:

1. A Description of the Proposed Project Activities, Scope of Project, Design Concept, and Construction Materials;
2. Baseline Information defining the Geomorphology, Topography, Ecosystem, and Demography of the project area;
3. Justification for the Proposed Project;
4. Policy, Institutional, and Legal Framework;
5. Consultations and Public Participation;
6. Consideration of Alternatives;
7. Assessed Positive and Negative Impacts during Construction, Operational, and Decommissioning Phases;
8. Proposed Suitable Mitigation Measures; and
9. A Developed Environmental and Social Management and Monitoring Plan.

CHAPTER 2: PROJECT DESCRIPTION AND DESIGN

2.1 Project Location

The project location is in Nairobi, the administrative and commercial capital of the Republic of Kenya and the seat of the Government. Nairobi borders Kiambu County to the North and West, Machakos County to the East, and Kajiado County to the South. It is close to the Rift Valley. The Ngong hills are towards the west, Mount Kenya is towards the North and Mount Kilimanjaro is towards the southeast. The three major rivers traversing Nairobi include the Nairobi River, Motoine/ Ngong River, Ruaraka, Getathuru, and Mathare River. The project area is located in the South-West direction of the City's central business district. The topography of the Motoine river basin is of relatively high relief in the West reaching an elevation of 1,950m above sea level near the Motoine swamp and falling to 1,525m above sea level at the confluence with the Nairobi River (Krhoda, 2002).

2.2 Route Description

The sewer routes have been established taking cognizance of the following;

- Natural drainage patterns and ground slopes
- Utilities wayleave and reserves
- Other existing underground services.

The Main Motoine Trunk sewer has been provided at the lowest natural drainage levels in as much as it's permissible to enable ease of connections from both sides of the valleys.

The proposed trunk sewer (Use of the Motoine River Riparian Reserve through Ngong Road Forest - Option 1) is 11.85 km long with pipe diameters ranging from 400 mm to 600 mm.

The alignment of the trunk sewer is as described below:

i. 1.630km DN600mm. This section is partially in Kibera Informal settlement and section 4 Ngong Road Forest. It carries all flows from the entire project area
ii. 5.844km DN500mm. This section is entirely within section 4 of the Ngong Road forest up to the Ngong Road-Southern Bypass Interchange.
iii. 3.947km DN400mm. This section is approximately half in Section 1 of the Ngong Road Forest and the rest on the riparian reserve along the Motoine River up to Karinde.
iv. 429m cross-road from section 1 at the interchange to Sanctuary Section and from Sanctuary to Section 4.

Where the trunk sewer follows the riparian reserve, the alignment is approximately 6m from the river bank as much as it's possible. This, however, depends on the ground slopes to enable economical gravity flow.

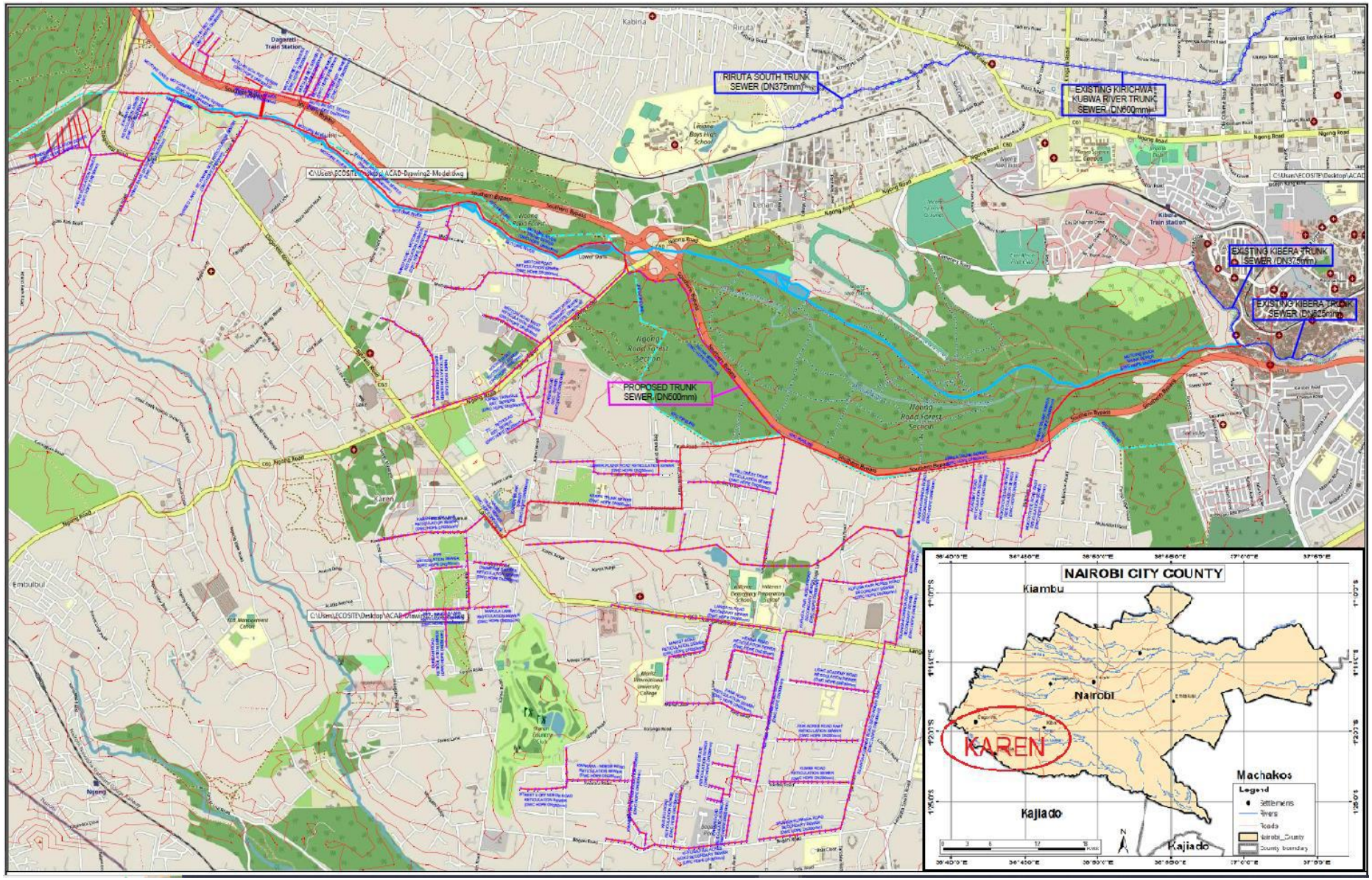


Figure 2.1: Project Location Map

2.3 Project Design Concepts

The project involves laying of 11.85 km long Trunk Sewer along the Motoine River riparian reserve through the Ngong Road Forest with pipes ranging from 400mm to 600mm in diameter. 8.78km of the length shall be within the Ngong Road Forest Sanctuary and 0.92km on the road reserve. The total length of the provided secondary and lateral sewers is approximately 34km with pipes ranging from 250 mm to 300 mm in diameter to collect the sewage within the project area and convey it to the trunk sewer.

2.3.1 Design References and Standards

Appropriate design criteria and technical parameters have been used in the design of this sewerage project.

The design of the sewerage system has been carried out based on the following Design Codes and Standards:

- *Ministry of Water and Irrigation – Practice Manual for Water Supply services in Kenya, 2005.*
- *BS EN 1916 Concrete Pipes and Fittings, Unreinforced, Steel Fibre, and Reinforced,*
- *BS EN 1917 Concrete Manholes and Inspection Chambers, Unreinforced Steel Fibre and Reinforced.* However, the above Eurocodes are still used in parallel with *BS 5911: Part 100:1988 – Specification for Unreinforced and Reinforced Pipes and Fittings with Flexible Joints,* as some parts of BS 5911 has not been covered by an equivalent BS EN.
- *BS 8005: Part 1:1987 Guide to New Sewer Construction.*
- *WHO Report No. 9 – Selection and Design Criteria for Sewerage Projects.*
- *Nairobi City Council Adoptive Standards for Infrastructure Works.*
- *Ministry of Public Works & Housing Manual for Civil Works Details – 1983*

2.3.2 Design Horizons

The design ultimate horizon for the project is the year 2045.

2.3.3 Construction Materials and Inputs

Most of the materials used in the project will be locally sourced from licensed dealers.

The materials to be used include:

i). Pipes

a) High-Density Polyethylene (HDPE) Pipes: The pipe materials have been selected taking into consideration availability, durability and cost. Circular High-Density Polyethylene (HDPE) pipes have been adopted in this design. HDPE pipes of diameter 400mm-600mm are recommended for the trunk sewer. They are resistant to corrosion and are stiff, endure higher heat, and are durable and sustainable. This translates to longer service life and long-term cost saving.

b) **Steel pipes:** They are recommended for all aerial crossings on river valleys, Class A and B road crossings, rail crossings, and deep sewers. Different pipe bedding types will be used depending on the nature of the ground.

ii). Pre-Cast Concrete Manhole Rings

Pre-cast concrete manholes of various diameters will be used with their spacing and sizing selected in accordance with the Nairobi City Adoptive Standards for Sewers. They will be provided at all changes of direction, changes of sewer levels, at every junction and throughout the systems at intervals sufficiently close, to simplify sewer cleaning during operation and maintenance.

iii). Equipment

Equipment used in the project implementation are: -

- Construction machines include machineries such as excavators, compressors trucks, concrete mixers, tools, and other relevant construction equipment.
- Pick-ups and trucks

2.3.4 Type of Sewerage System

The sewerage system has been designed in a way not expected to take any direct stormwater.
The sewerage collection system has been designed to carry sewage mainly composed of:

- Sewer from residential establishments,
- Sewer from commercial establishments such as shops, malls, offices, and hotels,
- Sewer from institutional establishments like schools, health facilities, and government institutions,
- Infiltration Inflow (I/I) to sewer lines and manholes

2.3.5 Construction Methods

The contractor shall submit a construction methodology statement before the commencement of work to the proponent for approval. The Contractor shall submit to the project engineer adequate data and samples of materials to use in the project work including methods of maintaining safety and compliance with the program for approval. Inspection works and tests will be carried out to ensure that materials and components are properly installed and that they will adequately fulfill the functional and performance requirements without creating a health risk.

The contractor shall apply a cut and fill method utilizing manual and mechanical modes of excavating trenches. The majority of the construction requires no special technical difficulties, apart from those allied to rock excavation in constrained wayleaves. Standard construction techniques currently employed in Kenya as described in the *Design References and Standards* will be utilized.

Due to the special regulation by the Roads Authorities, sewer crossing of all tarmacked roads has been proposed to be undertaken using trenchless technologies like micro tunneling and horizontal boring. Application to Kenya National Authority for approval for micro-tunneling at the Southern By-Pass has been made and granted.

2.4 Project Activities

The project phase determines the activities in question. Phases of the proposed project are:

2.4.1 Pre-construction Phase

Specific activities in this phase include:

- Site surveys or visits aimed at gathering the baseline data that would be useful in informing the design of the proposed project
- Project site screening
- Preparation of the designs
- Public participation and stakeholder engagement
- Environmental and social impact assessment (ESIA) of the proposed project
- Confirmation of trunk sewer routes through surveying.
- Pegging of trunk sewer route.
- Site clearance.
- Mapping of underground infrastructure.
- Relocation of underground infrastructure where necessary.
- Securing of relevant permits by the contractor such as road crossing permits, and waste collection licenses.
- Mobilization of machinery and equipment for use by the contractor
- Recruitment of the workers

2.4.2 Construction Phase

- Procurement of construction materials from approved dealers
- Transportation of construction materials using light machinery
- Appropriate storage of construction materials.
- Preparation of the grounds-this will involve excavation works to create space for laying of sewer pipes.
- Plumbing works to includes the installation of sewer pipes and connection to the existing sewer.
- Covering of the laid sewer lines and landscaping
- Reinstatement of work
- Disposal of the resulting debris/waste materials.
- All debris and excavated materials will be dumped on approved sites but should be recycled in the project as much as possible e.g. in backfilling
- Completion of the development and operation

2.4.3 Operation Phase

The sewers have been designed to be self-cleansing and should therefore require only routine maintenance once the system is fully operational. Manhole covers are specifically designed to be tight fitting to prevent ingress of sand, surface water, or deposit of solid waste.

2.4.4 Decommissioning Phase

Decommissioning is an important phase in the project cycle and comes as the last to wind up the operations of a particular project. Decommissioning of a sewer infrastructure includes the removal of hazardous materials and wastes, cleaning and removal of equipment, and decontamination and rehabilitation of a sewer system. The main purpose of decommissioning is to restore/ rehabilitate the infrastructure to acceptable standards. Future rehabilitation of the infrastructure shall be done in line with the principles of sound environmental management. The project has however been designed to be long-lasting.

2.5 Waste Generation

The proposed project will generate solid, liquid, and gaseous wastes during the construction, operation, and decommissioning phases. Whereas portable eco-mobile toilets will be used to dispose of human waste, solid waste will need to be properly managed to avoid attracting scavenging birds and animals.

Table 2.1: Waste Generation and Disposal Methods

Project Phase	**Activity**	**Byproducts and Waste**	**Disposal methods**
Construction Phase	- Excavation Works	- Spoil/ Excess Material - Vegetative matter, wood	- Spoil material will be disposed of at NEMA Licensed waste sites. - Materials can be donated to KFS to construct nature trails or boulders used as artefacts.
	- Project Activities - Clearance of pipe alignment corridor	- Organic wastes generated by workers' food remains - Non-biodegradable wastes including papers or plastics	- Waste bins will be placed in designated sections and collected by a licensed waste handler
	- Vehicle maintenance at the campsite garage	- Used oil from vehicles and machines	- Waste oil collected by NEMA licensed oil collectors.
	- Construction activities	- Wastewater	- Wastewater collected by NEMA licensed waste handlers
	- Transportation of material - Excavation works	- Dust emissions	- Dusty areas will be dewatered to emit dust

	- Construction activities		
Operation phase	- Maintenance activities	Solid waste	- Waste collected by NEMA licensed waste handlers
	- Manhole inspection and maintenance	Sludge	- Waste collected by NEMA licensed waste handlers
Decommissioning phase	- Decommissioning activities	Solid wastes, dust, noise, vibrations, etc	- Waste collected by NEMA licensed waste handlers

2.6 Land Requirement and Ownership

The project has been designed to utilize public wayleave. However, in the implementation of the project, efforts shall be made to minimize project impacts on people's property and source of livelihood. Where private property will be interfered with in order to acquire a wayleave for the project, a compensation action plan shall be prepared as a separate report based on AfDB guidelines, Kenyan law, and precedents established in Kenya. The procedure should incorporate objective assessment compensation, investigation, and analysis to determine the nature of each particular case.

2.7 Project Cost

The project cost is based on Option 1 (Use of the Motoine River Riparian Reserve through Ngong Road Forest) and is as provided in the table below.

Table 2.2: Project Cost

Construction Cost	**Amount (KShs.)**
Demolition and Site Clearance	254,795.00
Supply and Laying of Pipes	70,877,617.50
Pipework Ancillary Works (Manholes, Chambers, Crossings, Reinstatement, supports, and protection)	28,784,839.18
Rock Excavation	10,693,963.64
Pipework Miscellaneous Works (Testing, Connections)	531,250.00
Pumping Station and Associated Works	0.00
Sub-Total	**111,142,465.32**
Resettlement Costs	

Acquisition of wayleave for sewer (Rising Main – 330m long by 6m wide)	0.00
Temporary Loss of Livelihood	0.00
Sub – Total	**0.00**
GRAND TOTAL	**111,142,465.32**

The estimated cost of the proposed project based on Option 1 is Ksh. **111,142,465.32** (Kenya shillings one hundred and eleven million, one hundred and forty-two thousand, four hundred and six five and thirty-two cents). the client will hence pay 0.1% of this amount to NEMA Ksh. 111,142.47 (Kenya shillings one hundred and eleven thousand, one hundred and forty-two and forty-seven cents) being part of the EIA license application fee.

2.8 Contract Timelines and Contract for Construction of the Works

Tendering and award of the project have been carried out. The Sewerage Project is being implemented by the Athi Water Works Development Agency (AWWDA) with the assistance of the appointed Consultant who supervises and coordinates the construction of the sewerage works. As required under the International Federation of Consulting Engineers (FIDIC) Conditions of Contract, the following constitute the Construction team;

Table 2.3: Project Construction Team

Employer:	Chief Executive Officer, Athi Water Works Development Agency
Engineer:	Chief Manager, Water, and Sanitation - Athi Water Works Development Agency
Engineer's Representative:	Hankuk Consulting Engineers in Joint Venture with Ecosite Development Consultants
Contractor:	China Road and Bridge Corporation

A period of 6 months is envisaged for the execution of the construction works. After that, there will be a 12-month Defects Liability Period during which time the Contractor shall attend to any faults arising from the execution of the works.

CHAPTER 3: BASELINE INFORMATION

3.1 Geographical Location

The Motoine river basin extends from latitude 1° 17´ N to 1° 18´ N and longitude 36° 40´ E to 36° 55´ E within Dagoretti Sub-County, Mutuini Ward within the Nairobi County. The source of the river is the Motoine swamp near the Dagoretti forest. The Motoine river lies within the Ngong Road forest which is managed by the Kenya Forest Service and the Ngong Road Community Forest Association. The river basin is about 42.3 km long that flows into the Nairobi Dam before becoming the Ngong River.

3.2 Physical Environment

3.2.1 Topography and Geomorphology

The geology of the area traversed by the pipe alignment corridor proposed at the Ngong Road forest is dominated by widespread volcanic activity of the Cainozoic age Lavas and other pyroclastics that cover nearly the entire area. These lavas and pyroclastics overlie a foundation of folded and metamorphosed Precambrian rock of the Mozambique Belt. Superficial deposits are of Pleistocene and Recent Age (Saggerson, 1991). The rock beneath the Ngong Road and the Ngong forests is the Upper Athi Series, which is porous and permeable. This series is composed of sandy sediments, gravel or pebble beds, tuffs, and pyroclastic sediments.

The topography of the Motoine River basin is of relatively high relief in the West reaching an elevation of 1,950 m a.s.l near the Motoine swamp also referred to as Riu swamp near the Dagoretti forest and falling to 1,820 m a.s.l at the Bridge on the main Ngong road. The elevation falls further to 1,525 m a.s.l at the confluence of the Nairobi River (Krhoda, 2002). The upper part of the Athi catchment flows over the Upper Athi volcanic is porous and permeable thus allowing percolation and as a result, recharging the Motoine River. The Lower Athi volcanic further downstream of the study area weathers into clay materials and therefore less conducive as an aquifer.

The catchment generally gently slopes except along river valleys where slopes range from about 7% to 19%. Topographic characteristics influence drainage basin processes, and the character and extent of the channels affect sediment availability and the rate of water yield from the drainage basin. Sediments of the Motoine River vary from one point to the other along the river's course and between the wet and dry seasons.

3.2.2 Climate

The Motoine River basin falls under a wet climatic zone with a mean annual rainfall ranging from 1000 mm to 1200 mm (Monene, 2014). Long rains come from mid-March to mid-May and short rains during the months of November and December. The wettest month with long rain is in April, with average monthly rainfall of approximately 223 mm. November records the highest rainfall for the short rains at an average of 166 mm. The driest months are August and September. The basin has daily maximum temperatures ranging from 21.4°C in August to 25.6° C in March. Daily evaporation ranges from a minimum of 89mm in July to a maximum of 191mm in March (Monene, 2014).

3.2.3 Soil Characteristics of the Catchment

The Motoine River flows through part of the Nairobi area covered by deep soils and gravel. Areas underlain by ironstone soils with lithosols, the soils are gravelly whose clay content ranges from 60 % to 70%. Areas underlain by vertisols and vertic gleysols soil are composed of cracking clay, dark brown to very dark greyish brown soil, mottled and poorly drained (Kenya Soil Survey (KSS, 2013).

In places with calcareous slightly saline, deep, and stony subsoil exists (KSS, 2013). Soil characteristics influence the infiltration capacity of rainwater, soil water storage, and groundwater recharge through percolation into the aquifers which consequently becomes a base flow.

3.2.3 Hydrological Characteristics

The source of the Motoine River is the Motoine swamp in Dagoretti. The flow of the river is mainly sub-surface through the Ngong Forest. The Motoine river tributary runs from Dagoretti forest and joins the Ngong tributary within Kibera slums. From this point of confluence, the river then flows into Nairobi Dam, through Nairobi West area as Ngong River, across Mombasa Road it traverses through the Industrial area before joining Nairobi River. Motoine river runoff is slow due to the undulating nature of its water head. Discharge of the river varies from one point to another along its course (Monene, 2014). The flow of the Motoine river varies between seasons and flash floods, rising and falling rapidly after a rainfall event.

3.3 Biological Environment

3.3.1 Flora

The area of interest is dominated by scattered trees and shrubs due to the rocky ground. Trees identified in Section 1 of the Ngong Road forest include Oleaceae species (323 stems), croton megalocarpus (285 stems), podocarpus (6 stems), Juniperus procera (4 stems), Mauritius thorn (518 stems), Gliricidia sepium (1412 stems), Bamboo (46 stems), Panicum Trichocladum (44) (Ngong Road Forest Bio-data Inventory, KFS, 2021). Section 4 of the Ngong Road Forest (Sanctuary) is majorly composed of Acacia Xanthopholea, Clausena Anisata (157 stems), Croton megalocarpus (1232 stems), Olea (641 stems), Bamboo (40) which occupies a large swathe of the proposed alignment corridor (Ngong Road Forest Bio-data Inventory, KFS, 2021). Research shows that an increase in rock fragment content can be beneficial in rocky areas leading to soil nutrient accumulation and soil water storage and circulation which contributes to the growth of plants (Ying Zheng, 2021).

Riverine vegetations identified are mainly Typha and Cyperus sp with Napier grass in the surrounding drainage canals that are harvested and used as fodder for stall-fed animals and as construction materials (Monene, 2014).

3.3.2 Fauna

The forests act as habitats for many species of mammals and birds. Some of the common mammals found within the Ngong Forest include African hare, black-faced vervet monkey, bushbuck, dik-dik, sykes monkeys, hyenas, unstripped ground squirrel, black-tipped mongoose, and white-tailed mongoose and other mammals are found sparsely within the forest (Nature Kenya, 2004).

Among the identified reptiles includes green snakes, pythons, cobras, skaapsteker striped skink lizards, and Jackson's three-horned chameleons. They are various species of birds within the forest including the owls, hoopoe starling, African harrier hawk, trogons, crows, honeyguides, weavers, and crowned eagles. There are no species of biological conservation significant along the identified pipe alignment corridor.

3.4 Socio-Economic Environment

3.4.1 Project Demographics

3.4.1.1 Current Population

Nairobi City has a population of 4,397,073 (male 2,192,452: female 2,204,376) with a population density of 6,247 per kilometer square. The Motoine River Trunk Sewer and related reticulation sewers serve parts of the following two (2) sub-location within the Nairobi City County. About 59% of Mutuini Sub-Location in Dagoretti Sub-County. The current (2022) population to be served in this area is estimated to be 5,133 persons and is projected to increase to 10,151 persons by the project design's ultimate year (2045). About 36% of Lenana Sub-Location in Lang'ata Sub-County with a current population estimate of 2,181 persons and is projected to increase to 3,270 persons by 2045.

The following table shows the population, population densities, land areas and household numbers of the various sub-locations covered by the Karen Sewerage project based on the 2019 Kenya Population and Housing Census carried out by the Kenya National Bureau of Statistics (KNBS).

Table 3.1: Population of Karen Project Areas (2019)

Project Area (Sub-Locations)	**Population**			**Households**	**Area (km^2)**	**Population Density**
	Male	**Female**	**Total**			
Karen	4,343	3,781	8,124	3,234	23.1	352
Lenana	2,772	2,657	5,429	1,744	16.6	327
Lang'ata	7,142	6,072	13,214	4,132	17.5	756
Hardy	4,440	3,979	8,419	2,921	14.3	590
Bomas	13,719	14,874	28,597	8,642	120.2	238
Mugomo-ini	13,628	16,044	29,675	9,367	3.4	8,680
Mutuini	3,783	4,042	7,826	2,815	2.9	2,742
	49,827	**51,449**	**101,284**	**32,855**	**198**	**13,686**

3.4.1.2 Projected Future Population

Using the commonly used compounded growth with diminishing growth rates of 3.6%, 3.2%, and 2.9% up to the years 2025, 2035, and 2045 respectively, the population is projected to be 179,717 persons in the project's ultimate design horizon (Year 2045).

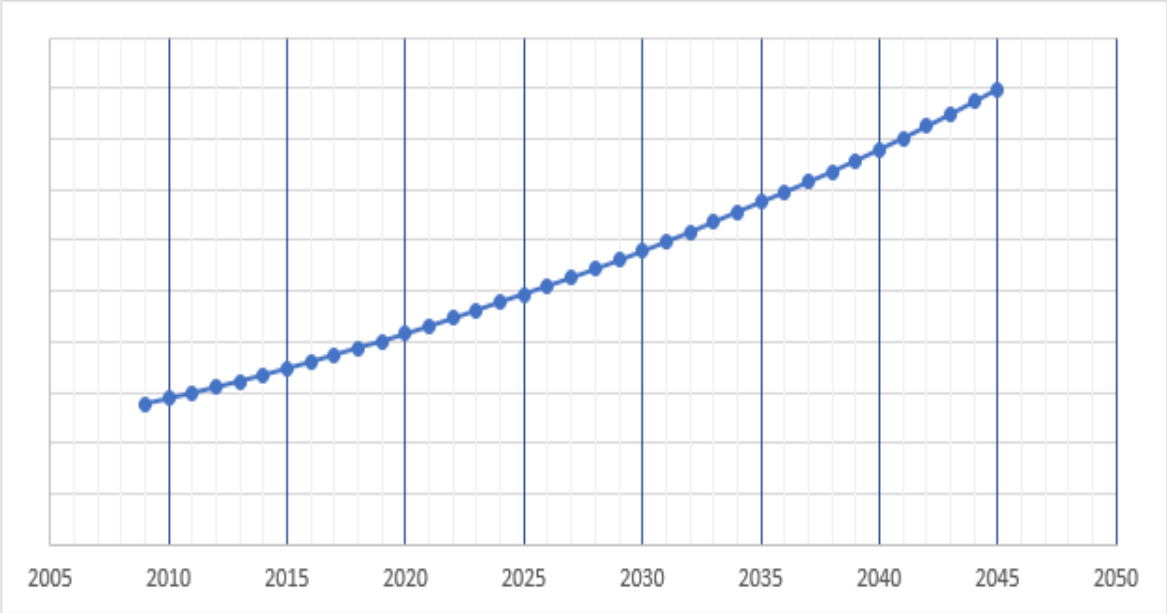


Figure 3.1: Population Projections up to the Project Ultimate Design Horizon

3.4.2 Solid and Liquid Waste Management

Solid waste management is a growing problem in Nairobi city. Increasing urbanization, rural-urban migration, rising standards of living, and rapid development associated with population growth have resulted in increased solid waste generation by industrial, domestic, and other activities. However, this increase has not been accompanied by an equivalent growth in the capacity to address the problem.

Nairobi County generates over 2400 tons of garbage per day and this is projected to reach 3200 tons by next year. Currently, only about 60% of generated waste gets to the final dumping sites. Approximately 10% of the waste is recycled with the rest 30% ending up in rivers and other undesignated dumping sites.

The proper management of waste has thus become one of the most pressing and challenging environmental problems in the city. Waste in the city comes from a variety of household, service, and industrial processes in the following proportions; Domestic sources contribute 68%; industrial waste 14%; roads 8%; hospitals 2%; markets 1% and 7% from other sources. Food waste, plastic, and paper are the most dominant forms of solid waste in Nairobi.

Many of the areas, that is Karinde, Mutuini, and Karen under this proposed project are characterized by lots of solid waste dumping along the rivers and open spaces. The implementation

of the proposed interventions will lead to decreased pollution in City Rivers leading to a clean environment and a reduction in the incidences of water-borne diseases.

Major challenges facing Nairobi County in managing Solid Waste include waste collection inefficiencies, transportation bottlenecks, and inadequate maintenance of disposal sites, among others.

Solid waste management in the project area is the responsibility of the County Government of Nairobi. All the municipal waste is normally collected by the County Government of Nairobi whilst all the domestic waste from residential areas is collected by private garbage collectors licensed by the County Government. After collection, the waste is transported to the Dandora dumpsite in Dandora, Nairobi for safe disposal. Whereas the waste should be managed by the county Government in partnership with private garbage collectors, incidences of inappropriate waste disposal are common in the area as waste is disposed of along the roads, open spaces and rivers or through open burning. The majority of the residents and business community in the area are not connected to a sewer system. The most commonly used form of sanitation is the onsite systems such as pit latrines for disposal of human waste and septic pits which are exhausted as need be. An overflow of the pit latrines renders the wastewater flowing on surface area and in some cases drained into the rivers. The insufficient sanitation services justify the need to implement the proposed Motoine Trunk Sewer. It is expected that any waste generated throughout the project cycles should be managed as per the guidelines of the County Government and NEMA waste regulations.

3.4.3 Land Tenure and Ownership

Land in Nairobi County is classified as freehold or leasehold land. An individual holds freehold land for an unspecified period while a leasehold is given by the government to an individual or organization over a specified period and is expected to remit rent to the government. Land ownership in the project area is freehold where the owners have title deeds.

The project site ownership for the proposed pipe alignment corridor was verified during the consultation where the community agreed that the proposed route is a public wayleave.

3.4.4 Land Use

Nairobi City has grown at a rate of 3.7% per annum since 2003 compared to 60% in the early 1960s (UNEP/ UNHABITAT/GOK/NCC, no date). The areas covered by wetland, bare ground, grassland, and forest have seen a remarkable decrease in the 37 years of record (Monene, 2014). This is mainly due to the burgeoning population and rapid economic development. The land is mainly used for livestock rearing, crop growing, forestry, and building –ups both commercial (in form of business premises, academic, institution, and health facilities) and residential. There are also Agents for various financial institutions such as Cooperative, Equity, and Kenya Commercial Bank. There are also several recreational facilities in the area such as hotels, pubs, and clubs.

The proposed project is designed to use public wayleave. Therefore, private land will not be utilized.

3.4.5 Administrative Setting

The project area is entire in Nairobi County. The targeted beneficially traverses two sub-location that is Mutuini Sub-Location in Dagoretti Sub-County and Lenana Sub-Location in Lang'ata Sub-County. The areas are sub-served by chief administrations and police posts including Mutuini police station, Karen police station, and Karen-Lang'ata chief camp.

3.4.6 Existing Infrastructure and Services

The project area has good communication, telecommunication, and road network.

3.4.6.1 Roads and Transportation

The Southern Bypass Road link to other parts of Kiambu and Nairobi Counties. There also exists an old railway line in the Dagoretti sub-county. The main mode of transport in the area is by public service vehicles (PSVs), especially the Nissan Matatu.

3.4.6.2 Communication Mode

The use of mobile phones in the area is prevalent and connectivity to the internet is good.

3.4.6.3 Water Services

Nairobi, the capital city of Kenya is a growing city and a major economic hub on the African continent. With an estimated population of over 4 million inhabitants, the provision of adequate and reliable quality water in an environmentally sustainable manner is one of the essential services required for the efficient running of the city.

The water supply in the project area is by Nairobi City Water and Sewerage Company (NCWSC) company which is supplemented by us boreholes and shallow wells that are sunk in the area. However, due to the increase in population, space for putting up shallow wells has been reduced due to the possible contamination from pit latrines and septic tanks. The quality of water from the existing boreholes is diverse with some having fresh water while others have a slightly high concentration of fluoride which often exceeds 1mg/l. This poses a threat to waterborne diseases and a public health concern. Hence, the need to implement the proposed sewer project to the reduction of onsite sanitation and waterborne diseases.

3.4.6.4 Health Facilities

The project area has both public and private health facilities. The project has four major hospitals including Karen hospital, Mutuini health centre, Dagoretti sub-county, and Mutuini hospital also locally referred to as CDF that offer both in-patient and out-patient services. There are, however, numerous private health facilities within the project area.

3.4.6.5 Energy

Households in the area use a combination of fuels. Energy sources used include biomass, fossil fuels, and electricity.

3.4.6.6 Education

Education is considered to be one of the greatest pillars /backbones of society/ community development. It helps a person to get knowledge and improve confidence level all through their life. It plays a greater role in career growth as well as in the personal growth.

National Defence University, African International University, Karen Christian College, Nairobi Waldorf Schools, Mutuini Primary School, West Nairobi School, Kirigo primary, and DR Muthiora Primary School are some of the educational facilities within the project area.

3.4.7 HIV/AIDS

HIV and AIDS is considered a threat to the development of Kenya. The national prevalence rate stands at 4.9 percent and in Nairobi County at 6.1 percent (KENPHIA) 2018). AIDS-related deaths are common and those mainly affected are within the productive age group of 15-49 years of age. The Kenya Population-Based HIV Impact Assessment (KENPHIA), 2018 reported that the number of HIV/AIDS orphans is on the increase. Poverty is viewed as a major cause of HIV/AIDS. Poverty increases the vulnerability of people with HIV/AIDS, hence there is a need to redirect resources towards support services for poor households. The situation is further aggravated by the fact that HIV/AIDS mostly affects people of productive age leaving minors and elderly people to take care of households. Progressive gains on poverty reduction may be reversed if concerted efforts are not urgently put in place to bring the HIV/AIDS pandemic under control. During the implementation process of the proposed project, HIV/AIDS training will be conducted to create awareness among the workers in the project area.

3.4.8 Gender and Social Equity

Gender integration in project activities still remains a challenge in many projects. This was observed during the public participation meeting where women's representation was generally low. The project aims to create conditions and opportunities that will integrate gender considerations into the project activities. Social equity will also be leveled through improved sustainable access to sanitation and by also improving the living conditions, health and safety, and the consequent reduction in the prevalence and spread of waterborne diseases.

CHAPTER 4: POLICY, LEGAL AND LEGISLATIVE FRAMEWORK

Environmental and Social Impact Assessment is an instrument for environmental management and development control. It is now accepted that development projects must be economically viable, socially acceptable, and environmentally sound. It is a condition of the Kenya Government for developers to conduct an Environmental and Social Impact Assessment (ESIA) on the Development Projects. This is necessary as many forms of developmental activities have the potential to cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

The following is an outline of the policy, legislative and regulatory framework for which the Proponent and the Contractor shall observe and implement to comply with Environmental Sustainability.

4.1 Policy, Legal and Institutional Framework

4.1.1 The Kenya Vision 2030

Kenya Vision 2030 is the current National Policy Economic Blueprint as a long-term development strategy for Kenya towards achieving a globally competitive and prosperous country with a high quality of life by 2030. Specifically, Vision 2030 aims at transforming Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens in a clean and secure environment. This is in line with the Sustainable Development Goals.

One of these aims is to make Kenya a nation that has a clean, secure, and sustainable environment by 2030. The transformation will be achieved by promoting and improving basic infrastructure and water services and sanitation facilities.

Relevance: This project is in line with the transformational agenda as it aims at improving the sanitation services in Karinde, Mutuine- Karen, and Nairobi environs through the construction of the sewerage project.

4.1.2 The National Environment Policy (NEP), 2013

The revised draft of the National Environmental Policy, 2013, sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources. The objective of the Policy is to develop an integrated approach to environmental management, strengthen the legal and institutional framework for effective coordination, and promote environmental management tools.

The core principles of the policy include a clean and healthy environment and a duty to safeguard and enhance the environment, the right to development in consideration of sustainability, resource efficiency, and economic, social, and environmental needs.

The policy promotes the use of EIA as an innovative environmental management tool. It also calls for the Government of Kenya (GoK) to ensure that all significant development projects are subjected to EIA and regular environmental audits.

Relevance:
The ESIA report and its ESMMP act as a first step in fulfilling the NEP requirements to ensure that ecosystems are not destabilized. The Project shall implement the Environmental and Social Management and Monitoring Plan (ESMMP) to mitigate the impacts of resulting impacts during the construction and operational phases of the project, this will ensure that the sensitive ecosystems are not destabilized by the subsequent Project activities.

The project will also be subjected to regular audits as prepared to promote sustainable development as envisaged in the policy.

4.1.3 The National Biodiversity Strategy, 2007

The overall objective of the National Biodiversity Strategy and Action Plan (NBSAP) is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity (CBD). It is a national framework of action to ensure that the present rate of biodiversity loss is reversed and the present levels of biological resources are maintained at sustainable levels for posterity. The general objectives of the strategy are to conserve Kenya's biodiversity to sustainably use its components; to fairly and equitably share the benefits arising from the utilization of biological resources among the stakeholders, and to enhance technical and scientific cooperation nationally and internationally.

Relevance:
The project has been guided by the policy principle of a participatory and consultative process involving all stakeholders in the conservation of biodiversity within Ngong Road Forest as Chapter 6 shows. Best practices in biodiversity conservation will be integrated into the development planning for sustainable resource utilization through participatory management practices.

4.1.4 The National Policy on Gender and Development Policy, 2019

The National Gender and Development Policy provides a framework for the advancement of gender equity and an approach that would lead to greater efficiency in resource allocation and utilization to ensure the empowerment of women. This is an adoption of the Kenya Government's commitment to implementing the Beijing Declaration and Platform for Action (PFA).

The National Policy on Gender and Development is consistent with the Government's efforts of spurring economic growth and thereby reduce poverty and unemployment, by considering the needs and aspirations of all Kenyan men, women, boys, and girls across economic, social, and cultural lines. It provides an avenue for gender mainstreaming across all sectors in order to generate efficient and equitable development outcomes.
The policy is also consistent with the Government's commitment to implementing the National Plan of Action based on the Beijing Platform for Action (PFA).

Relevance:
This policy will facilitate the needs and concerns of men and women in the project area. It guides the contractor in ensuring that all genders are given an equal opportunity during recruitment during

the construction phase and operation phases of the project. The contractor will also provide adequate sanitation facilities for all genders within the project site.

4.1.5 Big 4 Agenda

The Big Four Agenda is aligned with Kenya Vision 2030. The four pillars of the agenda include Food Security, Universal Health Coverage, Manufacturing, and Affordable Housing.

Relevance:

Kenya's Big 4 Agenda is quite relevant to the proposed project in many ways. The development of affordable houses consequentially results in the generation of wastewater. The sewer infrastructure will therefore provide a system of collecting the wastewater while conserving the environment.

4.1.6 National Land Use Policy, Sessional Paper No. of 2017

This Policy recognizes the central place of land in the production chain and addresses issues that relate directly to the use of land, its resources, and the perceptions held towards land. It incorporates measures and principles to guide all activities, whether proposed or ongoing, that may have a direct or indirect impact on the use of land and its resources. This Policy upholds the values of economic productivity, environmental sustainability, and the conservation of culture; and seeks to facilitate their protection and optimal use. The policy provides actions for addressing environmental problems such as the degradation of natural resources, soil erosion, and pollution. For the management of the urban environment, it provides guidelines to prohibit the discharge of untreated waste into water sources by industries and local authorities; it also recommends appropriate waste management systems and procedures, including waste and wastewater treatment, reuse, and recycling.

Relevance:

This Project aims at improving the management of wastewater before discharge to water sources serving other areas of downstream users. The policy goes further to advocate for environmental assessment and audit as a land management tool to ensure environmental impact assessments and audits are carried out on all land developments that may degrade the environment and take appropriate actions to correct the situation. The project shall take cognizance of the land use and its resources within the project area to ensure the project is environmentally and socio-economically sustainable.

4.1.7 Kenya Youth Development Policy, 2019

This Policy aims at ensuring that the youth play their role alongside adults in the development of the Country. The National Youth Policy visualizes a society where youth have an equal opportunity as other citizens to realize their fullest potential.

Relevance:

The proposed project will provide direct employment to the youth as required by the Policy.

4.1.8 National Water Policy, 2012

The Policy is built on the achievements of the sector reform commenced with the Water Act and based on the sector principles lined out in the National Water Policy 1999. In water resources management, the policy seeks the management of water resources along natural catchment/basin boundaries following the Integrated Water Resource Management approach.

Relevance:

The project has mitigation measures to ensure that the water resources are protected and sustainably used for present and future generations. There is progressive restoration and protection of ecological systems and biodiversity of the Motoine river.

4.1.9 National Climate Change Response Strategy, 2010

The strategy paper recognizes that Kenya is a water-scarce country and offers a variety of strategies for ensuring that the resource is utilized in ways that recognize that it is a finite resource. The paper also argues that interventions in the water sector should take a participatory approach involving different water users including gender groups, socioeconomic groups, planners, and policymakers in water resource management (Kenya, 2010: 53).

Relevance:

Strategies for mitigating climate change have been considered in this project.

4.1.10 Public Health (Prevention, Citation. Control, and Suppression of COVID-19) Rules, 2020

This is captured in Legal Notice 49 of 2020. The rules require that in the wake of the Corona Virus Disease 2019 (COVID – 19) pandemic that has ravaged the World over, Kenya has not been spared. COVID-19 has affected the health, economic and social status of Kenya‘s population. In line with its mandate, Kenya Law has kept track of the various directives and legislation that the government has passed in tackling the COVID-19 pandemic. The various presidential addresses on the state of interventions to cushion Kenyans against the economic effects of COVID – 19 have had tremendous implications on legislative reforms in Kenya.

Relevance:

The contractor will ensure full compliance with Covid-19 Protocols during the entire project life.

4.1.11 The National Environmental Sanitation and Hygiene Policy, 2007

The Policy is devoted to environmental sanitation and hygiene in Kenya as a major contribution to the dignity, health, welfare, social well-being, and prosperity of all Kenyan residents. The Policy recognizes that healthy and hygienic behavior and practices begin with the individual.

Relevance:

The implementation of the Policy will greatly increase the demand for sanitation, hygiene, food safety, improved housing, use of safe drinking water, waste management, and vector control at the household level and encourage communities to take responsibility for improving the sanitary conditions of their immediate environment.

4.1.12 National Policy for Prevention and Response to Gender Based Violence (GBV), 2014

The overall goal of this National Policy is to accelerate efforts toward the elimination of all forms of GBV in Kenya. The Policy Goal is to be realized as laid out in the key objectives which seek to ensure; a coordinated approach to addressing GBV and effective programming; enhanced enforcement of laws and policies towards GBV prevention and response; increase in access to quality and comprehensive support services across sectors; and improved sustainability of GBV prevention and response interventions.

Relevance:

Provisions of this policy will be adhered to during the project implementation phase. A Gender-Based Violence awareness training will be conducted.

4.1.13 National Gender and Development Policy, 2019

The goal of the policy is to "achieve gender equality and women's empowerment in national development so as to enhance participation of women and men, boys and girls, vulnerable and marginalized groups for the attainment of sustainable development". The policy sets, legislative and administrative measures to address the existing gaps in the realization of gender equality and women's empowerment. This Policy aims at achieving equality of opportunity and outcomes with respect to access to and control of national and county resources and services; and equality of treatment that meets the specific and distinct needs of different categories of women and men.

Relevance:

This Policy will be referred to during Project implementation especially during the hiring of staff to be involved in the Project, procuring of suppliers, sub-consultants and sub-contractors for the Project

4.2 Legislative Framework

4.2.1 The Constitution of Kenya, 2010

The Constitution of Kenya is the supreme law of the Republic and binds all persons and all State organs at all levels of government. The Constitution provides a broad framework regulating all existence and development aspects of interest to the people of Kenya, along which all national and sectoral legislative documents are drawn.

Article 42 states that every person has the right to a clean and healthy environment. The constitution guides steps that may be taken in case of any infringement on these rights. In addition, it provides for the establishment of systems for carrying out an environmental impact assessment, environmental audit, and monitoring of the environment. In addition to the protection of the environment, the constitution states that the land in Kenya belongs to the people of Kenya collectively as a nation. The constitution classifies the land in Kenya into different categories. These categories will dictate whether compensation will be required for the acquisition of a wayleave. Among public land, categories include:

- Government forests other than forests to which Article 63(2)(d)(i) applies,
- Government game reserves, water catchment areas, national parks,
- Government animal sanctuaries, and specially protected areas,

- The land between high and low watermarks, all roads and thoroughfares.
- All rivers, lakes, and other water bodies as defined by an Act of Parliament;
- Any land not classified as private or community land under this Constitution

Part II of Chapter 5 of the Constitution (Environment and Natural Resources), (I) the State undertakes to carry out the following:

- Ensure sustainable exploitation, utilization, management, and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
- Work to achieve and maintain a tree cover of at least ten percent of the land area of Kenya;
- Protect and enhance the intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
- Encourage public participation in the management, protection, and conservation of the environment;
- Protect genetic resources and biological diversity;
- Establish systems of environmental impact assessment, environmental audit, and monitoring of the environment;
- Eliminate processes and activities that are likely to endanger the environment; and
- Utilize the environment and natural resources for the benefit of the people of Kenya.

Part (II) "Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Relevance:

The proposed project is a key development activity that touches on components of the physical and natural environment and therefore this ESIA and its clearly stipulated environmental and social management and monitoring plan (ESMMP) is a step towards mitigating potential adverse effects on the environment. The constitution also calls for the duty given to the Project proponent to cooperate with State organs and other persons to protect and conserve the environment as mentioned in Part II.

4.2.2 The Environmental Management and Coordination Act 1999, (2015 and 2019 Amendment)

The Act covers virtually all diverse environmental issues which require a holistic and coordinated approach towards its protection and preservation for the present generation without compromising the interests of the future generation to enjoy the same. Consequently, it provides for the legal regime to regulate, manage, protect and conserve biological diversity resources and access to genetic resources, wetlands, forests, marine, and freshwater resources, and the ozone layer to name a few.

EMCA accentuates the right of every person in Kenya to live in a clean and healthy environment and obliges each and every one to safeguard and enhance the environment. It is the master plan for

the environment in Kenya and contains a national environmental policy, environmental framework, legislation, and environmental strategy.

The Act gives power to the National Environment Management Authority (NEMA) which is a semiautonomous government agency mandated to exercise general supervision and coordination over all matters relating to the environment and to be the principal instrument of the Government of Kenya in the implementation of all policies relating to the environment. NEMA is the body in charge of ensuring developments adhere to the policies and frameworks set out by the Authority.

EMCA empowers stakeholders to participate in the sustainable management of natural resources. It calls for Environmental Impact Assessment (EIA) (under Section 58) to guide the implementation of environmentally sound decisions.

Relevance:

It is under this provision that this environmental and social impact assessment study and the report were undertaken. The proponent shall ensure that the main contractor adopts and implements all possible cleaner production methods during the construction phase of the project. During the construction phase of the project, the proponent shall ensure that the main contractor implements the measures stipulated in the ESMP as necessary to enhance sound environmental management and coordination.

The Act has several regulations that aid in its implementation; the relevant regulations are highlighted in the sections below.

4.2.2.1 The Environmental (Impact Assessment and Audit) Regulations, 2003 and Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2016, 2019

These Regulations stipulate the importance of conducting an ESIA as well as the procedure necessary. The ESIA study will be conducted before the implementation of the proposed development; and the reports will be subject to approval by NEMA, which will provide a license after its review.

The regulations also call for Environmental auditing and monitoring that will be carried out during the construction or operation of the sewerage infrastructure, the regulations provide the format of the audit report which will be provided to NEMA.

Relevance:

The proponent has undertaken an environmental impact assessment for the proposed project before commencement which has been accomplished by this ESIA report. The report meets the requirement of CPR as stipulated in the 2019 Amendment vide legal notice 32.

4.2.2.2 The Environmental Management and Coordination (Water Quality) Regulations, 2006 Legal Notice No. 120

These Regulations were published in the Kenya Gazette Supplement No. 68, Legislative Supplement No. 36, and Legal Notice No. 120 on 29th September 2006. The Regulations provide for sustainable management of water resources including prevention of water pollution and protection of water sources such as lakes, rivers, streams, springs, wells, and other water sources.

It is an offense under Regulation No. 4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution. Regulation No. 11 further makes it an offense for any person to discharge or apply any poison, toxic, noxious, or obstructing matter, radioactive waste, or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment.

Relevance:
The proponent shall ensure that all relevant water resources and the environment are not polluted by both liquid and solid wastes. Wastewater and solid waste generated during the construction period shall be collected by a NEMA-licensed waste handler and disposed of at approved designated sites.

4.2.2.3 The Environmental Management and Coordination (Waste Management) Regulations, 2006 Legal Notice No. 121

These Regulations provide details on the management (handling, storage, transportation, treatment, and disposal) of various waste streams including domestic waste; Industrial; hazardous, and toxic waste; pesticides and toxic substances; biomedical wastes; and radioactive waste.

Regulation No. 4 (1) makes it an offense for any person to dispose of any waste on a public highway, street, road, recreational area, or in any public place except in a designated waste receptacle. Regulation 5 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal. Regulation 6 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated and they include:

1. Improvement of the production process through;
2. Conserving raw materials and energy;
3. Eliminating the use of toxic raw materials and wastes;
4. Reducing toxic emissions and wastes;
5. Monitoring the product cycle from beginning to end by identifying and eliminating potential negative impacts of the product;
6. Enabling the recovery and re-use of the product where possible,
7. Reclamation and recycling; and
8. Incorporating environmental concerns in the design and disposal of a product.

Regulation 20 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment.

Relevance:
The proposed project, during the construction phases, will generate wastes that will need to be disposed of as per the guidelines in the regulations. The Contractor will have to meet the requirements of the regulations, by providing solid waste sorting and transportation using a

licensed transporter who will dispose of the waste to the designated receptacle. The contractor shall implement these regulations for all categories of waste as provided.

4.2.2.4 The EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

Enacted as Legal Notice No. 61, these Regulations determine the level of noise that will be permissible, in particular during the construction phase; the following factors will be considered:

- Time of the day;
- Proximity to residential area;
- Whether the noise is recurrent, intermittent, or constant;
- The level and intensity of the noise;
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
- Whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise.

These regulations are summarized in the table below as stipulated in the second schedule of these regulations:

Table 4.1: Noise Level Permitted

	Facility	Maximum Noise Level Permitted in Decibels	
		Day	Night
1.	Health facilities, educational institutions, homes for disabled etc.	60	35
2.	Residential areas	60	35
3.	Areas other than 1 and 2 above	75	65

Regulation 14 (3) provides that the contractor shall ensure that the vibration levels do not exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source.

Relevance:

Where some of the construction activities are bound to make some level of noise, the contractor will make plans to minimize or eliminate adverse construction, noise, or vibration impacts generated from construction machinery in line with the guidelines provided in these regulations. This includes undertaking construction works between 8:00 A.M and 5:00 P.M.

4.2.2.5 The EMCA (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006

Part II of Regulations, section 4 states that no person shall engage in any activity that may have adverse impacts on ecosystems, lead to the introduction of exotic species or lead to unsustainable use of natural resources without an EIA license. The regulation puts in place measures to control

and regulate access and utilization of biological diversity that include among others banning and restricting access to threatened species for regeneration purposes. It also provides for the protection of land, sea, lakes, or rivers declared to be a protected natural environmental system in accordance with section 54 of EMCA, 1999.

Relevance:
The contractor will ensure reforestation and revegetation are done with appropriate plant species in consultation with KFS. A biodiversity data record of species affected was done in consultation with KFS.

4.2.2.6 The Environmental Management and Coordination (Air Quality) Regulations, 2014

The objective of this regulation is to prevent, control and abate air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including mobile sources such as vehicles. Regulation 5 (1) prohibits the contractor from acting in a way that directly or indirectly causes or may cause air pollution to exceed levels set out in the Second Schedule to the Regulations. Regulation 11 provides that the contractor shall not cause pollution in a controlled area as listed under the Sixth Schedule to exceed the limits stipulated under the First Schedule. It provides guidelines on mobile emission control as stipulated in the twelfth schedule on "Acceptable Mobile Emission Control Technologies".

Relevance:
The contractor shall limit the trips of vehicles on the road and ensure stockpiling or storage of material is done in a manner likely not to cause air pollution. Vehicles will also be well maintained to reduce emissions while water spraying while working in dry areas will reduce the dust menace.

4.2.3 The Water Act, 2016

This Act provides for the regulation, management and development of water resources and water and sewerage services. Section 11 gives power to the Water Resource Authority set guidelines on water use from rivers or watercourses and groundwater and stipulates that a permit is required in all cases of proposed diversion, abstraction, obstruction, or storage.

Pollution of water resources is prohibited in Part VIII, section 143 of the Act. Any rubbish, dirt, refuse, effluent or any other offensive matter shall not be allowed near or in water resources. Section 144 states that a person who pollutes will be required to clean up the pollution caused or remedy any harm caused.

Relevance:
This Act shall be relevant during both the construction and operation phases of the Project whereby the contractor and proponent shall ensure that all relevant water resources are not polluted from both liquid and solid wastes. Demarcation of the riparian corridor for easement of work shall be conducted by Water Resource Authority (WRA) prior to the start of works.

4.2.4 The Employment (Amendments) Act, 2022

The Act declares and defines the fundamental rights of employees, provides basic conditions of employment for employees, and regulates the employment of children. The act provides the basic minimum conditions for employment to include hours of work, water (for use at the place of work), food, and medical attention. It promotes equality of opportunity in employment to eliminate discrimination in employment.

Relevance:

At the construction stage, the project contractor will hire both full-time and casual staff and the prevailing basic minimum conditions of employment will have to be observed. The contractor will ensure that persons of age are employed to prevent child labour.

4.2.5 The Occupational Health and Safety Act, (OSHA 2007).

This legislation provides for the protection of workers during the construction and operation phases. It is tailored to the implementation of the EHS plan in compliance with the relevant sections of this Act. The ESMP prepared under this assessment has provided for specific health and safety aspects to be complied with during the implementation of the project.

Relevance:

The Contractor will be required to safeguard the welfare of project workers as stipulated in the Act and to comply with all provisions of the Act. The contractor will register the construction site(s) as a workplace with the directorate of occupational safety and health services under the Ministry of Labour, Social Security, and Services as required.

The contractor will provide PPE to all workers, will provide first Aid kits, and train workers on safety and compliance with COVID -19 protocols of wearing masks, regular washing of hands, maintaining social distance, and using of thermo-gun to measure temperature during entry to the site.

The contractor shall form a safety and health committee to oversee safety and health on site while construction activities onsite are ongoing.

Overall, the ESMP will be provided to the contractor to use to develop a Contractor-ESMP to guide mitigation against occupational hazards.

4.2.6 The Public Health Act, (CAP. 242)

Part IX Section 8 & 9 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Any noxious matter or wastewater flowing or discharged into a watercourse is deemed as a nuisance. Part Xll Section 136 states that all collections of water, sewage, rubbish, refuse and other fluids which permit or facilitate the breeding or multiplication of pests shall be deemed a nuisance The Act addresses matters of sanitation, hygiene, and general environmental health and safety.

Relevance:

This Act will govern the Contractor's activities on-site including ensuring the health and safety of employees including providing personal protective equipment (PPE) and health services when it comes to venereal diseases.

4.2.7 The Forest Conservation Management Act, 2016

Section 8 of the Forest Act mandates the Kenya Forest Service (KFS) to conserve, protect and manage all forests; receive and consider applications for licenses or permits in relation to forest resources or management of forests or any other relevant matter in accordance with the Act; collaborate with relevant persons in identifying research needs and applying research findings in relation to the forest; manage water catchment areas in relation to soil and water conservation, carbon sequestration and other environmental services in collaboration with relevant stakeholders.

Section 49 grants a community forest association permission to participate in the management or conservation of a forest. It also sets out the roles and responsibilities of communities in managing forests.

Relevance:

The act is important because the project will affect Ngong Road forest resources by clearing vegetation along the alignment corridor. Identified existing road access provided by KFS and CFA will be used to deliver the project materials including pipes. Mitigation measures shall be put in place to reduce negative impacts on the forest. The KFS in collaboration with the Ngong Road Forest Association, a community forest association will identify appropriate trees and plants for reforestation and revegetation of the project-affected areas.

4.2.8 The Wildlife Conservation and Management Act, 2013

Section 26 (1) of this Act provides that conservation, protection, and management shall conform with the provisions of the Environmental Management and Coordination Act. Section 27 provides that any activity must comply with the environmental, cultural, economic, and social impact assessment license under the Environmental Management and Coordination Act, 1999.

Relevance:

There is no identified threatened wildlife recorded and reported during the evaluation exercise. However, the mitigation measures shall be adhered to restore the ecological integrity for enhanced wildlife conservation.

4.2.9 The HIV and AIDS Prevention and Control Act, 2006

This is an Act of Parliament to provide measures for the prevention, management, and control of HIV and AIDS, provide for the protection and promotion of public health and the appropriate treatment, counseling, support, and care of persons infected or at risk of HIV and AIDS infection, and for connected purposes.

Relevance:

The Contractor will make provision for Voluntary Counselling and Testing (VCT) services for employees and locals, as well as conduct training on HIV/AIDS awareness. This will go a long way in ensuring the reduced risk of a new infection, and stigmatization of those already infected as well as management during the construction period.

4.2.10 County Government Act No.17 of 2012, Revised 2017

The proposed Project will be implemented within Nairobi County. Part II of the Act empowers the County Government to be in charge of functions described in Article 186 of the Constitution, (county roads, water, sanitation, health). It reiterates the role of the county government to control air and noise pollution, and other public nuisances from activities within their jurisdiction. This is necessary or desirable for the maintenance of the health, safety, and well-being of the inhabitants of an area. In addition, the Act covers matters of planning, placing the responsibility of planning within counties, and the development of various plans as outlined in Section 107 on the county government. This includes the County Integrated Development Plan (CIDP) and the County Spatial Plan (CSP). Sections 114 and 115 deal with planning for nationally significant projects in a county. These require a mandatory public hearing and public participation as well as the provision of clear and unambiguous information through clear environmental impact assessment reports.

Relevance:

The Project once complete will be handed Nairobi City Water and Sewerage Company (NCWSC) which is owned by Nairobi County Government for operation and maintenance. Public participation meetings were carried out in process of developing this ESIA study report.

4.2.11 Land in the Kenyan Constitution, 2010

The issue of land has informed major constitutional and administrative changes in the country and it is this fact that necessitated its inclusion in the Constitution of Kenya (2010) with it being given prominence in an entire chapter. Article 40 of the constitution is a fundamental part as far as the issue of land ownership is concerned. It guarantees the protection of the right to property; persons are entitled to acquire and own property of any description and in any part of the country. It also delimits the powers of the legislature by prohibiting any legislation that would arbitrarily deprive a person of property of any description or of any interest in, or right over, any property of any description or to limit, or in any way restrict the enjoyment of any right under this Article17 on the basis of any of the grounds specified or contemplated in Article 27 (4).

Chapter Five of the Constitution specifically addresses the land issue. It provides for both the institutional and legislative changes that are now being felt. Article 60 starts by outlining the principle of land policy.

These policies are to be implemented by a national land policy that is to be developed and reviewed regularly by the national government and then through legislation. This is reflected in the Ministry of Lands Sessional Paper No. 3 of 2009 on National Land Policy as to the principles that guided the formulation of the Policy document. It should be noted, however, that the land policy document was enacted before the Constitution of Kenya (2010) and thus the guiding principles were included in the Constitution of Kenya (2010) to give them a legal force Article 61(1) and (2) entrenches the fact that all land in Kenya belongs to the people of Kenya and goes further to give a classification of Land as public, community and private.

Public land under Article 62 is defined to include those from sub Article (a) to (n). Both the Land Act and the Land Registration Act refer to the definition given under the Constitution of Kenya (2010) to be the one to apply in each of the respective statutes. Public land is to be vested in the County Government and to be administered by the National Land Commission. It shall not be disposed of except in an Act of Parliament. Such disposition can be done through conversion where public land can be converted to private land by alienation, for instance. The Act of Parliament mentioned in the Constitution of Kenya (2010) is seen to be the Land Act. Community Land as defined in Article 63(2) of the Constitution of Kenya (2010) cuts across the four legislations as the definition given by the Constitution of Kenya (2010) is standard.

It is therefore noteworthy that all three land laws do not address the Community Land in depth for the Constitution provides that Parliament shall enact legislation to give effect to the provision on community land which has not yet been fulfilled. The lacuna in this legislation may end up paralyzing any transactions concerning this though. Private land, defined under Article 64 of the Constitution of Kenya (2010), forms the bulk of most of the legislation on land and the administration and registration are by far the most addressed in each of them. The constitution 2010 has categorized land into three namely:

4.2.11.1 Public Land

This is created under Article 62 of the constitution. Public land includes land previously held under the Government Lands Act; government forests, all minerals, lands transferred to the state by way of sale, reversion, or surrender, land that is without claimants, continental shelf, and exclusive economic zones inter alia. Section 42 of the Land Act gives the National Land Commission powers to on behalf of National and County governments allocate public by way of public auction to the highest bidder, public notice of tenders, application confined to a targeted group of persons or groups, public drawing of lots, public requests for proposals, public exchanges of equal value.

Relevance:

The proposed project is located on public land.

4.2.11.2 Private Land

Established under Article 64, this includes any land that is vested in a natural or artificial person, and any other land declared through an Act of Parliament. However, the constitution limits the extent of landholding by non-citizens, including the corporation. Non-citizens are barred from owning freehold land, and can only own leasehold land with a maximum term of 99 years. The Constitution 2010 has emphatically stated that: freehold land cannot be owned by a non-citizen of Kenya, and leasehold interest of over 99 years cannot be held by a non-Kenyan citizen. Thus, any freehold land owned by a nonKenyan citizen is converted into a 99-year leasehold interest commencing from 27/8/2010 and any leasehold interest with an unexpired term of over 99 years is deemed to be converted into a 99-year leasehold interest commencing from 27/8/2010. However, no procedure is in place for conversion of freehold title to leasehold so, for example, if before the coming into effect of the new Constitution a non-Kenyan citizen owned freehold land and you conduct a land registry search today the result will still show the non-Kenyan citizen as owning the land on freehold tenure. The Constitution deems a body corporate/company to be a Kenyan

citizen only if it is fully owned by Kenyan citizens. Section 13(1) of the Land Act states: "Where any land reverts to the national or county government after the expiry of the leasehold tenure the Commission shall offer to the immediate past holder of the leasehold interest preemptive rights to the allocation of the land provided that such lessee is a Kenyan citizen and that the land is not required by the national or the county government for public purposes. Section 12(6) of the Land Act states that on expiry or extinction of a lease granted to a non-citizen, reversion of interests or rights in or over land shall vest in the national or county government. Where any land reverts back to the national or county governments after the expiry of the leasehold the commission shall offer to the immediate past holder of the leasehold interest.
The proposed project is not within private land.

4.2.11.3 Community Land

Established under Article 63 of the constitution, Community land includes land currently under the Land (Group Representatives) Act; land currently classified as trust lands, community forests, land that is transferred to the community by any process of law, ancestral land, and lands traditionally occupied by hunter-gather communities inter alia. Community land is a new category of land explicitly created by the new constitution 2010. The term "community" would require a legal definition to allow the transfer of land that is currently forest, protected areas, or other public lands to such communities. Ethnicity may determine the community land however; Article 27 is prohibiting discrimination on the basis of ethnicity. Ancestral land too is not defined, nevertheless, it may be applied to any group or community which identifies itself as traditionally holding a specific area and which it has a legal claim as its own.
The proposed project is not located within community land.

4.2.12 The Land Act, 2012

It is the substantive law governing land in Kenya and provides a legal regime over the administration of public and private lands. It also provides for the acquisition of land for public benefit. The government has the powers under this Act to acquire land for projects, which are intended to benefit the general public.

Relevance:
The Project proposed will be implemented within government land and along riparian and road reserves.

4.2.13 The National Construction Authority Act, 2011

This Act assented on 2nd December 2011 but it commenced on 6th June 2012. The Act established and defines the powers and functions of a body known as the National Construction Authority (NCA). The overall responsibility of NCA is to oversee the construction industry and coordinate its development. Part 5 of the Act is on the functions of NCA among others: development, improvement, and expansion of the industry, research, standardization and improvement of construction materials, consultancy and advisory services, and registration of construction workers and supervisors. The Act also provides for the establishment of a National Construction Board and defines its composition and functions. One of the functions is to register various classes of

contractors as specified in its Third Schedule. A developer has to get an NCA certificate at a fee to comply.

Relevance:

The proponent is in the process of getting relevant certification for the project from NCA.

4.2.14 Physical and Land Use Planning Act, 2019

Section 29 of the aid Act empowers the local Authorities (now county governments) to reserve and maintain all land planned for open spaces, parks, urban forests, and green belts as well as land assigned for public social amenities. The same section allows for prohibition or control of the use and development of an area. Section 30 states that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant a license for commercial or industrial use or occupation of any infrastructure without development permission granted by the respective local Authorities.

Relevance to the Project

Thus the Act directs, regulates, and harmonizes the development and use of land over the Country, the entire pipeline route has been designed within the public reserve land. This is in an effort to avoid cases of acquisition of private property and resettlement complications.

4.2.15 The National Museums and Heritage Act, 2006

An Act of Parliament to consolidate the law relating to national museums and heritage; to provide for the establishment, control, management, and development of national museums and the identification, protection, conservation, and transmission of the cultural and natural heritage of Kenya; to repeal the Antiquities and Monuments Act (Cap. 215) and the National Museums Act; and for connected purposes.

Relevance:

The ESIA report considered identified Physical and Cultural Resources that would be affected by the project. There are no cultural resources affected by the proposed project.

4.2.16 The Standards Act Cap 496

The Act is meant to promote the standardization of the specification of commodities, to provide for the standardization of commodities and codes of practice; to establish a Kenya Bureau of Standards, define its functions and provide for its management and control.

Relevance:

Code of practice is interpreted in the Act as a set of rules relating to the methods to be applied or the procedure to be adopted in connection with the construction, installation, testing, sampling, operation, or use of any apparatus, instrument, device, or process.

4.2.17 Traffic Act Cap. 403 and the Traffic (Amendment) Act, 2022

PART V of the Act provides driving and other offenses relating to the use of vehicles on roads. The act provides explicit measures related to; Speed of motor vehicles, Penalties in relation to speed, driving under influence of drink, Driving on pavement, pedestrian walkways, Causing death

by driving or obstruction, Reckless driving, Signals, and signs to be obeyed, Condition of vehicles, Limitation of loads.

Relevance:

This Act will be cited in relation to the operation of plant and equipment on site. This act is enforced by the Traffic Police Department and the National Transport and Safety Authority (NTSA).

4.2.18 Environment and Land Court Act, 2011

Article 162 of the constitution provides for the creation of specialized courts to handle all matters on land and the environment. Such a court will have the status and powers of a High Court in every respect. Article 159 on the principles of judicial authority, indicates that courts will endeavor to encourage the application of alternative dispute resolution mechanisms, including traditional ones, so long as they are consistent with the constitution. Section 20, of the Environment and Land Court Act, 2011 empowers the Environment and Land Court, on its motion, or on the application of the parties to a dispute, to direct the application of alternative dispute resolution (ADR), including traditional dispute resolution mechanisms.

4.2.19 Labour Relations Act, 2012

An Act of Parliament to consolidate the law relating to trade unions and trade disputes, provide for the registration, regulation, management, and democratization of trade unions and employers organizations or federations, to promote sound labour relations through the protection and promotion of freedom of association.

Relevance:

This act will be applied by the labour force on site in addressing disputes related to working conditions.

4.2.20 HIV/AIDS Prevention and Control Act No. 14 of 2006, Revised in 2012

The objective and purpose of this Act are to promote public awareness about the causes, modes of transmission, consequences, and means of prevention and control of HIV and AIDS; and extend to every person suspected or known to be infected with HIV and AIDS full protection of his human rights and civil liberties.

Relevance:

The Act provisions will be applied during the Project implementation phase where the contractor will be required to create awareness among workers and the community at large as well as other measures such as the provision of condoms.

4.2.21 Sexual Offences Act, 2006

An Act of Parliament that makes provision for sexual offenses aims at prevention and the protection of all persons from harm from unlawful sexual acts and for connected purposes. Section 15, 17, and 18 focus mainly on sexual offenses against a minor (child).

Relevance:

In an effort to comply with provisions of this Act, the contractor will integrate SEA in job descriptions, employment contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle-blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated SEA focal points in the project and trained community liaison officers among other measures.

4.2.22 Children Act, 2022

This Act of Parliament makes provision for parental responsibility, fostering, adoption, custody, maintenance, guardianship, care, and protection of children. It also makes provision for the administration of children's institutions and gives effect to the principles of the Convention on the Rights of the Child and the African Charter on the Rights and Welfare of the Child.

Relevance:

Contractors implementing the various Project components envisaged under the Master Plan Study will be required to comply with provisions of the Act during Project implementation. The contractor will develop and implement a Children Protection Strategy that will ensure minors are protected against negative impacts associated with the Project including SEA. All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behavior.

4.2.23 Climate Change Act, 2016

The Acts provide for a regulatory framework for enhanced response to climate change; provide mechanisms and measures to achieve low carbon climate development, and for connected purposes.

Relevance:

Mitigation measures to reduce the release of greenhouse gases shall be adhered to. The contractor shall ensure that the vehicles are well maintained to avoid air pollution.

4.2.24 National Gender and Equality Commission Act, 2011

The over-arching goal for NGEC is to contribute to the reduction of gender inequalities and discrimination against all; women, men, persons with disabilities, the youth, children, the elderly, minorities, and marginalized

4.2.25 Work Injury Benefits Act (WIBA), 2007

This is an Act of Parliament to provide compensation to employees for work-related injuries and diseases contracted in the course of their employment and for connected purposes. An employee is a person who has been employed for wages or a salary under a contract and includes an apprentice or indentured learner. The proposed project will adhere to the provisions of this act throughout the construction period of the project.

It is an Act of Parliament to provide compensation to workmen for injuries suffered during their employment. It outlines the following:

- Employer's liability for compensation for death or incapacity resulting from the accident;
- Compensation in fatal cases;
- Compensation in case of permanent partial incapacity;
- Compensation in case of temporary incapacity;
- Persons entitled to compensation and methods of calculating the earnings;
- No compensation shall be payable under this Act in respect of any incapacity or death resulting from deliberate self-injury; and
- Notice of an accident, causing injury to a workman, of such a nature as would entitle him for compensation shall be given in the prescribed form to the director.

Relevance:

The contractor will need to abide by all the provisions of WIBA in managing the hazardous environment and according to injured persons, their dues in terms of shouldering the medical expenses or compensation of the families should there be a loss of life.

4.2.26 Energy Act, 2019

PART VIII provided for energy efficiency and Conservation of energy resources. the Act provides that factories and buildings and energy appliances by types, quantities of energy use, or methods of energy utilization for purposes of energy efficiency and conservation, as provided by the act safe handling of petroleum used by plant and equipment on site will be emphasized. Requirements for dealing in energy handling including safety are enforced by the Energy and Petroleum Regulatory authority (EPRA). EPRA will be instrumental in licensing the bulk storage of petroleum on site where necessary.

Relevance:

The contractor shall create awareness of energy conservation and management.

4.2.27 Penal code CAP 63

Section 191 of the Penal Code states that any person or institution that voluntarily corrupts, or foils water of public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offense. Section 192 of the same act says a person who makes or vitiates the atmosphere in any place to make it noxious to the health of persons/institutions in dwellings or business premises in the neighborhood or those passing along public way commit an offense.

Relevance to the proposed project:

The Proponent will be required to ensure strict adherence to the Environmental Management Plan throughout the project cycle in order to mitigate against any possible negative impacts.

4.2.28 Employment and Labour Relations Court Act, 2011

This is an Act of parliament that applies to all employees employed under a contract of service. It determines disputes relating to employment and labour relations and for connected purposes.

Relevance:

The Contractor will need to understand all the requirements of the Act during employment such as ensuring that employees are of the right age, entitlement to leave, and protection from discrimination and sexual harassment among others.

4.2.29 Sustainable Waste Management Act, 2022

The Act of Parliament establishes the legal and institutional framework for the sustainable management of waste and ensures the realization of the constitutional provision on the right to a clean and healthy environment. It provides for efficient use of resources and minimization of pollution by avoidance, reduction, reuse, repair, refurbishment, recycling, recovery, and final treatment for safe disposal.

Relevance:

The contractor shall ensure that the waste generated is sustainably managed. A NEMA-licensed waste handler shall be engaged to collect solid and liquid waste.

4.2.30 Eviction Wayleave and Rehabilitation Bill, 2014

The Bill though yet passed will provide for procedures for the evictions of unauthorized occupants from private or public land and the resettlement of displaced persons coerced or involuntary displaced. The Bill's main objective is to set out appropriate procedures applicable to evictions and resettlement, the bill also has outlined principles that are intended to guide the resettlement and eviction procedures including:

- every person shall be protected from arbitrary eviction;
- the persons, affected by an eviction should not suffer detriment to their human rights; human dignity, equity, social justice, discrimination, or marginalization.
- every person has the right to administrative action that is expeditious, efficient, reasonable, and procedurally fair

The bill gives power to the cabinet secretary based on the Environmental and Social Impact Assessment Report prepared, to prepare a plan for the resettlement of the affected persons after consultation with the representatives of the affected persons.

Relevance:

The Project route has been designed to entirely utilize the government riparian and road reserve which implies that no person shall claim ownership of land for the trunk sewer system to be constructed. The bill together with reference to Operation Safeguards (OS 2): Involuntary Resettlement: Land Acquisition, Population Displacement, and Compensation, shall be used as a reference during the implementation of the project in case sources of livelihood are impacted.

4.3 The African Development Bank Group's Integrated Safeguards System- Policy Statement and Operational Safeguards

The African Development Bank (AfDB) environmental and social policy framework is strongly anchored in the concept of sustainable development. This concept defines sustainability as "development that meets the needs of the present without compromising the needs of the future". AfDB safeguards aim to avoid adverse impacts of projects on the environment and affected people while maximizing potential development benefits to the extent possible; minimize, mitigate, and/ or compensate for adverse impacts on the environment and affected people when avoidance is not

possible; and help the clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risk.

The AfDB Operational Safeguards (OS) include:

4.3.1 OS 1: Environmental and Social Assessment

This OS governs the process of determining a project ‘s environmental and social category and the resulting Environmental and Social Assessment requirements. The requirements cover the scope of application, categorization, use of Environmental and Social Impact Assessment, Environmental and Social Management Plans, public consultation, community impacts, treatment of vulnerable groups, including indigenous peoples, and grievance procedures.

4.3.2 OS 2: Involuntary Resettlement: Land Acquisition, Population Displacement, and Compensation

This operational safeguard embraces comprehensive and forward-looking notions of livelihood and assets, to account for social and cultural dimensions, as well as economic aspects. It also adopts a progressive understanding of community and common property that emphasizes the crucial need to maintain social cohesion, community structures, and the social inter-linkages that common property provides.

4.3.3 OS 3: Biodiversity and Ecosystem Services

This OS translates the policy commitments in the Bank ‘s policy on integrated water resources management into operational requirements and also reflects the objectives of the Convention on Biological Diversity to preserve biological diversity and promote the sustainable use of natural resources. It reflects the importance of biodiversity in the African continent and its value to the population of key ecosystems. This OS aim at conserving biological diversity and ecosystem integrity by avoiding or, if avoidance is not possible, minimizing potentially harmful impacts on biodiversity through the implementation of mitigation measures. It endeavors to reinstate or restore biodiversity, including, where some impacts are unavoidable to achieve “not a net loss but net gain” of biodiversity.

4.3.4 OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials, and Resource Efficiency

This OS aim at managing and reducing pollutants resulting from the project— including hazardous and non-hazardous waste—so that they do not pose harmful risks to human health and the environment. AfDB requires the borrower or client to apply pollution prevention and control measures consistent with national legislation and standards, applicable international conventions, and internationally recognized standards and good practices, particularly the EHS Guidelines.

Implementation of resource efficiency and pollution-prevention techniques, taking into consideration their technical and financial feasibility and cost-effectiveness throughout the project cycle- planning and design, construction, commission, operation, and decommissioning phase- are

key criteria in assessing and evaluating the borrower or client treatment measures and environmentally sound disposal practice.

4.3.5 OS 5: Labour Conditions, Health, and Safety

This OS outlines the rights of workers; protects the workforce from inequality, social exclusion, child labour, and forced labour; and establishes requirements to provide safe and healthy working conditions. It also institutes health, safety, and environmental program that includes plans or procedures to prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work as a requirement. A grievance and redress mechanism for the workforce should also be in place as a necessity.

Relevance:

The Project is being financed by AfDB, therefore the ESIA was dissected against the operation safeguards provided. These operation safeguards guided the mitigation measure for the assessed impacts. A summary of assessed impact in line with AfDB operational safeguards is summarized in the table below.

Table 4.2: AfDB Operational Safeguards Assessed Impacts

AfDB Operational Safeguard	**Triggered by the Project**	**Assessed Impact and Relevance to the Project**
OS1: Environmental and Social Assessment.	Yes	The Project components will have an impact on the operational safeguards due to the interaction with the physical, biological, and social setting within the immediate surroundings.
OS 2: Involuntary Resettlement: Land Acquisition, Population Displacement, and Compensation.	No	The Project shall be constructed within existing public land, road reserves, and river riparian. Therefore, it is not anticipated that there would be involuntary resettlement, land acquisition, or displacement of persons that would warrant compensation.
OS 3: Biodiversity and Ecosystem Services.	Yes	Project activities have a direct linkage to biological diversity and ecosystem services. OS 1 shall be applied in the project area as the ESMP provides biodiversity and ecosystem services.
OS 4: Pollution Prevention and	No	Project activities shall not result in a significant amount of greenhouse gases. The EMSP has proposed mitigation measures to ensure air quality is air pollution is minimized as much as possible.

AfDB Operational Safeguard	Triggered by the Project	Assessed Impact and Relevance to the Project
Control, Greenhouse Gases, Hazardous Materials, and Resource Efficiency.		The Project design has ensured that the sewer flows through the distribution lines by gravity hence reducing the need for a pumping station.
OS 5: Labour Conditions, Health, and Safety.	Yes	The Project shall involve workers both during the construction and operation phases of the project. The guidelines provided in this operational standard shall be integrated with other policies and regulations provided including OSHA, 2007 to ensure that the health, safety, and working conditions of both workers and the community are safeguarded.

4.4 Institutional Framework

The Government of Kenya has established a number of institutional and administrative entities to ensure adequate management of associated concerns and eventualities.

The following are the main institutions that perform the regulatory role and are relevant to the project.

4.4.1 Ministry of Water & Sanitation and Irrigation

The mandate of the Ministry is to protect, conserve and manage water resources and ensure sustainable use of water in Kenya. The Ministry has a responsibility of improving the sustainable management of water resources to support socio-economic development, reduce poverty, improve living standards, and ensure a clean environment.

4.4.2 National Environment and Management Authority

National Environment and Management Authority (NEMA) is established under section 7 of the Environmental Management and Coordination Act, No 8 of 1999 as the principal institution which exercises general supervision and coordination over all matters relating to the environment. It is also the principal instrument of Government in the implementation of all policies relating to the environment. NEMA is charged with the responsibility to:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programs, and projects with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya;
- Identify projects and programs or types of projects and programs, plans, and policies for which environmental audit or environmental monitoring must be conducted under this Act;
- Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities, the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impending environmental emergencies is given;
- Publish and disseminate manuals, codes, or guidelines relating to environmental management and prevention or abatement of environmental degradation.

Some of the NEMA functions are performed through committees established by EMCA as follows.

(a) Standards and Enforcement Review Committee (SERC)

EMCA provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee (SERC).

(b) Public Complaints Committee

EMCA has also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate

complaints relating to environmental damage and degradation. The members of the Public Complaints Committee include representatives from the Law Society of Kenya, Non-governmental organizations (NGOs), and the business community.

(c) County Environmental Offices

NEMA has offices at the county level contributing to decentralized environmental management.

Relevance:

The project will have to be licensed by NEMA before construction starts and thereafter comply with NEMA regulations on environmental matters.

4.4.3 Department of Occupational Health and Safety (DOSH)

It oversees provisions of health, safety, and welfare of all workers in all workplaces, trains and does awareness on occupational safety and health, investigates occupational accidents at workplaces, and does regular inspection and auditing of workplaces to promote best practices and ensure compliance with safety and health standards as set out in OSHA, 2007 and it's subsidiary legislations and undertakes examination and testing of equipment such as hoists and cranes.

Relevance:

The contractor will comply with the safety and health standards as set out in OSHA, 2007.

4.4.4 County Government of Nairobi

The function of the County government is in the implementation of specific national government policies on natural resources and environmental conservation. This is achieved through the Department of the Ministry of Environment, Water and Natural Resources established in the County. The county government of Nairobi is thus expected to help in coordinating various project-related activities as far as general environmental conservation and public participation are concerned.

4.4.5 Water Resource Authority

The Water Resource Authority (WRA) is a national organization with the mandate of regulating water resources issues such as water allocation, source protection and conservation, water quality management and pollution control, and international waters.

Relevance:

The Water Resource Authority will peg the riparian reserve of the Motoine river.

4.4.6 Water Services Regulatory Board

The Water Services Regulatory Board (WSRB) oversees the implementation of policies and strategies relating to the provision of water and sewerage services. This institution is responsible for licensing Water Services Providers (WSP) and monitors the compliance of WSPs. The sewer infrastructure project spearheaded by Athi Water Work Development Agency (the Proponent in this project) and later be handed over to Nairobi City Water and Sewerage Company for operation and management must comply with WSRB regulations.

4.4.7 Athi Water Work Development Agency

Athi Water Work Development Agency (AWWDA) is the project implementing agency. AWWDA is one of the nine (9) Water Works Development Agencies (WWDA) established under the Ministry of Water& Sanitation and Irrigation. It was established under the Water Act, 2016 vide Legal Notice No. 28 of 26th April 2019.

The Agency is responsible for the development, maintenance, and management of water and sewerage infrastructure in the counties of Nairobi, Kiambu, and Muranga Counties.

Core mandates of AWWDA include:

- Plans and develops National Public Water Works for bulk water supply
- Formulates Development and Investment Plans in liaison with county governments
- Provides input to the national development and financing plan
- Provides technical assistance to Water Service Providers for county asset development.

4.4.8 Nairobi City Water and Sewerage Company (NCWSC)

Nairobi City Water and Sewerage Company (NCWS**)** is a Water Service Provider formed in line with the Water Act of 2016 and is charged with the provision of water and sewerage services in Nairobi County. NCWSC has been appointed by the Athi Water Work Development Agency to provide water and sewerage services to the residents of Nairobi.

NCWSC will be responsible for the operation and maintenance (O&M) of the project once the project has been commissioned.

4.4.9 Kenya Forest Service

Kenya Forest Service (KFS) is mandated to manage protected forests within the country. Protection of the Ngong Road forest will be vital for sustained water supply for the project targeting Nairobi Rivers under the Nairobi Rivers Sewerage Improvement Program (NaRSIP) Phase II. The pipeline will pass through the Ngong Road forest section 1 at a length of 1.9km and Section 4 (Sanctuary) of the Ngong Road forest at a length of 1.8km. Negotiations have been made and agreed upon in the issuance of a Special User License for the proposed project.

4.4.10 Kenya National Highway Authority

Kenya National Highway Authority (KenHA) has the responsibility of controlling national roads and road reserves and access to roadside developments and overseeing the management of traffic and road safety on national roads.

The proposed Moptoine Trunk Sewer is expected to cross the road at the interchange of Southern By-Pass from the Ngong Road Forest- Section 1 and the Southern By-Pass Road to Section 4 of the Ngong Road Forest by micro-tunneling. KeNHA is responsible for the issuance of the permit to allow road crossings and use of the Southern By-Pass Road reserve.

4.5 International Conventions

4.5.1 Convention on Biological Diversity

This global convention was held to foster conservation and sustainable use of biological resources, to preserve their diversity for posterity. Kenya is a signatory to this convention, which it ratified in 1994. The provisions of this Convention have since been integrated into the laws of Kenya after the promulgation of the 2010 Constitution. The government also developed the Fourth National Report on the Kenya National Biodiversity Strategy and Action Plan.

Relevance:

The project shall consider minimal destruction of biological resources to ensure sustainability as recommended in the ESMP.

4.5.2 Kyoto Protocol to the United Nations Framework Convention on Climate Change

The Kyoto Protocol requires signatories to the United Nations Framework Convention on Climate Change to reduce their greenhouse emissions levels to 5% below 1990 levels by the year 2012. The Protocol came into force on 16th February 2005, and Kenya became a member of the same. However, major countries like the United States, China, India, and Australia are not signatories to the Protocol.

Relevance:

Compliance with this convention will largely inform the technical and environmental evaluation of the project. There is thus a necessity that proper adherence to minimal carbon emission levels during the construction phases of the project since automobiles that emit carbon dioxide will be used.

4.5.3 The Ramsar Convention

This is the Convention on Wetlands of International Importance. It was held in Ramsar, in 1971 and came into force in 1975, hence the name Ramsar Convention. This convention aimed to raise in a global context the value of wetlands in our ecosystem and encourage partner states to develop instruments for the conservation and management of wetlands. Kenya ratified the convention in June 1990. The convention defines “Wise use of wetlands” as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development". "Wise use" therefore has at its heart the conservation and sustainable use of wetlands and their resources, for the benefit of humankind.

Relevance:

There is no designated Ramsar site within the project area. However, to avoid detrimental effects during the implementation cycle the mitigation measures will be adhered to in the conservation of the river.

4.5.4 African Convention on the Conservation of Nature and Natural Resources

It was held on 15 September 1968 in Algiers. The convention sought to awaken the continent to the need to preserve natural ecosystems and employ sustainable use of natural resources of economic importance, particularly the soil, water, flora, and fauna.

Relevance:

The existing natural vegetation will be cleared during the construction thus disrupting plant biodiversity. The potential environmental impact associated with bush clearing includes the removal of vegetation to facilitate trench excavation. The natural vegetation considered in this analysis is a combination of short trees and short and high bushes. This was identified by KFS using the inventory data collected on affected species. Approximately 3.7km swath of the forest will be cleared of all vegetation within the Ngong Road Forest (Section 1 at 1.9km and section 4 at 1.8km) over a maximum width of a 6m corridor. The lost vegetation will be restored immediately after the sewer lines have been laid. It was noted that no threatened, critically endangered endemic plants were observed.

CHAPTER 5: ANALYSIS OF PROJECT ALTERNATIVES

The Environmental and Social Impact Assessment also involved the examination of the alternatives to the proposed project. This is essential since it allowed the project proponent to make an informed decision regarding not only the location of the project but also the technologies that will be applied during the construction phase. This process also ensured that the project activities are located in suitable locations and are cost-effective. The following sections provide the analysis of alternatives that were considered in the case of the proposed Motoine Trunk Sewer project construction

5.1 No Action Alternative

The selection of the "No Action Alternative" Option with respect to the Proposed Project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. However, if the project is not implemented, this would have ripple effects on other factors in consideration.

- There will be no improved Health and Sanitation among the target beneficiaries. The objective of reducing water-borne diseases and other preventable diseases by a measure of improving sanitation, will not be met. This would mean the living standard for the targeted beneficiaries would remain at a status quo and/or continue deteriorating.

- This option would imply economic loss to the proponent, local and national economies. If the site is left undeveloped, the proponent would lose in terms of financial commitments already made in the design and planning of the project.

- This option would similarly result in no creation of employment opportunities during both the construction and operation phases of the projects. This would mean a lost opportunity for residents to earn an income.

From the above analysis, it becomes apparent that the No Action Alternative is no alternative to the community and the generally targeted project beneficiaries.

5.2 Using Other Waste Disposal Methods

The project beneficiaries within the proposed project area use septic tanks and pit latrines. These methods are used due to the lack of sewer infrastructure in the area. The problem with the existing wastewater management system is that the area is characterized by poorly drained black clayey soils not suitable for onsite sewage treatment practices commonly used. The use of pit latrines raises environmental concerns as the waste is disposed of directly in the soil and the surrounding. This results in the contamination of groundwater. In an area where boreholes are a source of water, contaminated groundwater poses to be a potential risk to human health.

Effluent from the onsite sewage management system in practice in the area drains into the nearby water bodies polluting dams inside the Nairobi National Park used as watering points for wildlife and polluting the water downstream. Sewage entering waterways has a detrimental effect on aquatic life and animals drinking the water. It causes an increase in weeds, which push out native

species while encouraging algae blooms to suffocate all forms of underwater life. The onsite sewerage management system practiced has proven not to be sustainable due to the following:

- The rapid growth in housing density in the project area necessitates the need for a municipal sewerage system.
- A large number of shopping malls, schools, public and private universities, hospitals, museums, and government institutions are located in the area. Sewage from these establishments would best be managed through a municipal sewerage system.
- To avoid clogs and overflow, a septic tank must be pumped regularly. The homeowner must therefore finance the expenses of septic system maintenance every three to five years.
- While these two main onsite wastewater management systems may be cheaper to install than a sewer line, their higher maintenance costs are more than offset. The owners of the establishments either commercial or residential are required to regularly exhaust accumulated sludge and service them on an ongoing basis.
- When the septic system is overloaded with too much sewage, this results in collapse. This is a potential public health hazard that may result in waterborne diseases. This also has a detrimental effect on the environment. The cleanup procedure might be time-consuming and expensive.

5.3 The Proposed Project: Construction of Motoine Sewer

The proposed construction of a sewer line is the best option based on various considerations of environmental, economic, and social perspectives, and current and projected population growth for the year 2045.

The Motoine River Trunk Sewer and related reticulation sewers serve 59% of the Mutuini Sub-Location in Dagoretti Sub-County and 36% of Lenana Sub-Location in Lang'ata Sub-County within the Nairobi City County. The current population (the year 2022) to be served in the Mutuini area is estimated to be 5,133 persons and is projected to increase to 10,151 persons by the project design's ultimate year (2045). Lenana Sub-Location in Lang'ata Sub-County has a current population estimate of 2,181 persons who are to be served by the sewer and is projected to increase to 3,270 persons by 2045. The total population to be served is therefore 7,314 persons and is projected to increase to 14,466 persons by 2045**.**

The proposed sewer line will have the following benefits to the targeted project beneficiary.

i. Improve the sanitation of the project area

Open sewerage and the flow of sewerage from loaded septic tanks and latrines cause nuisance due to the unaesthetic view, creating a breeding ground for mosquitoes and public health problems.

The quality of life and the hygienic conditions in the areas where the system operates would improve significantly. Open sewerage collected by the sewer infrastructure will significantly reduce public health issues, reduction of water-borne diseases, and increase the value of properties like land value with improved sanitation. This is in fulfillment of the Constitution of Kenya (2010), Article 42 where 'all people within the present generation have the right to benefit equally from

the exploitation of the environment, and that they have an equal entitlement to a clean and healthy environment'.

As a result of the above, the sewerage system will contribute to a better and cleaner environment, further development, and increase the standard of living in the project area. This will assure life lived in dignity for both men and women as provided in the constitution of Kenya

ii. Preserving the natural environment and cleaning up the Nairobi River

With the operation of the sewerage system, groundwater pollution caused by the discharge of pit latrine sewerage waste directed into the soil will be curbed. Sewerage flowing into the rivers will be channeled into the sewer system. This will arise in a clean river, improved quality of water, and protection of the aquatic ecosystem.

iii. The convenience of money and time saving and economic empowerment

In the long term, the sewerage system will cause relief and big savings for the homes/establishment owners who continuously empty and finance the maintenance of septic tanks and soak ways onsite wastewater management system practiced within the project area.

Disease and time burden associated with lack of access to improved sanitation prevent many adults from earning a living or fulfilling their potential in the professional arena. Not only could access to improved sanitation free up adults, particularly women, to do more productive activities but the construction and maintenance of the proposed sewerage infrastructure would also create associated employment. Money and time spent on medical bills burdened due to waterborne disease may be diverted to livelihood investments towards the economic growth of the project beneficiaries.

iv. Gender-equity

The sewer system will contribute to achieving the gender-equity. In most situations, it is women and girls who bear the burden of caring for relatives made sick by lack of proper sanitation, and who often miss out on education and employment opportunities due to the domestic roles assigned to them. This exacerbates the marginalization of females by locking them into a cycle of poverty and drudgery, with wider consequences for society and national economies.

v. Reduction of mortality rate

The impact on child mortality rates is devastating with approximately 19,500 Kenyans, including 17,100 children under 5 years, dying each year from diarrhea – nearly 90% of which is directly attributed to poor sanitation, unclean water, and poor hygiene (UNICEF,2020). Many children in low-income communities with no access to proper sanitation, are unable to attend school due to water-borne diseases. With the operation of the sewer system, improved sanitation will enable better health for children and concentration on education.

vi. Saving and processing waters

Sewer systems can accommodate greater quantities of wastewater for the burgeoning population in comparison to onsite wastewater management systems. As the population density increases, the sewer becomes cheaper than on-site sanitation systems. Athi Water Works Development Agency is currently undertaking a water supply project in the area. As such, with improved water supply services, wastewater generation rates are expected to increase requiring an improved sewage management system. The existing unutilized wastewater treatment that has a capacity of 50,000m3 /day needs to be optimized. There is therefore a necessity to construct and operate a sewer system to ensure full utilization of the existing wastewater treatment at Ruai.

The sewerage project with respect to the considerable socio-economic, environmental and public health benefits for the project area and the country are indicators that the proposed sewer line is the most feasible option.

5.3.1 Route/ Location Alternatives

The considerations used in identifying alternative project routes included but are not limited to the following:

i. Engineering Technical Considerations: They are designed to run along depressions to allow for maximum coverage and drainage of the raw sewerage. The gradient of the sewer ensures the gravity flow of the sewerage.
ii. Financial Considerations: A cost-benefit analysis and sustainability during construction and operation of the project were factored into identifying the project route alternatives.
iii. Environmental Impact- The route is designed to ensure environmental damage is minimized.
iv. Displacement and Compulsory Acquisition: The sewers were designed to follow public wayleaves as much as possible and reduce compulsory displacement.

Four main alignment options were identified and they are discussed here below;

a. OPTION 1: Use of the Motoine River Riparian Reserve through Ngong Forest.
b. OPTION 2: Use of the Southern By-Pass, Ngong Road, and Miotoni Roads Reserve.
c. OPTION 3: Diverting Some Flow along the Ngong Road Reserve then through Ngong Road and outfall at Kibera Trunk Sewer.
d. OPTION 4: Use both the Motoine River Riparian Reserve and Southern By-Pass Road Reserve through the Ngong' Road Forest.

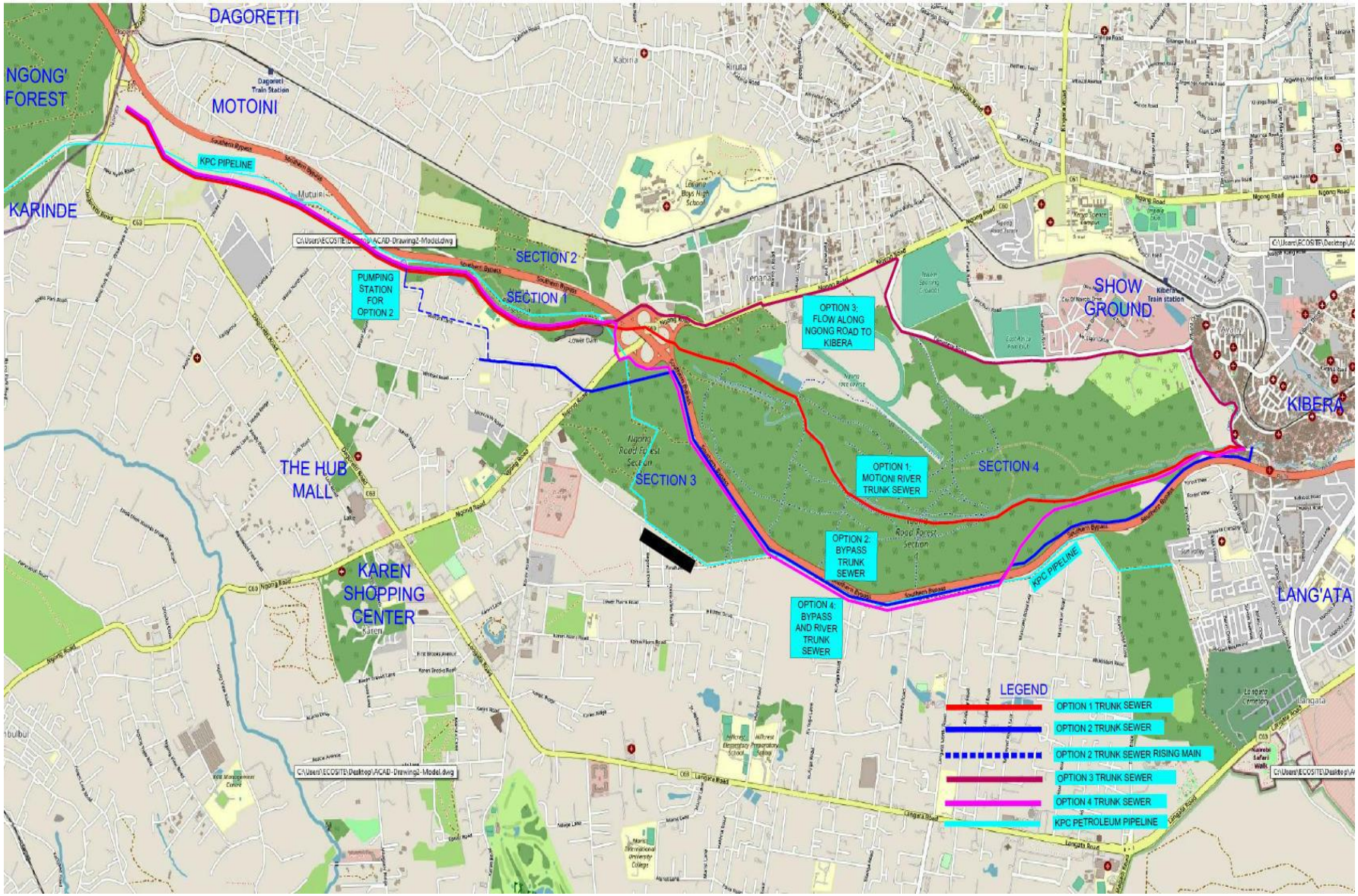


Figure 5.1: Project Alignment Alternative Options Considered for the Main Trunk Sewer

5.3.1.1 OPTION 1: Motoine River Riparian Reserve

This option entails laying the main sewer along the Motoine River riparian reserve from Kibera to Karinde (the map for Option 1 is attached in Annex 5, Drawing No. CWE20/KAREN/GL/01A). The trunk sewer is of sizes 400-600 mm and will run for 11.85 km. This option has advantages and some disadvantages.

The alignment of the trunk sewer is as described below:

i. 1.630km DN600mm. This section is partially in Kibera Informal settlement and section 4 Ngong Road Forest. It carries all flows from the entire project area

ii. 5.844km DN500mm. This section is entirely within Section 4 of the Ngong Road forest up to the Ngong Road-Southern Bypass Interchange.

iv. 3.947km DN400mm. This section is approximately half in Section 1 of the Ngong Road Forest and the rest on the riparian reserve along the Motoine River up to Karinde.

v. 429m cross-road from section 1 at the interchange to Sanctuary Section and from Sanctuary to Section 4.

The main advantages of this option are:

i. A significantly larger area will be served by the trunk sewer on both sides of the valley by gravity. Fifty-nine percent of the Mutuini Sub-Location in Dagoretti Sub-County with a current population estimated to be 5,133 persons and projected to increase to 10,151 persons by the project design ultimate year (2045), and 36% of Lenana Sub-County that has a current population estimate of 2,181 persons and projected to increase to 3,270 persons by 2045 will be served by the sewer. The total population to be served is therefore 7,314 persons and is projected to increase to 14,466 persons by 2045. Vital institutions like the National Defence University, African International University, Karen Christian College, and the Miotoni area.

ii. It's an easier and more cost-effective construction option with a cost estimate of Kes 111,142,465.32 since the sewer is located on the lowest drainage level, therefore the sewer shall be within 1.5-3.0m in depth. Cost estimates in comparison for the four alternatives are provided in Table 5.1 below.

iii. Connection to the sewer by the public will be easier as the trunk sewer will be at the lowest level as opposed to laying the sewer along the ridge.

iv. The entire project area will be served by gravity without the requirement for a pumping station thus reducing the long-term cost of the project. The pumping station and associated work will ultimately cost Kes 30,000,000.00 (Refer to Table 5.1). The operation and maintenance are costly and not sustainable with experience from previously installed pumping stations in other parts of the country like in Mombasa City, Karatina in Nyeri County, and Ruai for pumping sewage into the Dandora Sewage Treatment Plant inlet works.

v. There will be no impact on people's private assets and sources of livelihood since the proposed route will use the riparian reserves and public wayleave. This will evade the acquisition of private land or even an easement for the trunk sewer.

The main disadvantages of adopting this option are:

i. The line will significantly pass through Ngong Forest and lead to loss of vegetation. Approximately 7,174 stems of mixed indigenous tree species and 1,054 stems of exotic tree species will be affected. The identified species are not in the category of threatened, critically endangered, rare, or endemic in the International Union for Conservation of Nature classified red list. This is as per the KFS inventory data. The contractor will take necessary precautions to minimize the cutting of all these trees. A Special User License with stipulated conditions will be issued by the Kenya Forest Service.

ii. Impact on ecotourism. The presence of machinery and equipment will have an impact on the visual and aesthetic quality of the area. The proposed alignment corridor does not follow the nature trail therefore there will be minimal damage to the trails. This will be a temporary impact and mitigation measures will be put in place including confining project activities within the alignment corridor. Reinstatement of the area will be undertaken since the sewer line is underground.

iii. It is expected that there might be some rock during excavation that might require specialized equipment to save time. This requires more working space. However, the contractor will restrict himself to the provided and approved corridor by KFS with a width of 6m. The blasting method will not be applied in this project.

5.3.1.2 OPTION 2: Southern By-Pass, Ngong Road, and Miotoni Roads Reserve

This option entails laying the main sewer of 12.85 km long with 500m being inside the forest at Section 3, (as the line cannot fully follow the Southern By-pass due to the interchange at Ngong Road) 2.7km along Motoine River and 9.7km along the road reserve i.e Miotoni Road and Southern By-pass (the map for Option 2 is attached in Annex 6, Drawing No. CWE20/KAREN/GL/01B). The trunk sewer is of a diameter ranging between 400 and 600mm.

The main advantages of this option are:

i. It minimizes cutting down of trees within the Ngong Road Forest Sanctuary.
ii. It would shorten the length of the sewer from the Karen Sewage Treatment Works by 2.6km.

The disadvantage of this option is that:

i. A large area, including the Karinde high-density residential area and the National Defense University, cannot be served by this sewer thus the sewer will not meet its full objectives. If it were to be constructed without these critical and needy users, the cost per capita of the sewer would be extremely high, the return on investment very low, and further investment would be required since a separate sewer system would need to be laid to serve this area incorporating a sewage pumping system.

ii. This option would involve pumping 11.56L/S of sewerage through a 23m head. While pumping is certainly not a viable option, the alternative would require very deep excavation of up to 11m in depth in order to maintain gravity sewage flow along the Miotoni Road and the Southern By-pass. While this also is not a viable option, it would have the effect of increasing both the capital and maintenance costs tremendously.
iii. The land will need to be acquired to locate the pumping station as well as the acquisition of wayleave for sewer (Rising Main – 330m long by 6m wide) thus increasing project costs.
iv. Due to the size of the trunk sewer, it would be necessary to demolish houses within the Raila Village of Kibera informal settlement. This cause is likely to result in social upheaval and violence and high resettlement costs. (Identification exercise was conducted during the stakeholder engagement meeting on 7th February 2022. Minutes and photolog are attached in Annex 9. J).
v. The sewer would interfere with other public utilities including the ICT infrastructure, water lines, stormwater drainage systems, and the petroleum pipeline, especially in Section 3 and Section 4 of the Ngong Road Forest (layout maps are attached in Annex 4 and 6).

5.3.1.3 OPTION 3: Diverting Some Flow along the Ngong Road Reserve through Ngong Road and then outfall at Kibera Trunk Sewer

This option entails having two separate systems as follows and as shown in Annex 7, Drawing No. CWE20/KAREN/GL/01D.

i. **Lower System –** This system collects the main Karen and Miotoni road areas then follow Southern By-Pass and finally back to the Motoine River close to Kibera for outfall into the Kibera Trunk Sewer.
ii. **Upper System –** This starts at the Karen and Mutuini areas and follows the Motoine River up to the Ngong Road-Southern By-pass Interchange, then diverts along the Ngong Road towards the cemetery road. The trunk sewer then is diverted to the outfall at the Kibera Trunk Sewer. The length of this trunk sewer is 12.16km of sizes 400-600mm in diameter.

The main advantages of this option are:

i. It reduces the length of the sewer being laid inside the forest by 43% (5km instead of 8.78km).
ii. It serves the entire area by gravity.

The main disadvantages are:

i. Very deep excavations are required to divert the sewer from the Motoine River to Ngong Road at the interchange and KFS main entrance. This would apart from the slow progress, result in extra excavation costs.
ii. To connect the Ngong Road Secondary Sewer (DN 300) to this trunk sewer, a 120m long aerial crossing using expensive steel pipes with associated support piers shall be required. This is not usually recommended as it is not viable in a built-up area thus as it poses extra human health risks in case of leaks or damage.

iii. The proposed duplication of the Kibera Trunk Sewer to ASK Grounds would be in a heavily populated and heavily encroached Soweto area resulting in displacement impacts.
iv. Intrusion into the KPC wayleave within the forest to ensure levels allow diversion of sewer from Motoine River basin to the Kirichwa Kubwa River basin.
v. Thirty-one private assets and sources of livelihood with an estimated cost of KES 10,000,00.00 would be impacted along the sewer route.
vi. Interference with the road infrastructure would require approval and permits from KENHA and KURA with the possibility of an additional cost.

5.3.1.4 OPTION 4: Motoine River Riparian Reserve and Southern By-Pass Road Reserve

This option entails laying the main sewer along the Motoine River riparian reserve from Kibera into the Ngong' Road Forest's Section 4 for about 2.5km then diverting to the Southern Bypass Road up to the Inter-change with the Ngong' Road for an approximate length of 5.1km and finally returning to the Motoine River riparian Reserve to Karinde for 4.5km after the interchange. The trunk sewer is of sizes 400 - 600 mm and will run for 11.8km where 8.78km of the length shall be within the Ngong Road Forest Sections 1 and 4, 5.1km on the Southern By-pass Road Reserve, and 2.1km on the Motoine River Riparian Reserve outside the forest. This sewerage network is shown in the attached Drawing No. CWE20/KAREN/GL/01G.

The main advantages of this option are:

i. The length of the DN600mm Karen Trunk sewer is reduced by approximately 2.5km.
ii. The entire project area is served by gravity flow reducing operational and maintenance costs for the water service provider, the Nairobi City Water, and Sewerage Company.
iii. Compared to Option 1, this option reduces the length of sewer to be constructed inside section 4 of the forest by 4.5km.
iv. This option does not affect private assets or sources of livelihood for private citizens.

The main disadvantages are;

i. Three (3) sections of a total length of 650m of this proposed sewer require the use of steel pipes supporting concrete support piers to maintain gravity flow and reduce excavation depths. This significantly increases the project cost.
ii. There will require intrusion into the KPC wayleave within section 1 of the Ngong' Road forest to maintain levels that allow diversion of sewer from Motoine River basin to the Southern Bypass Road at the interchange.
iii. Interference with the road infrastructure would require approval and permits from KENHA and KURA adding cost to the project.

5.3.1.5 Cost Comparison for the Alternative Routes

An analysis of the cost for the four options was undertaken taking into consideration the construction cost, and resettlement costs. The summary is shown in Table 5.1.

Table 5.1: Cost estimates comparison for the alternatives

	OPTION 1	**OPTION 2**	**OPTION 3**	**OPTION 4**
Construction Cost				
• Demolition and Site Clearance	254,795.00	117,988.26	1,437,289.91	572,490.00
• Supply and Laying of Pipes	70,877,617.50	87,237,163.50	102,177,761.00	120,699,490.00
• Pipework Ancillary Works (Manholes, Chambers, Crossings, Reinstatement, supports, and protection)	28,784,839.18	26,460,750.86	30,374,719.55	36,323,600.00
• Rock Excavation	10,693,963.64	13,934,019.27	15,557,818.91	10,086,316.00
• Pipework Miscellaneous Works (Testing, Connections)	531,250.00	560,450.00	652,900.00	637,150.00
• Pumping Station and Associated Works	0	30,000,000.00	0	0
Sub-Total	**111,142,465.32**	**158,310,371.89**	**150,200,489.37**	**168,319,046.00**
Resettlement Costs				
• Acquisition of Land (1 Acre for Pumping Station)	0.00	60,000,000.00	0.00	0.00
• Acquisition of wayleave for sewer (Rising Main – 330m long by 6m wide)	0.00	22,000,000.00	0.00	0.00
• Temporary Loss of Livelihood (1.5km)	0.00	0.00	10,000,000.00	0.00
Sub – Total	**0.00**	**82,000,000.00**	**10,000,000.00**	**0.00**
GRAND TOTAL	**111,142,465.32**	**240,310,371.89**	**160,200,489.37**	**168,319,046.00**

5.3.1.6 Summary of Project Alternative Route

Table 5.2: Summary of Project Alternative Route

Alternative Routes	Advantages	Disadvantages	Cost (Kes)
Option 1: Motoine Riparian Reserve (from Kibera to Karinde) through Ngong Road Forest 11.85 km where 6km of the length shall be within the Ngong Road Forest Sanctuary	-A significantly larger area will be served. -It's easier and more cost-effective. -The sewer shall be within 1.5-3.0m in depth. -The trunk sewer will be at the lowest level making it easier to connect the public. -No pumping station will be required -The riparian reserve and public wayleave will be utilized thereby minimizing impacts on people's private assets and sources of livelihood. This will evade the acquisition of an easement for the trunk sewer.	-Loss of vegetation. The ESMP provides adequate mitigation measures. -Temporary impacts on ecotourism, the visual and aesthetic quality of the area due to the presence of machinery and equipment. Mitigation measures are provided in the ESMP. -Specialized equipment will be required during rock excavation to save time.	**111,142,465.32**
OPTION 2: Southern By-Pass, Ngong Road, and Miotoni Roads Reserve 10.23km long on the road reserve	-It avoids cutting down trees within the Ngong Road Forest Sanctuary. -It would shorten the length of the sewer from the Karen Sewage Treatment Works by 2.6km.	A large area cannot be served by this sewer. Thus the cost per capita of the sewer for this project would be extremely high, the return on investment very low, and further investment would be required since a separate sewer system would need to be laid to serve areas not covered while incorporating a sewage pumping system. -Very deep excavations of up to 11m in depth	**240,310,371.89**

Alternative Routes	Advantages	Disadvantages	Cost (Kes)
		would be required to maintain gravity sewage flow. This significantly increases both the capital cost and the operation and maintenance cost. - It would necessitate the demolition of houses within the Raila Village of Kibera informal settlement. This would likely result in social upheaval and violence and high resettlement costs. -Interference with other public utilities including the Petroleum pipeline, ICT infrastructure, water lines, and stormwater drainage systems.	
OPTION 3: Diverting Some Flow along the Ngong' Road Reserve through Ngong Road and then outfall at Kibera Trunk Sewer	-It reduces the length of the sewer laid inside the forest by 43% (5km instead of 8.78km). -It serves the entire area by gravity.	-Very deep excavations are required to divert the sewer from the Motoine River to the Ngong road at the interchange and KFS main entrance due to depressions at the Ngong' Road Forest. The alternative to this is the use of expensive steel pipes for aerial crossing of the two (2) depressions. -The proposed duplication of the Kibera Trunk Sewer to ASK Grounds would be in a	**160,200,489.37**

Alternative Routes	Advantages	Disadvantages	Cost (Kes)
		heavily populated and heavily encroached Soweto area. -Interference with the KPC wayleave within the forest to ensure levels allow diversion of sewer from Motoine River basin to the Kirichwa Kubwa River basin. -A number of people's private assets and sources of livelihood would be impacted along the sewer route. -Interference with the road infrastructure would require approval and permits from KENHA and KURA.	
OPTION 4: Motoine River Riparian Reserve and Southern By-Pass Road Reserve	• 2.5km which is a significant cost saving for the entire project. • The entire project area is served by gravity flow reducing O&M costs. • Reduces the length of sewer to be constructed inside section 4 of the forest by 4.5km. • Does not affect private assets or sources of livelihood for private citizens.	• The use of steel pipes supported on piers increases the project cost. • Intrusion into the KPC wayleave within section 1 of the Ngong' Road forest • Interference with the road infrastructure would require approval and permits from KENHA and KURA adding cost to the project.	**168,319,046.00**

5.3.1.7 Recommendation for the Alternative Route

i Based on the foregoing, it is recommended that OPTION 1: Use of Motoine Riparian Reserve (from Kibera to Karinde) through Ngong Road Forest be adopted. This alternative would see the construction of the sewerage infrastructure as proposed by the proponent, and as outlined in this ESIA report document. It will ensure a big area is covered by the project, and that the intended outcome of serving as many people as possible in a cost-effective and sustainable manner is met.

ii The identified disadvantages related to loss of vegetation shall be mitigated by limiting the width of the trenches and working areas as well as ensuring that a reforestation program is immediately commenced. A meeting was held on April 27th, 2022 in negotiation for a special user license and pertaining conditions. A summary of the negotiations during the meeting is attached in Annex 10.

iii A detailed description of the potential effects of the Project on the biophysical environment and social aspect is provided in Chapter 7 of the report where appropriate mitigation measures to address these potential effects are identified and dealt with. A management and monitoring plan is provided in Chapter 8.

5.3.2 Construction Design, Technology, and Procedures

The pipe materials have been selected taking into consideration availability, durability and cost. Circular pipes have been adopted in this design. Corrugated double-walled HDPE pipes are recommended for sewers with less or equal to 400mm-600mm. Steel pipes are recommended for all river aerial crossings, Class A and B road crossings, and deep sewers. The main road will be crossed using trenchless construction techniques such as Horizontal Directional Drilling (HDD) and micro-tunneling.

The majority of the route is expected to be constructed using conventional excavation and back-fill, which involves the digging of the trench directly into the surface ground layer. Laying of the pipes, burying the pipe, and backfilling the trench back to the previous ground level. The objective will be to return the ground to its previous condition and characteristics as quickly as possible. Original soil and earth structures will be used as far as possible to minimize the introduction of new or invasive species. The proposed conventional trench and backfill construction technique will be used for the majority of the route and will be undertaken within the approximately 6m wide construction wayleave.

CHAPTER 6: CONSULTATIONS AND PUBLIC PARTICIPATION

6.1 Introduction

This chapter describes the process followed to consult the interested/affected public in an effort to identify the issues and impacts of concern in the implementation of the proposed project. Views from the residents, stakeholders, surrounding institutions, and development partners who in one way or another would be affected or rather interested in the proposed project were sought through the administering of questionnaires, interviews, and public consultation meetings as stipulated in the Environment Management and Coordination Act, (EMCA), Amendments, 2015 and 2019.

6.2 Objectives of the Consultation and Public Participation (CPP)

The objective of the consultation and public participation was to:

i. Disseminate and inform the stakeholders about the proposed project and alternative routes for the trunk sewer.

ii. Gather comments, suggestions, and concerns of the interested and affected parties.

iii. Incorporate the information collected in the ESIA study.

6.3 Identification of Stakeholders

Various stakeholders were incorporated into the consultation process. Stakeholder identification was based on various needs, interests, and potential influences on the project. The stakeholders identified were;

- Primary stakeholders i.e., the direct project beneficiaries of the development project or those that are directly affected.
- Secondary stakeholders i.e., those indirectly affected by the project but influence development.

These are involved in the project implementation. They include the responsible agency; Kenya Forest Service, Water Resource Authority, Community Forest Association, Government line ministries and departments, and the local administration. Annex 9 provides minutes of consultative engagement meetings held with various stakeholders.

6.4 Methodology used in the CPP

In accordance with the requirements, of the EIA Regulations, 2003, of section 17, the public participation exercise was conducted in different ways, namely;

a. Field surveys and observations

Field surveys were undertaken and observations were made on the environmental and socio-economic characteristics.

b. Administering of questionnaires

Questionnaires were used to gather relevant data for the proposed project. One hundred and sixteen (116- male: 79; female: 37) questionnaires were administered to collect data from Motoine, Karinde,

and Karen areas. These were also distributed to various stakeholders to gather information relevant to the proposed project.

c. Interviews

Six (6) interviews with stakeholders' representatives. The interviews were with the Karinde and Mutuini community chairpersons, Ngong Road forest representatives, and local administration officers representing Karinde, Mutuini, Karen, and Kibera. The purpose of the interviews was to identify the positive and negative impacts and subsequently promote invite on the best practices to be adopted and mitigate the negative impacts respectively. It also helped in identifying any other potential sources of conflict during the project implementation stage.

d. Public participation meeting (minutes of meetings are attached in Annex 9).

Public consultations served as the main tool to involve the public, the administration, civil society organizations, business organizations, active citizens, and experts in the process of identification of environmental, social, and health impacts related to the proposed project, including mitigation measures. A schedule of consultative meetings held is provided in Table 6.1 below. Relevant data for the study report and challenges experienced on wastewater by residents who are direct beneficiaries of this proposed project were collected through this platform.

Public consultation meetings were carried out with various stakeholders to understand the possible links between the corresponding environmental and health issues and the impact of the project and its further consequences for the communities where the trunk sewers are proposed for construction.

Table 6.1: Schedule of Consultative Meetings held with Various Stakeholders

	Target Group	**Date**	**Venue**	**Male**	**Female**	**Total**
1.	Karen- Langata District Association (KLDA) (Annexe 9A)	30/08/2021	KLDA Office	6	5	11
2.	Karen Residents (Annex B)	09/09/2021	Kenya School of Law	23	13	36
3.	CFA Group (Annex 9C)	4/11/2021	Kenya Forest Service Office, Lenana Road	13	7	20
4.	KFS/CFA Group and General Public (Annex 9D)	15/11/2021	Kenya Forest Service Office, Lenana Road	17	10	27
5.	Mutuini Community Group (Annex 9E)	18/11/2021	Saigon Field, Mutuini	19	8	27

	Target Group	Date	Venue	Male	Female	Total
6.	Karinde Community Group (Annex 9F)	23/11/2021	Bush Park Hotel, Karinde	12	5	17
7.	Ngong Road Forest Association (Annex 9G)	16/12/2021	Karen Chief's Office, Karen	13	12	25
8.	KFS and CFA (Annex 9H)	24/01/2022	AWWDA Office, Muthaiga	16	7	23
9.	Kenya Forest Service and Stakeholders (Annex 9I)	03/02/2022	Kenya Forest Service Office/ Proposed Alternative Routes/ Ngong Road Forest	12	4	16
10.	Kibera Administration and Project Affected Person (Annex 9J)	07/02/2022	Ngong River at Soweto, Kibera	8	2	10
11.	Kenya Forest Service Technical Committee (Annex 9K)	14/02/2022	Kenya Forest Service Office, Lenana Road.	12	7	19
12.	Kenya Forest and Stakeholders (Annex 9L)	16/06/2022	Ngong Road Forest- Section 1	11	4	15
Total Number of Stakeholders Engagement Meetings			12	162	84	246

6.5 Analysis of the Public Consultation Findings

6.5.1 Positive Issues

- The respondents noted that the proposed sewerage project will enhance and improve the hygiene of the area. This will be done by collecting and removing wastewater in the open drainages that were breeding grounds for mosquitoes. This will significantly improve public health by reducing waterborne diseases.
- The landowners were of the view that they will be able to save a lot of money that they use to pay for services rendered by exhauster companies that are always very expensive.
- The respondents noted that the infrastructure will be able to cater to the increasing number of residents by connecting the sewer to their buildings since the population in the area is rising steadily.
- The project is anticipated by the residents since it will create unskilled, skilled, and semi-skilled job opportunities where the local community will be considered a priority in the workforce. This will increase their income and uplift the welfare of the local community.

6.5.2 Matters of Concern

The table below highlights the various issues raised on the platforms.

Table 6.2: Summary of Issues/Agreements Raised by KFS

	Issue/Concern	How to Respond/Main Agreement Reached
1.	Type of species that would be affected.	An inventory of species affected along the alignment route will be taken. This will be done by KFS in collaboration with the supervising engineer.
2.	A need for a special license use for the project.	A negotiation meeting was held on 27/04/2022 to agree on the term. (Annex 10) provides the details.
3.	Reinstatement of work	A restoration program will be conducted immediately in collaboration with the KFS and CFA who will identify the trees to be planted. Damaged nature trails will be reinstated to their original form. Photographs will be taken before construction work that will be used as a reference during the reinstatement of works.

Table 6.3: Summary of Issues/Agreement Raised by Ngong Road Forest

	Issue/Concern	How to Respond/Main Agreement Reached
1.	Project activities should be undertaken until an ESIA report has been shared and submitted.	A study report was done and a draft of the ESIA report was shared with the various stakeholders for their input.
2.	Impact on eco-tourism and damage to the infrastructure.	It was agreed that project activities and the workers will be restricted at the alignment corridor to avoid disturbing people who use the forest for their various activities. The contractor will remove his equipment from the forest when not in use.
3.	Security during the project activities.	The contractor will provide security for their machines. The workers will put on personal protective equipment with the logo of the company for easier identification.
4.	Alternative routes should be analyzed.	The consultant identified four alternative routes (details are in Chapter 5) that were analyzed in consideration of the gravity flow of the sewerage, cost-benefit analyses and sustainability during the construction and operation of the project, environmental impacts from the project, displacement and compulsory acquisition of the wayleave and the number of people projected to benefit from the project. It was recommended that Option 1: Use of the Motoine River Riparian Reserve through Ngong Road Forest was more viable.

Table 6.4: Summary of Issues/Agreements Raised by Residents/Community Groups

	Issue/Concern	How to Respond/Main Agreement Reached
1.	Concerned about the vegetation lost during the construction phase	The community will be involved in the restoration program. Representatives of the community group will be part of the committee that will be formed to ensure the mitigation measures are adhered to.
2.	Concern that some areas may not be connected with the sewer system.	The supervising engineer will ensure that large areas are covered as the gradient factor will allow. The majority of the buildings will be connected under the household connection component provided. An estimated 2,298 households will benefit from this proposed trunk sewer extension and related reticulation sewers. The total population to be served is therefore 7,314 persons and is projected to increase to 14,466 persons by 2045.
3.	Issues of payment of project-affected persons were raised.	It was noted that most of the project components will be laid within the public right-of-way. Any private property that will be affected will be compensated in line with the Land Act, 2012, and AfDB guidelines.
4.	Employment opportunities	The engineer representative stated that the community residents will be considered a priority when hiring casual workers.
5.	Concerns on how fast the project can be implemented.	The Motoine trunk sewer is scheduled to be laid within a time frame of six months. However, the commencement would begin once the various authorities including NEMA have approved the project and issued relevant licenses.

6.5.3 Continuous Community Engagements

While this ESIA reports on the consultation and disclosure undertaken as part of the ESIA process, it is acknowledged that consultation is an ongoing process and forms part of the life cycle of the project. 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

6.6 Grievance Redress Mechanism

The grievance redress mechanism (GRM) seeks to respond directly and proactively to concerns, tensions, and fears of the community arising from the project activities and resolve them in a manner that meets both the aggressor and the project-affected persons' needs and ensures agreement and commitment by all. Grievances may arise at any stage during project activities. It is expected that grievances, complaints, and disputes may arise at multiple stages including design, preparation, planning, and implementation. This can potentially be exacerbated by inadequate, ineffective, or inappropriate stakeholder engagement and information disclosure that could exclude vulnerable, marginalized, and minority sections of the community from project benefits.

A grievance can be submitted by individuals, groups, communities, and organizations that are affected by the project activities. The grievances are channeled through the environmental and social safeguard officers on the site either in writing or verbally. The complainant fills in a grievance redress form which is then filed into a grievance log.

CHAPTER 7: IMPACT ASSESSMENT AND MITIGATION MEASURES

This chapter provides a detailed description of the positive and negative impacts of the proposed project and describes the mitigation measures for the negative impacts identified. The impacts will be related to activities to be carried out during the project life cycle, that is, the construction, operation, and decommissioning phases. Once identified, potential impacts need to be assessed to enable a judgment of their significance that allows prioritization of the mitigation and management measures. The analysis is based on the nature, the predicted impact, extent, duration, intensity, and probability, and the stakeholders and/or values affected. This assessment is done taking into full account the regulatory requirements described in Chapter 4 of this report.

In assessing the significance of all the impacts (positive or negative), the criteria presented in the following table have been applied.

Table 7.1: Impacts Assessment Criterion

Item	**Impact Criterion**	**Effect consideration on the Environment**	**Classification of Impact**	
			Expression	**Description of Impact**
i	Type of Impact	Will the impact be positive or negative?	Positive	A positive impact
			Negative	A negative impact
ii.	Likelihood of Occurring	Is the occurrence of the associated impact certain?	Certain	Will occur
			Unlikely	Unlikely
iii.	Duration	What time frame will the impact be felt or last?	Permanent	Permanent
			Medium	Beyond the construction period but not permanent
			Short term	It will end at the end of the construction period.
iv.	Timing	At what stage will the impact occur or be felt?	Immediately	Will occur upon starting project activities
			Near future	Near future
v.	Significance	How severe will the impact be?	Insignificant	Little impact
			Moderately Significant	Moderate impact
			Significant	High impact
			Very Significant	Very high impact

Item	Impact Criterion	Effect consideration on the Environment	Classification of Impact	
			Expression	**Description of Impact**
vi.	Extent	What is the area extent or coverage of the impact?	Project area	Effect confined to project area
			Surrounding Environs	Effect to be felt by surrounding areas
			Beyond Surrounding Environs	Effect to be felt within surroundings and beyond environs
vii.	Overall rating	How important is the impact in project design?	Insignificant	The impact is not substantial and needs no mitigation.
			Low	Impact of little importance and needs limited mitigation
			Moderate	The impact has influence and requires mitigation.
			High	Impact of great importance and mitigation is a must

7.1 Construction Phase Impacts Assessment

The potential positive and negative construction phase impacts are as discussed below:

7.1.1 Positive Impact

7.1.1.1 Economic Impact

During this phase, local skilled, semi-skilled and unskilled personnel will be needed for the proper operation and management of the project. This represents an increase in the level of employment within the project area. It is anticipated that the proposed project will result in improved welfare in the form of increased economic activity. The anticipated increase in the flow of money will create a suitable environment for micro and small-scale enterprises. This will be in form of materials bought from local hardware/shops and sales made by the food vendors.

Local revenue will be generated to government institutions including NEMA, and KFS through the payment of rates and fees required for approval of the project and issuance of licenses and permits.

This is a positive impact that needs no mitigation measures.

7.1.1.2 Skills Transfer and Training

Through the recruitment of labour locally, the workers will have an opportunity to learn an array of skills that relate to sewerage infrastructure projects. The workers will be able to use the skills gained in other similar projects after the decommissioning phase or elsewhere.

This is an important positive impact that requires no mitigation.

7.1.2 Negative Impact

7.1.2.1 Impact on Flora

It is worth noting that the potentially significant impact on flora in the area will be medium-term and reversible. The existing natural vegetation will be cleared during the construction thus disrupting plant biodiversity. The potential environmental impact associated with bush clearing includes the removal of vegetation to facilitate trench excavation. The natural vegetation considered in this analysis is a combination of short trees and short and high bushes. This was identified by KFS using the inventory data collected on affected species attached in Annex 12. The lost vegetation will be restored immediately after the sewer lines have been laid. It was noted that no threatened, critically endangered endemic plants were identified.

Mitigation:

- AWWDA to ensure a permit for working within the forest (special use license) is obtained from the KFS as per the Forest Conservation and Management Act, 2016. A special user license negotiation meeting was held on 27th April 2022 and it was agreed that the Licence will meet the cost of repairing the affected/damaged forest nature trails and related infrastructure; will meet the cost of restoring the affected sections of the electric fence at Miotoni Forest Block; construct one rangers' camp and refurbish an existing one at Sanctuary Forest Block; construct one ablution block at Miotoni Forest block, and installation water and electricity at a rangers'

camp at Miotoni Forest block. (A summary of the special user license negotiation meeting is attached in Annex 10. Cost analysis is detailed in Chapter 5 of the report).

- Clearing of vegetation and project activities will be restricted within the sewer alignment corridor. This will be done over a relatively narrow corridor of 6m or less, both as a way of saving cost and protecting the vegetation. The extent of areas to be cleared was marked with white pegs as guided by KFS during the ground survey exercise to minimize exposure.
- The use of existing cleared or disturbed areas for the Contractor's office or stockpiling of materials shall be encouraged.
- Work in collaboration with the KFS and Ngong Road Forest CFA to ensure the replanting of destroyed trees in cleared areas where works are complete.
- Access roads to be used for machinery and vehicle movement during construction will be predetermined in consultation with KFS and CFA to avoid the unnecessary trampling of vegetation.
- Use of manual labour will be employed where possible.
- Ensure that the affected/damaged forest nature trails and related infrastructure are restored.
- A photographic record will be prepared prior to the commencement of construction for areas of the site that are to be rehabilitated. This will be used as a baseline against which to measure the success of rehabilitation.
- A committee consisting of the KFS, CFA, Consultant, Contractor, and various stakeholders will be formed to ensure that the recommended mitigation measures during the construction phase are adhered to.

In addition, a number of Corporate Social Responsibility (CSR) activities have been proposed and included in the draft special use license. They include:

i. Restoration of the affected sections of the electric fence at Miotoni Forest Block.
ii. Construction of one rangers' camp and refurbishment of an existing one at Sanctuary Forest Block.
iii. Construction of one ablution block at Miotoni Forest block.
iv. Installation of water and electricity at a rangers' camp at Miotoni Forest block.

7.1.2.2 Impact on Fauna

The construction activities may result in alteration and disruption of habitats. Habitat alteration may include fragmentation of habitat, loss of nesting sites and other wildlife habitats through bush clearing; creation of barriers to wildlife movement; and visual and auditory disturbance due to the presence of machinery, construction workers, and associated equipment.

Mitigation Measures:

- Awareness raising regarding natural resource management.
- Carefully designed and implemented safeguarding plans for protected areas including restoration of the alignment corridor in the forest.
- Manage waste in a way that prevents the poisonous types from being accessed by wildlife.

- Revegetate the alignment corridor with appropriate species as recommended by KFS.

7.1.2.3 Soil Erosion and Contamination

Removal of vegetation along the alignment corridor makes the soil more sensitive to wind and water. Clearing the vegetation leads to soil compaction by heavy machinery. The compacted soil can reduce the rate of infiltration which can cause surface runoff leading to loss of humus and topsoil that ensures high biological productivity. Furthermore, compacted soil may prevent growth and water uptake by plant roots, and thereby hinder spontaneous re-vegetation. In addition, the use of machinery within the forest is likely to loosen up soil particles easily resulting in erosion. Excavated material stored at the bank of the river could lead to increased sedimentation of the water.

The project will also involve the use of plant and equipment diesel oils. In the event that these oils accidentally leak into the environment, they could result in significant contamination of soil, surface, and underground water resources. Further, Improper sanitary facilities at the site for the labor force could also lead to contamination. This could lead to knock-on effects for flora and fauna and local community users.

Mitigation:

- The Contractor will prepare and supervise a site construction erosion and sediment control plan as part of the Contractor construction ESMP.
- Construction machinery will be restricted to designated areas to avoid soil loosening and compaction within the project site, while any compacted areas will be ripped to reduce run-off.
- Topsoil removed during excavation will be stored separately and used for reinstatement. Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile.
- Excavated material shall be stored 2m away from the shore of the river to avoid erosion and sedimentation of the water.
- Vegetation disturbance shall be minimized by using established access routes.
- Exposed areas will be replanted with suitable vegetation immediately after the construction phase. These are to be identified in collaboration with KFS to avoid the introduction of alien species.
- Loose soils will be compacted to minimize wind erosion.
- The contractor shall minimize vehicle movement as much as possible.
- Construction vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum. Drivers and workers will be trained in oil and fuel management.
- There shall be no servicing of equipment or machinery/vehicles on site. Servicing should be conducted at designated dealer's yards.

7.1.2.4 Air Quality Impacts

Vehicular or equipment engine exhaust emissions are a potential source of air pollutants. Trucks used to transport various building materials from their sources to the project site contribute to increases in emissions of CO2, and NO2 along the way as a result of diesel combustion. These emissions are known for contributing to global warming. On the other hand, particulate matter (dust particles) will be

generated by excavation and exposed soils to the wind. Air emissions may contribute to health problems, especially respiratory diseases.

These emissions from construction vehicles and equipment are not likely to contribute significantly to the degradation of environmental value in relation to air quality. Vehicular and equipment exhaust emissions during project operation will, thus, have a minor incremental/cumulative impact locally and regionally.

It is not possible to accurately estimate the particulate concentration that might occur at the site because it is dependent on weather and wind conditions, soil moisture, and the distance covered by truck movements. Nonetheless, mitigation measures will be put in place against advanced outcomes.

Proposed mitigation measures include:

- Contractor to develop a Dust Management Plan (DMP);
- Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the Dust Management Plan and will consider water availability and any stakeholder grievances.
- A speed limit of 20km/h should be observed within the site during construction phases to reduce dust particles emission.
- Use of environmentally friendly fuels such as Low Sulphur diesel.
- Minimizing the period for the idling of machinery and construction vehicles.
- Regular maintenance of construction machinery and equipment to minimize the generation of hazardous gases will be done by the contractor.
- Ensuring wastes are well disposed of in approved designated areas.
- Providing PPEs such as nose masks to the workers in dusty areas on the site.
- All personnel working on the project will be trained before starting construction on methods for minimizing air quality impacts during construction.
- Drivers of construction including bulldozers, earth-movers, etc. will be under strict instructions to minimize unnecessary trips and minimize the idling of engines.
- Erect solid screens if feasible around stockpiles.
- Remove dusty materials from the site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible.
- Minimize drop heights when loading stockpiles or transferring materials.
- Prohibit waste or vegetation burning.
- Revegetate exposed areas as soon as feasible
- Expose the minimum area required for the works and undertake, and exposure on a staged basis to minimize dust blow.

7.1.2.5 Noise Pollution

Project implementation is usually noisy, which is undesirable, especially for those residing at or near the site. This could also lead to psychologically related effects that may include annoyance and loss of concentration. Physical effects may include loss of hearing, pain, interference with communications

and if the exposure is severe, interference with recreational activities. The proposed project is expected to generate noise during the construction period mainly from machinery such as excavators, stabilizers, concrete mixers, and drills. Trucks transporting materials to, within, and from the site will generate noise and vibrations. This will be a short-term impact that will end with the construction phase.

Proposed mitigation measures include the following:

- Construction works will be carried out only during the specified time of 0800-1800hrs.
- Machinery shall be maintained regularly to reduce noise.
- Workers near the source of the noise shall wear safety and protective gear such as earmuffs.
- The project implementation team shall comply with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.
- Construction work shall be restricted within the designed corridor to prevent physical and psychological effects.
- Sensitize operators of construction machinery on the effects of noise.
- There will be no unnecessary hooting by construction vehicles at the construction site
- Siting noisy equipment as far away as possible from Noise Sensitive Receptors (NSRs), and using barriers (e.g., acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable.
- Where practicable, stationary equipment will be located in an acoustically treated enclosure.
- Throttle settings will be reduced, and equipment and plant turned off, when not being used.

7.1.2.6 Occupational Health and Safety, and Labour Rights

Projects have a great deal of positive or negative impacts on the environment. Therefore, project safety cannot be overemphasized. The contractor's workers are likely to be subjected to environmental hazards such as trench collapse, falling debris or materials, dust, falling objects from heights, open pits, etc. Incidents and accidents may likely occur due to faulty machinery and equipment used. Food for the construction workforce is usually provided by mobile individuals who usually operate without licenses. This might compromise the health of the workers especially if foodstuffs are prepared in unhygienic conditions or from unverified sources. There is also a potential risk for the spread of infectious diseases like Covid-19 during the project activities that could influence the work program when a large number of the workforce are infected.

Proposed mitigation measures include the following, among others:

- To reduce the workers' accidents and hazards, the Proponent will develop and commit the Contractors to site occupational health and safety rules and regulations as stipulated in the Occupational Safety and Health Act, 2007.
- The contractor shall maintain and inspect all machinery and equipment to prevent failure or unanticipated accidents. Equipment and materials that are not suitable for use will be removed from the site.
- Only properly trained employees will operate equipment or machinery and proper instructions in their safe operation shall be provided.

- All site workers shall be provided with full protective gear. These include working boots, overalls, helmets, goggles, earmuffs, masks, and gloves.
- The contractor shall use a personal flotation device (PFD) when working near waterways and ensure rescue buoys and throw bags are readily available.
- A first aid kit shall be provided within the site. This should be fully equipped at all times and should be managed by a qualified first aider.
- Workers will be trained on emergency preparedness and procedures.
- The contractor shall maintain a valid insurance cover for all his workers, machinery/ vehicles, and third parties.
- Adequate sanitary facilities including wash basins and soap will be provided and standard cleanliness maintained by the contractor.
- Training on Covid-19 awareness, screening of temperature for the workers, and encouraging workers to be inoculated with the Covid-19 vaccine will be done.
- Food handlers preparing food for the workers at the site will be controlled and monitored to ensure that food is hygienically prepared.
- The speed of vehicles in and around the project site will be controlled.
- The construction crew at the site will be sensitized to negative social issues such as drugs, alcohol, and infectious diseases.
- A lead person responsible for emergencies occurring on the site will be identified, appointed, and introduced to the construction workers. Visible emergency contact numbers will be made available at the site which all can access. This should include telephone numbers for the Police, Fire brigade, and Ambulance.
- The contractor shall make prior arrangements with health care facilities such as a Health Centre in proximity, a private doctor, or the Government Hospital to accommodate any affected worker.
- Work procedures will be adequately communicated to ensure certainty.
- The contractor shall restrict and control unauthorized access to construction sites to prevent accidents and injuries.
- All workers will be sensitized before construction begins on how to control accidents related to construction.
- Ensure that the workers are registered with NHIF / NSSF and remit appropriate fees.
- A comprehensive contingency plan shall be prepared before construction begins on accident response.
- Reports and records of health, safety, and environmental incidences shall be kept in chronological order as required by law.
- The contractor will develop a Human Resources Policy, which will outline worker rights to be included in all contracts including restrictions on working hours in line with applicable ILO standards, compensation including consideration of overtime and payment intervals, etc. County Labour offices to ensure these are enforced.

- Workers are to be issued contracts stipulating roles and responsibilities and obligations for both parties.
- The contractor will ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities
- Ensure that all site personnel are provided with an adequate supply of safe drinking water, which should be at accessible points at all times. Provide conveniently accessible, clean, orderly, adequate, and suitable washing facilities within the site.
- The contractor will ensure that its Code of Conduct is followed to regulate the performance and behaviour of all workers, including provision for disciplinary action for anti-social behaviour and non-compliance with health and safety regulations such as lack of use of PPE.
- Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restrictions on site, frequency, and personnel responsible for safety inspections and controls.
- The contractor to register the site with DOSH and avail the abstract of the Occupational Safety & Health Act 2007 must be displayed at prominent places within the site.
- Daily site inspections should be done to ensure safe work practices are adhered to;
- The contractor will prohibit the use of alcohol or drugs, which could adversely affect the ability of the employee to perform the work safely or adversely affect the health and safety of other employees, community members, or the environment. This needs to be supplemented by signage around the construction site.
- The contractor will implement regular health and safety checks and audits of workers, and implement sanctions in case of breaches of national standards and the Project's specific standards. Such audits include workplace H&S; worker contracts, working hours, pay, and conditions.
- The contractor will develop and implement a Workers' Grievance Mechanism for the Project workforce.

7.1.2.7 Waste Generation

The project will generate solid and liquid waste during the construction phase. Solid waste will mainly be in the form of excavated materials and materials generated by workers on-site. Solid waste if not well managed has the potential of causing disease outbreaks due to the creation of breeding conditions for various pests and rodents, attracting wild animals like monkeys or ending up in the river. The disposal of wastewater generated at the construction campsite is considered to have minor negative impacts on the groundwater.

The following mitigation measures are recommended:

- The contractor will develop solid waste and spoil management plan before the project commences, identifying optimal waste reuse options and disposal areas. An integrated solid waste management system, through a hierarchy of options: source reduction, recycling, composting, and reuse shall be practiced where applicable.

- The contractor or the proponent shall work in hand with NEMA licensed waste handlers and the County Environmental Personnel to facilitate proper segregation of waste at the source during the project cycle.
- Waste management bins shall be provided at strategic places within the work site.
- All construction debris and solid waste generated by the workforce must be taken out of the site and disposed of at a specified and NEMA-approved dumpsite. The boulders can be used as construction by-product material or as garden ornaments where applicable.
- Any disposal shall be carried out by a NEMA licensed person/company to a NEMA-approved site. Any soil potentially contaminated by chemicals, oils, fuels, etc. must be collected and disposed of by a NEMA-authorized waste handler.
- The waste shall be managed in accordance with the provisions of the Waste Management Regulations, 2006.
- The contractor shall provide sanitary conveniences for the construction workers for the disposal of sewage and ensure proper decommissioning of all sanitary facilities.
- The trucks should be covered during the transportation of all the building materials and waste.
- Sensitize workers on the reuse of materials where appropriate. Large sections of the excavated material will be re-utilized on site for the backfilling of the trenches.
- Where potentially hazardous substances (oils and greases) are being disposed of, a chain of custody documentation will be kept with the environmental register as proof of final disposal.

7.1.2.8 Impact on Eco-tourism

During the construction phase, the project will necessitate a temporary change in landscape and scenery. This will be a result of the presence of excavation equipment and the removal of vegetation that will cause a change in the landscape due to excavation and fills. It will also lead to the destruction of the nature walk trail at one cross path to the riparian reserve at an approximate width of 1m and at the entrance of the forest at an approximate width of 5m. This will have an influence on the visual and aesthetic quality of the area. Abandon construction material would have an impact on the scenic quality if not removed soon after completion. This impact will however be short-term.

Mitigation Measures:

- Project activity will be well designed to minimize the importation of materials, and work will be programmed in such a way that the area's visual aspects are not unduly interfered with. Project activities and the workers with branded Contractor’s PPE will be restricted at the identified alignment corridor. Necessary and relevant stockpiling will be done to minimize the importation of materials.
- Areas affected by vegetation clearing will be re-vegetated with suitable tree and vegetation species in liaison with the stakeholders.
- To retain wildlife habitats in the area, if any, vegetation removal shall be kept at a minimum.
- Careful site planning of the construction program will help reduce the amount of vegetation clearing.
- The contractor will reinstate all the nature walk trails that will be affected by the project.

7.1.2.9 Social Tensions and Conflicts

Social tensions and conflicts emerge mainly due to acts of omission or commission by the project Proponent or Contractor, for example, due to delays. Tensions may occur with employment opportunities, especially where local communities are not accorded priority in employment as unskilled labours. Misunderstanding amongst stakeholders, for example on actions or way forward on arising matters, may result in tensions.

Mitigation Measures:

- The contractor will formulate a grievance redress mechanism where arising matters will be registered and immediate action will be taken as soon as possible upon receipt of a complaint.
- A standard form will be kept on-site by the Resident Engineer to log in any complaints or grievances. All incidents and complaints will be recorded by the contractor in chronological order in an incident reporting system.
- Investigations of complaints shall be completed within seven days of receipt where possible and corrective actions given as a way forward.
- All incidents or complaints about either environmental or social issues will be managed in accordance with the existing procedure in line with the legal framework.
- The contractor will ensure that local community members are given consideration during the employment of labour.
- The contractor shall ensure labourers are above 18 years of age to avoid child labour.
- The contractor will provide on-the-job training to local labourers to upgrade existing skills.
- The contractor will give attention to gender distribution in employment and ensure that women get an equitable share of employment opportunities.

7.1.2.10 Labour Influx

The construction works are likely to get people moving into the project area seeking employment opportunities and this may lead to conflicts that may delay or even stop the works.

Mitigation Measures:

- The contractor will ensure that any hiring of semi-skilled or unskilled labour prioritizes members of the local community.
- All employees are required to attend an induction-training course prior to commencing work on-site to ensure they are familiar with the CoC they should sign before the commencement of work. The CoC should include the promotion of workers' rights.
- The contractor shall comply with the International Labour Organization Standards ratified in Kenya which include but are not limited to the prohibition of forced labour (ILO No 29) and Abolition of forced labour (ILO No 159).

7.1.2.11 Gender Mainstreaming

There should be no form of discrimination or unfair labour or employment practices against any gender, especially since it's common in most construction sites to discriminate against women. Women face greater economic vulnerability as their labour participation is often highly informal, without social protection. Low-income women and women migrant workers are especially vulnerable.

Mitigation Measures:

- The contractor shall ensure compliance with the gender balance as required by the 2/3 gender rule.
- The contractor will ensure that equal employment opportunities are afforded for both men and women on-site, especially women where possible.
- The contractor will give attention to gender distribution in employment and ensure that women get an equitable share of employment opportunities.
- Ensure safe employment for women, including training for all staff on sex-disaggregated sanitation facilities, regular consultation with female employees, and other measures to ensure the physical safety and dignity of female employees.

7.1.2.12 Child Protection

National and international laws require that children are protected from abuse, inhuman treatment, and hazardous or exploitative labour. The law provides a child to be that individual under the age of eighteen years.

Mitigation Measures:

- Under no circumstances should children below the age of 18 years be employed to work on this site.
- Children to be treated (persons under the age of 18) with respect regardless of race, color, language, religion, political or other opinions, national, ethnic, or social origin, property, disability, birth, or any other status.
- No use of language or behavior towards women or children that is inappropriate, harassing, abusive, sexually provocative, demeaning, or culturally inappropriate.
- Sexual activity with children under 18-including through digital media is prohibited. Mistaken belief regarding the age of a child and consent from the child is not a defense.

7.1.2.13 Child Labour and Exploitation

Due to the hard economic times and increased number of orphans, the children have become household heads and may be tempted to seek jobs at the site to support their siblings.

Mitigation Measures

- The contractor shall ensure labourers are above 18 years of age to avoid child labour.

7.1.2.14 Sexual Exploitation and Abuse

The project may also lead to Sexual Exploitation and Abuse (SEA). This refers to sexual exploitation and abuse committed by Project staff against communities and represents a risk at all stages of the project, especially when employees and community members are not clear about prohibitions against SEA in the Project.

Mitigation Measures:

- Sensitization of staff on SEA and consequences of non-compliance including dissemination of project-level Information, Education, and Communication (IEC) materials.

- Training on Gender-Based Violence awareness will be conducted.
- Develop and implement a SEA action plan with an Accountability and Response Framework as part of the ESMP. The SEA action plan will follow guidance on the Africa Development Bank Code of Conduct (CoC) obligation addressing Sexual Exploitation in Investment Project Financing.
- The contractor to provide a mechanism where workers are free to report any sexual advances and abuse to the senior management without fear of intimidation.
- Ensure a clear human resources policy against sexual harassment that is aligned with national law.
- Integrate provisions related to sexual harassment in the employee CoC.
- Ensure appointed human resources personnel manage reports of sexual harassment according to policy.

7.1.2.15 Spread of HIV/AIDS

Development initiatives can promote HIV transmission through the interaction of workers with the community. However, the incorporation of HIV/AIDS as an impact in the project cycle can have a positive impact by proactively providing opportunities for scaling-up HIV prevention efforts.

Mitigation Measures

- Workers will be sensitized to cultural sensitivities and public health including HIV/AIDS, and communicable and sexually transmitted diseases.
- Advocacy and awareness programs on HIV/AIDS and behavior change, health education, and prevention measures.

7.1.2.16 Spread of COVID 19

During the construction phase, there is a risk of the spread of COVID-19. Inadequate ventilation is an aspect of the physical environment that promotes the transmission of the disease during the construction phase of the project. With the influx of people during construction, there will be a likelihood of an increase in the spread of the disease.

Mitigation Measures

- Wearing prescribed and appropriate PPE (including masks) on-site at all times.
- Regularly washing hands, sanitizing, and observing social distancing at all times as well as following WHO and GoK updated guidelines.
- Seeking healthcare services immediately if one experiences any of the following symptoms (while at home or work): cough, fever, and shortness of breath.
- Train staff on COVID-19 control measures such as respiratory hygiene, cough etiquette, hand hygiene, and use of PPE;
- Place signs and posters in areas around the project site to create awareness to protect workers against COVID-19.
- When more than one person is gathered maintain a social distance of at least 1.5 meters.
- Clean up the tools and equipment used on site with soap and water or use sanitizer as appropriate.

- Provide an easily accessible GRM to raise workplace concerns relating to COVID-19; such as encouraging reporting of co-workers if they show outward symptoms.

7.1.2.17 Community Health and Safety

The project will create some minor potential adverse impacts on the health, safety, and security of the communities. This may occur where trenches and manholes are left open and exacerbated by poor signage. Interaction of the project workers with the nearby community may contribute to the spread of communicable diseases such as HIV/AIDS and COVID-19.

Mitigation Measures

- The contractor will ensure all open trenches are backfilled, manholes are covered, and proper signage are erected.
- Advocacy and awareness programs will be conducted on COVID-19, HIV/AIDS and behaviour change, health education, and prevention measures.
- A grievance redress mechanism will be put in place to register and resolve community grievances.

7.1.3 Grievance Redress Mechanism (GRM)

Grievance Redress Mechanism (GRM) will be established for the project as a whole. The contractor will employ a sociologist who will be responsible for collating written complaints and coordinating responses to all complaints. A grievance form will be formulated and made available at the site for complainants to fill. Both verbal and written complaints are to be entered into a formulated Grievance Redress Log. The grievance will be assigned a number and recorded in chronological order in the grievance redress log with the dates received. The sociologist will follow up on the raised concern and record in the grievance log the resolution undertaken, when, and indicate when the complaint case raised is closed. Grievance Redress Committee (GRC) constituting the environmental health and safety officer, resident engineer, administration representative, and stakeholder's representative will form resolutions on complaints and grievances about any irregularities applying or transpiring from the project activities. All complaints shall be responded to in writing, though a verbal response will be provided as well if this is more appropriate in the circumstances. All complaints must be responded to within seven days of being received.

The contractor's sociologist will provide a monthly report detailing the number of complaints, and complaints resolved to indicate the dates they were resolved and any outstanding issues to be addressed. Monthly reports will include an analysis of the type of complaints, levels of complaints, and actions taken to reduce complaints.

7.2 Operational Phase Impact Assessment

During the operational phase, both positive and negative impacts are likely to occur.

7.2.1 Positive Impacts

7.2.1.1 Improved Sanitation

The number of households is estimated to be 2,298 households to benefit from this proposed trunk sewer extension and related reticulation sewers. The project will improve the sanitation in the project

area by providing an improved sewer network coverage that will collect the raw wastewater, and generally that which is currently discharged in open channels and nearby rivers. This will result in a significant reduction of water-related health issues.

The project will have significant inherent environmental benefits by reducing the amount of untreated sewerage discharged into the environment and Nairobi rivers, thus contributing to improving sanitation. This will result in cleaner rivers and improved groundwater quality. The project will benefit the PAPs by eliminating the use of septic tanks and their associated cost.

7.2.2.2 Reduction of Health Risks

Health risks associated with exposure of residents to improperly drained sewage in their surroundings will be significantly reduced. Waterborne diseases resulting from possible microbial pollution of drinking water obtained from contaminated shallow wells, or through suction of contaminated water with sewerage in water supply pipes will be drastically reduced.

7.2.2.3 Improved Standards of Living

There will be improved living conditions that would contribute to alleviating poverty conditions through employment opportunities in the operation phase of the project. Economic benefits will also be felt by saving money that would otherwise have been used on healthcare expenses from improper sewerage systems.

Improved state of sanitation and hygiene in the target areas will have overall effects on acceptable habitation and an aesthetic environment.

7.2.2.4 Employment Opportunities

Operation of the sewer system will create additional long-term skilled and semi-skilled job opportunities.

Enhancement Measure:

- Locally qualified people will be prioritized in these job opportunities.

7.2.2.5 Increase in Revenue to the Government

Relevant fees and rates will be paid to the various government institutions like the NCWSC that will contribute to the local and national revenue earnings. The operation of this sewer will have a return on investment to the proponent thus a viable economic investment.

7.2.2 Negative Impacts

7.2.2.1 Land, Soil, and Water Contamination

Soil and water may get contaminated near burst sewer lines or manhole overflow locations. This may result in physical changes in the soil and such as leaching, changes in humus content, and porosity, and chemical changes such as salinity or availability of nutrients like nitrogen, potash, phosphorus, etc. Introduced nutrients change the quality of water which has a knock effect on the quality of the aquatic ecosystem.

Mitigation Measures:

- High-Density Polyethylene (HDPE) pipe will be used in this sewer project due to its high level of impermeability and strong molecular bond that makes it suitable for high-pressure pipelines. HDPE pipes are resistant to chemical and corrosion reactions without a need to use a protective coating or galvanizing. They are flexible with a life expectancy of 50-100 years. They are cost-effective to install and have long-term maintenance cost savings.
- The water and sewerage service provider will ensure that proper and periodic maintenance of sewer lines is undertaken to prevent sewerage breakage.
- Sewers have been designed to ensure sufficient hydraulic capacity to accommodate peak flows which will prevent the overloading of sewers.
- Awareness-raising among community members will be conducted not to dump solids in manholes.
- The WSP shall conduct regular cleaning of grit chambers to remove grease, grit, and other debris that may lead to sewer bursts.
- The contractor shall design manhole covers that can withstand unanticipated loads with covers that can be readily replaced if broken to minimize entry of garbage and silt into the system.
- Regular monitoring and sampling of the wastewater at various points along the system shall be conducted by the WSP.

7.2.2.2 Occupational Health and Safety

During the operational stage, occupational health and safety risks would be due to exposure to dangerous working conditions at the sewerage treatment plant at Ruai. The wastewater may contain chemicals, radioactive substances, and heavy metals, which typically accumulate in the water treatment sludge. In addition, workers may be exposed to hydrogen sulfide, methane, carbon monoxide, chloroform, and other chemicals generated during wastewater treatment. This might lead to irritation of the eyes and skin, corneal injury, neurotoxic effects, and hemorrhagic pulmonary edema. Heavy metals can cause neurological complications, such as Alzheimer's and Parkinson's disease, kidney dysfunction, cancer, hepatotoxicity (damage to the liver due to toxicity), and reproductive and developmental toxicity.

Mitigation Measure:

- Workers shall be equipped with appropriate PPE at all times and emergency safety measures must be provided at all sewerage treatment plants and laboratories in case of accidents such as injuries or explosions.
- The Nairobi City Water and Sewerage Company (NCWSC) shall also implement a training program for operators who work at the sewerage treatment plants and are involved in dangerous manual or machine operations and/or handle dangerous chemicals such as chlorine and ammonia regarding safe handling practices and emergency response procedures.
- The operators shall use fall protection equipment when working at heights.
- NCWSC shall implement fire and explosion prevention measures in accordance with internationally accepted standards.

7.2.2.3 Community Health and Safety

A burst in the sewer system poses a serious threat to public health and the ecosystem. This could be informed of consumption of contaminated drinking water, food-chain transmission, and direct contact with sewer overflow. It is therefore important for the operators to optimize water and wastewater treatment plants, and regular maintenance to ensure the sewer system is working efficiently.

Mitigation Measures:

- Regular maintenance of the sewer system and monitoring of the sewer flow.
- Community awareness programs on the proper disposal methods of solid waste other than manholes to avoid blockage of the sewer system.
- Public awareness on personal hygiene and point-of-use water treatment such as boiling drinking water.

7.3 Decommissioning Phase Impact Assessment

Decommissioning is an important phase in the project cycle and comes as the last to wind up the operations/activities of a project. The main purpose of decommissioning is to restore/rehabilitate the project site to acceptable standards. Rehabilitation is to occur after the close down of the project and when its no longer economically viable to continue operating it. It will entail the reestablishment of topographical elements once the sewer line is no longer in use. Particularly this is key as the sewer line passes through a forest and along a river.

This section describes the anticipated positive and negative impacts during decommissioning stage.

7.3.1 Negative Impacts

7.3.1.1 Noise Pollution

Demolition of the sewer line infrastructure and removal of construction materials on site are likely to produce noise. This will be a short-term impact and will be felt throughout the demolition process

Mitigation measures include:

- Schedule noisy activities during the daytime.
- Use silencers on machines where possible.
- Ensure machinery is well maintained to reduce noise.

7.3.1.2 Solid Waste Generation

Demolition of project-related infrastructure will result in the generation of solid waste. Thus, creating a need of disposing of the waste and all the disadvantages associated with waste mismanagement will arise such as the spread of diseases. It is hoped that this phase will be implemented only under unavoidable circumstances for instance aging of the building and/or pertinent rights arising. All equipment will be dismantled and removed from the site on decommissioning of the project. Priority should be given to the reuse of this equipment. This being an infectious waste management facility, all

materials/ machines deemed fit for further use MUST be disinfected thoroughly before being put into any other use.

Mitigation Measures:

- Construction materials will be removed from the site.
- Construction materials will be re-used in other projects where possible and waste will be disposed of in NEMA-approved dumpsites by licensed NEMA waste handlers.
- Collection and sorting for waste disposal or recycling to ensure NEMA waste management regulations and procedures are followed as required.

7.3.1.3 Air Quality and Dust

The demolition process will likely generate dust and particulate matter in the vicinity. This will affect the visibility of the area and may lead to an increase in respiratory problems. The impact will be short-term and will last within the duration of the demolition process.

Mitigation Measures:

- Proper PPE should be used during this phase including masks and robes.
- The project area should be dewatered to reduce dust emissions.

7.3.1.4 Impact on Land and Soil

The aesthetic beauty of the land will be affected during the demolitions, and possible soil erosion and contamination. Contamination may originate from the equipment and removal of installed pipe systems containing hazardous substances.

Mitigation Measures:

- Restoration of the affected site e.g. rising main route etc. through landscaping and planting vegetation cover.
- The proponent must ensure that the workers are aware of the procedure for dealing with spills and leakage.
- Relevant authorities should be notified to contain the contaminated spill.

7.3.1.5 Occupational health and safety

The overriding concerns for the demolition phase will be safety and minimization of environmental impacts. This will include the safety of the operatives, the safety of the other workers on the site, and the safety of the general public as well as protection of adjacent facilities and minimization of nuisances.

Mitigation Measures:

- The Contractor will ensure and verify that all utilities and services (such as water and electricity supply systems) have been disconnected and rendered safe.
- Portable barricades could be used to cordon off different work zones where demolition is in progress with manned entrances.
- No members of the public or unauthorized person would be allowed to enter the site.
- Only contractor personnel and government officials concerned with the demolition will be allowed within the project site.

- All workers involved in the demolition exercise should be provided with appropriate PPE including safety boots, overalls, helmets, hand gloves, and dust masks.

7.3.2 Positive Impacts

7.3.2.1 Site Rehabilitation

The decommissioning phase will lead to the rehabilitation of the site. This will ensure that the environment is left as natural as possible and close to or in a better state than it was before the implementation of the project.

Mitigation Measures:

- A reforestation program will be carried out in this phase. The proponent will engage stakeholders in the reforestation program that will include the re-vegetation of soil-exposed areas with suitable trees. This will improve the visual and aesthetic quality of the area.
- Proper erosion control measures during re-vegetation.
- Proper monitoring and inspection of the site for indications of erosion; and Fencing and signs restricting access to minimize disturbance.

7.3.2.2 Employment Opportunities

Several employment opportunities will be created for demolition and construction staff. Skilled, semi-skilled, and unskilled workers will be employed during the decommissioning phase. However, this phase will result in the loss of employment opportunities for several workers at the project closure. The loss of employment will have far-reaching impacts as it will lead to loss of income and livelihoods.

Mitigation Measures:

- The contractor will notify the employees in advance of the project closure date. The contractor will provide counseling in readiness for project closure.
- The contractor where possible will refer workers to other project sites for job opportunities.

Table 7.2: Summary of Assessed Impacts Criterion

Potential Environmental Impact	**Impact Criterion**							
	Positive or Negative Impact	**Likelihood of Occurring**	**Duration**	**Timing**	**Significance**	**Extent**	**Project Phase**	**Overall Impact Rating**
Environmental Issue								
Flora	-ve	Certain	Medium	Immediately	High	Project Area	Construction	High
Fauna	-ve	Possible	Short	Immediately	High	Project Area	Construction	High
Soil Erosion	-ve	Certain	Short	Immediately	High	Project Area	Construction	High
Air Quality	-ve	Possible	Short	Immediately	Low	Surrounding Environs	Construction	Moderate
Noise Pollution	-ve	Certain	Short	Immediately	Medium	Surrounding Environs	Construction and Demolition	Moderate
Waste Generation	-ve	Certain	Short	Immediately	Medium	Project Area	Construction/ Demolition	High
Eco-Tourism	-ve	Possible	Short	Immediately	Medium	Project Area	Construction	Moderate
Soil and Land Contamination	-ve	Unlikely	Medium	Near Future	High	Project Area	Operation	Moderate
Social Economic and Cultural Issues								
Social Tension and Conflict	-ve	Possible	Short	Immediately	Moderate	Project Area	Construction	Moderate
Employment Opportunities	+ve	Certain	Medium	Immediately	High	Surrounding Environs	Project Cycle	High
Skill Transfer	+ve	Certain	Long	Immediately	High	Project Area	Construction	High
Gender Mainstreaming	+ve	Certain	Short	Immediately	High	Project Area	Construction	High

Potential Environmental Impact	**Impact Criterion**							
	Positive or Negative Impact	**Likelihood of Occurring**	**Duration**	**Timing**	**Significance**	**Extent**	**Project Phase**	**Overall Impact Rating**
Child Labour and Exploitation	-ve	Unlikely	Short	Immediately	High	Project Area	Construction	High
Sexual Exploitation and Abuse	-ve	Possible	Short	Immediately	High	Project Area	Construction	Moderate
Increase in transmissible diseases	-ve	Possible	Short	Immediately	Medium	Project Area	Construction	Moderate
Increase in National Economic Growth	+ve	Certain	Long	Near Future	High	Beyond Surrounding Environs	Operation	High
Increase in Local Economic Activities	+ve	Certain	Long	Near Future	High	Surrounding Environs	Construction	High
Health and Safety								
Occupational Health and Safety	-ve	Possible	Medium	Immediately	High	Project Area	Project Cycle	High
Dust Pollution	-ve	Certain	Short	Immediately	Medium	Project Area	Construction	Moderate
Health Risks Associated with Burst Sewers	-ve	Unlikely	Medium	Near Future	High	Surrounding Environs	Operation	High

CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This chapter provides a structure of actions that will be taken for the management of the environment during the construction, operation, and decommissioning of the proposed project. Environmental management is best achieved by developing and implementing an Environmental and Social Management Plan (ESMP), which ensures that environmental impacts are identified and mitigated during all phases of the project.

The ESMP outlined addresses the identified issues of concern and mitigation measures as well as roles, costs, and monitoring indicators that can help to determine the effectiveness of actions to upgrade the quality of the environment as regards the proposed project.

8.1 Purpose and Objective of ESMP

The purpose of the Environmental and Social Management Plan (ESMP) is to:

- initiate a mechanism for implementing mitigation measures for the potential negative environmental impacts and monitor the efficiency of these mitigation measures based on relevant environmental indicators.
- identify roles and responsibilities for different stakeholders for implementation, supervision, and monitoring.
- monitor results that will provide feedback on the success or otherwise of mitigation measures in protecting the environment.
- ensure compliance with environmental standards, and facilitate any needed project design or operational changes. This will ensure corrective actions are taken for the effective implementation of mitigation measures.
- track the project's actual impact, reduce environmental risks associated with the project, and allow for project modifications to be made where required.

Monitoring will be in the form of:

- physical monitoring through visual observations;
- biological monitoring through the selection of environmental parameters, sampling, and regular testing of these parameters.
- social monitoring through assessment of cultural integration and socio-economic activities around the project area.

8.2 ESMP for the Construction Phase

Table 8.1: Environmental and Social Management Plan during the Construction Phase

Environmental/ Social Impact	**Proposed Mitigation Measures**	**Responsibility for mitigation**	**Performance indicator**	**Verifiers (Sources/Means of Verification)**	**Estimated Cost (Kshs)**
Pre- Construction Phase					
Approval from NEMA and other Agencies for ESIA report	• The Proponent shall ensure that all pertinent permits, certificates, and licenses have been obtained prior to any activities commencing on-site and are strictly adhered to.	Implementation: Proponent/ Contractor Monitoring: NEMA	- EIA/ No of EIA Permits obtained	Copy of ESIA certificate	500,000.00
Setting out and clearance of project route	• Demarcation of riparian reserves by the Water Resource Authority (WRA).	Implementation: WRA Monitoring: WRA	-Visibly marked riparian reserve by WRA.	WRA marked peggings	200,000.00
	• Joint setting with KFS of the area to be cleared	Implementation: Supervising Engineer/KFS Monitoring: KFA in collaboration with CFA.	Visibly marked alignment corridor with white pegging.	Pipe laid along the identified alignment corridor.	
Construction Phase					
Impact on Flora	• Ensure a permit for working within the forest (special use license) is obtained from the	Implementation: Proponent	• Special Use	Copy of the SUL	10,000,000 .00

	KFS as per the Forest Conservation and Management Act, 2016. • Compensate KFS for the loss of 4,708 stems of forest species identified along the alignment corridor.	Monitoring: KFS	License (SUL)		
	• Clearing of vegetation and project activities will be restricted within the proposed sewer alignment corridor. This will be done over a relatively narrow corridor of 6m or less, both as a way of saving cost and protecting the vegetation. The extent of areas to be cleared and those that must not be cleared shall be identified. • Work in collaboration with the KFS and Ngong Road Forest CFA to ensure the replanting of destroyed trees in cleared areas where works are complete. • Access roads to be used for machinery and vehicle movement during construction will be determined to avoid the	Implementation: Contractor Monitoring: Supervising Engineer in collaboration with KFS and CFA	-Pipe laid at a relatively 6m corridor. -Number of types of permits. - Number of trees planted.	• Photos of rehabilitated area.	No Cost

	unnecessary trampling of vegetation. • Ensure that the affected/damaged forest nature trails and related infrastructure are restored. • A photographic record will be prepared by the contractor prior to the commencement of construction for areas of the site that are to be rehabilitated. This will be used as a baseline against which to measure the success of rehabilitation.				
Impact on Fauna	• Awareness raising regarding natural resource management • Carefully designed and implemented safeguarding plans for protected areas • Manage waste in a way that prevents the poisonous types from being accessed by wildlife. • Restoration of the alignment corridor with appropriate species recommended by KFS.	Implementation: KFS/Supervising Engineer Monitoring: KFS in collaboration with CFA.	• Implementation of proper waste management. • Number of trees and restoration of alignment corridor with appropriate species	• Inventory of solid waste collected. • Record of type of species planted along the alignment corridor. • Photos of restored alignment corridor	500,00.00

			recommended by KFS.	with appropriate vegetation species.	
Soil erosion and contamination	• Construction machinery will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off. • Topsoil removed during excavation will be stored separately and used for reinstatement. • Vegetation disturbance shall be minimized by using established access routes. • Exposed areas will be replanted with suitable vegetation immediately after the construction phase. • Loose soils will be compacted to minimize wind erosion. • The contractor shall minimize vehicle movement as much as possible.	Implementation: Contractor Monitoring: Supervising Engineer in collaboration with NEMA/KFS	Number of risks and Corrective action assessments. Workers wearing protective gear. Monitoring of the stream nearby.	• Photos of reinstatement work using appropriate material. • Inventory of number and types of species planted along the alignment corridor. • Records of vehicle maintenance. • Absence of soil contamin	No Cost

	• Construction vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum. Drivers and workers will be trained in oil and fuel management.			ation due to leaks.	
Air pollution	• A speed limit of 20km/h should be observed within the site during construction phases to reduce dust particles emission. • Use of environmentally friendly fuels such as Low Sulphur diesel. • Minimizing the period for the idling of machinery and construction vehicles. • Regular maintenance of construction machinery and equipment to minimize the generation of hazardous gases will be done by the contractor. • Ensuring wastes are well disposed of in approved designated areas. • Providing PPEs such as nose masks to the workers in dusty areas on the site.	Implementation: Contractor Monitoring: Supervising Engineer / County Public Health Officer	-Proportion of workers with requisite PPEs including respirators, nose masks, and earplugs used by workers. - Random analysis of how many of the workers have PPEs, and the extent of PPE use. - No and type of PPEs procured. - Analysis of inventory list/invoices	• Records on complaints raised on air pollution. • Plant leaves without excess dust cover. • Nil visible dust particulate in the air	No Cost

	• All personnel working on the project will be trained before starting construction on methods for minimizing air quality impacts during construction. • Drivers of construction including bulldozers, earth-movers, etc. will be under strict instructions to minimize unnecessary trips and minimize idling of engines.		and records of vehicle maintenance and collection of waste.		
Noise and excessive vibrations	• Construction works will be carried out only during the specified time of 0800-1800hrs. • Machinery shall be maintained regularly to reduce noise. • Workers near the source of the noise shall wear safety and protective gear such as earmuffs. • The project implementation team shall comply with the Environmental Management and Coordination (Noise and Excessive Vibration	Implementation: Contractor Monitoring: Supervising Engineer / County Public Health Officer	• Service, maintenance, repair, or replacement records of faulty machines. - Records of PPEs procured and issued to the workers.	• Records of workers' sign-in and Sign out the timesheet • Records of type of PPEs issued to workers	150,000.00

	Pollution) (Control) Regulations, 2009. • Construction work shall be restricted within the designed corridor to prevent physical and psychological effects. • Sensitize operators of construction machinery on the effects of noise.				
Oil pollution	• Proper storage, handling, and disposal of new/used oil and related wastes. • Maintain construction machinery and equipment to avoid leaks. • Maintenance of construction vehicles to be carried out off the site.	Implementation: Contractor Monitoring: Supervising Engineer / NEMA	• Records of vehicle maintenance services at the campsite garage.	- Records of machines/ vehicle maintenanc e	No Cost
Waste generation	• The contractor will develop a solid waste management plan before the project commences, identifying optimal waste reuse options and disposal areas. An integrated solid waste management system, through a hierarchy of options: source reduction, recycling, composting, and reuse shall	Implementation: Contractor Monitoring: Supervising Engineer / NEMA	• Weekly waste collection inventory	- Copy of licensed waste handlers - Waste disposal records - Number of waste receptacles - Waste manageme	No Cost

	be practiced where applicable. • The contractor or the proponent shall work in hand with NEMA licensed waste handlers and the County Environmental Personnel to facilitate proper segregation of waste at the source during the project cycle. • Waste management bins shall be provided at strategic places within the work site. • All construction debris and solid waste generated by the workforce must be taken out of the site and disposed of at a specified and NEMA-approved dumpsite. The boulders can be used as construction by-product material or as garden ornaments where applicable. • Any disposal shall be carried out by a NEMA licensed person/company to a NEMA-approved site. Any soil potentially contaminated by chemicals, oils, fuels, etc must be collected and			nt plan in place	

	disposed of by a NEMA-authorized waste handler. • The waste shall be managed in accordance with the provisions of the Waste Management Regulations, 2006. • The contractor shall provide sanitary conveniences for the construction workers for the disposal of sewage and ensure proper decommissioning of all sanitary facilities. • The trucks should be covered during the transportation of all the building materials and waste. • Sensitize workers on the reuse of materials where appropriate.				
Health and safety of Workers	• To reduce the workers' accidents and hazards, the Proponent will develop and commit the Contractors to site occupational health and safety rules and regulations as stipulated in the Occupational Safety and Health Act, 2007.	Implementation: Contractor Monitoring: Supervising Engineer / DOSH	• Records of remitted statutory requirements (NSSF/NHIF). • Contractor's existing	- Valid copies of statutory requirements under OSHA,2007	No Cost

	• The contractor shall maintain and inspect all machinery and equipment to prevent failure or unanticipated accidents. Equipment and materials that are not suitable for use will be removed from the site. • Only properly trained employees will operate equipment or machinery and proper instructions in their safe operation shall be provided. • All site workers shall be provided with full protective gear. These include working boots, overalls, helmets, goggles, earmuffs, masks, and gloves. • A first aid kit shall be provided within the site. This should be fully equipped at all times and should be managed by a qualified first aider. • The contractor shall maintain a valid insurance cover for all his workers. • Adequate sanitary facilities will be provided and standard		valid insurance covers. • Availability of existing sanitary facilities. • Visible emergency contact numbers. • Stocked first aid kits. • Inspect workers' PPEs. Records of incidents or accidents.	- Occupational accidents register - Lost workday cases - Training certificates	

	cleanliness maintained by the contractor. • Food handlers preparing food for the workers at the site will be controlled and monitored to ensure that food is hygienically prepared. • The speed of vehicles in and around the project site will be controlled. • The construction crew at the site will be sensitized to negative social issues such as drugs, alcohol, and infectious diseases. • A lead person responsible for emergencies occurring on the site will be identified, appointed, and introduced to the construction workers. Visible emergency contact numbers will be made available at the site which all can access. This should include telephone numbers for the Police, Fire brigade, and Ambulance. • The contractor shall make prior arrangements with health care facilities such as a				

	Health Centre in proximity, a private doctor, or the Government Hospital to accommodate any affected worker. • Work procedures will be adequately communicated to ensure certainty. • The contractor shall restrict and control unauthorized access to construction sites to prevent accidents and injuries. • All workers will be sensitized before construction begins on how to control accidents related to construction. • Ensure that the workers are registered with NHIF / NSSF and remit appropriate fees. • A comprehensive contingency plan shall be prepared before construction begins on accident response. • Reports and records of health, safety, and environmental incidences shall be kept in chronological order as required by law.				

Eco-tourism	• Project activity will be well designed to minimize the importation of materials, and work will be programmed in such a way that the area's visual aspects are not unduly interfered with. • Areas affected by vegetation clearing will be re-vegetated with suitable tree and vegetation species in liaison with the stakeholders. • To retain wildlife habitats in the area, if any, vegetation removal shall be kept at a minimum. • Careful site planning of the construction program will help reduce the amount of vegetation clearing. • The contractor will reinstate all the nature walk trails that will be affected by the project.	Implementation: Contractor Monitoring: Supervising Engineer in collaboration with NEMA/KFS and CFA	- Project activities within the alignment corridor. -Removal of construction materials after completion.	- Storage of equipment at the designated area. - Implementation of the revegetation program.	2,000,000.00
Social Conflict	• The contractor will formulate a grievance redress mechanism where arising matters will be registered and immediate action will be	Implementation: Contractor Monitoring: Supervising Engineer	- Records of training programs conducted. - Records of filed	- Number of workers employed from the local community.	500,000.00

	taken as soon as possible upon receipt of a complaint. • A standard form will be kept on-site by the Resident Engineer to log in any complaints or grievances. All incidents and complaints will be recorded by the contractor in chronological order in an incident reporting system. • Investigations of complaints shall be completed within seven days of receipt where possible and corrective actions given as a way forward. • All incidents or complaints about either environmental or social issues will be managed in accordance with the existing procedure in line with the legal framework. • The contractor will ensure that local community members are given consideration during the employment of labour. • The contractor shall ensure labourers are above 18 years of age to avoid child labour.		grievance forms.	- Employment of adults above the age of eighteen. - Employment slots for women. - Training certificates	

	• The contractor will provide on-the-job training to local labourers to upgrade existing skills. • The contractor will give attention to gender distribution in employment and ensure that women get an equitable share of employment opportunities. • Workers will be sensitized to cultural sensitivities and public health including HIV/AIDS, and communicable and sexually transmitted diseases. • Advocacy and awareness programs on HIV/AIDS and behaviour change, health education, and prevention measures. • Sensitization of staff on SEA and consequences of non-compliance including dissemination of project-level Information, Education, and Communication (IEC) materials. • Additional environmental awareness training of the				

	workforce with respect to procedures to be followed for environmental incidents or complaints will be undertaken.				

8.3 ESMP for the Operation Phase

Table 8.2: Environmental and Social Management Plan during the Operation Phase.

Environmental/ Social Impact	**Proposed Mitigation Measures**	**Responsibility for mitigation**	**Performance indicator**	**Verifiers (Sources/Means of Verification)**	**Estimated Cost (Kshs)**
Sewage/ wastewater spillage	• Regular inspection and maintenance of the internal sewer system. • Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas. • Inspection of the condition of sanitary sewer structures and identifying areas that	Implementor: Nairobi City Water and Sewerage Company (NCWSC)	- Regular inspection and maintenance of manholes. - Quality of water downstream. - Periodic water test on BOD, temperature, Total Suspended Solids (TSS), COD, Ammonia Nitrogen (NH3-N), PH, and fecal coliform counts.	Records number of inspections	100,000.00

	need repair or maintenance. • Monitoring of sewer flow to identify potential inflows and outflows. • Immediate clearing of blockage or repairs warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow. • Monitor water quality, both in the river and in the conveyance system				
Suffocation due to hydro-sulfide	• Gas masks during inspection and maintenance of internal sewer system. • Implement fire and explosion prevention measures in accordance with internationally accepted standards; • Implement a training program for operators regarding safe handling practices and emergency response procedures;	Implementor: Nairobi City Water and Sewerage Company (NCWSC)	- Accidents report register	- Training certificates - Evidence of emergency response mechanism plan.	No Cost

	• Provide appropriate personal protective equipment.				

8.4 ESMP for Decommissioning Phase

Table 8.3: Environmental and Social Management Plan during the Decommissioning Phase

Environmental/ Social Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Performance indicator**	**Verifiers (Sources/Means of Verification)**	**Estimated Cost (Kshs)**
Solid Waste Generation	• All removed materials that will not be used for other purposes must be removed and recycled/reused as much as possible. • Where recycling/reuse of the removed materials and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site	Implementation: Proponent	- Amount of generated waste and stockpiles	- Absence of litter - Records of waste disposed of at NEMA-approved disposal sites	No Cost
Degeneration of vegetation at the demolition site	• Implement an appropriate re-vegetation program to	Implementation: Proponent	- Number of trees planted.	- Presence of vegetation in the	No Cost

	restore the site to a better status. • Consider the use of indigenous plant species in re-vegetation. • Constant monitoring and inspection of the demolition work to prevent accidents.		- Biomass volume present	affected project area.	
Socio-economic impact	• Offer advice on alternative income-generating ventures to workers • Redeploy workers where opportunities avail.	Implementation: Proponent	- Number of training offered to affected staff.	- Redeployment of workers	No Cost Expected

CHAPTER 9: CONCLUSION AND RECOMMENDATIONS

9.1 Conclusions

The Government of Kenya through the Ministry of Water & Sanitation and Irrigation has an objective of improving the sewerage infrastructure. This is in cognizance of Article 42 of the Constitution of Kenya which guarantees every person a right to a clean and healthy environment. The implementation of the proposed Motoine Trunk Sewer project will improve sewer network coverage that will collect the raw waste, and generally that which is currently discharged in open channels and nearby rivers including the Motoine/Ngong River. This will in turn contribute to attaining the objective of the Nairobi Rivers Sewerage Improvement Project (NaRSIP)- Phase II by improving access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensuring that the vital Athi River Basin remains sustainable as a water source for the communities downstream and upstream centres.

The Motoine Trunk Sewer and related reticulation sewers will serve 59% of the Mutuini Sub-Location in Dagoretti Sub-County with a current estimated population of 5,133 persons and projected to increase to 10,151 persons by the project design ultimate year (2045); and 36 % of Lenana Sub- Location in Lang'ata Sub-County with a current population estimate of 2,181 persons and projected to increase to 3,270 persons by 2045. The total population to be served is therefore 7,314 persons and is projected to increase to 14,466 people by 2045.

Double corrugated HDPE pipes ranging from 400mm to 600mm in diameter will be used to construct the main trunk sewer while secondary and laterals sewers will be laid with HDPE pipes of diameters 250mm and 300mm to collect the sewage within the project area and convey it to the main trunk sewers.

During the preparation of this ESIA report for the proposed sewerage infrastructure development, identified environmental and social aspects that are likely to be impacted by the proposed project were assessed in detail and mitigation measures were recommended. Baseline data that will be used for monitoring and evaluating the implementation of the mitigation measures during the project cycle was generated. Relevant environmental, social, health, and safety policies and legal framework were reviewed. Various project alternatives were identified and analyzed to come up with the best viable and sustainable option factoring in the gravity flow of the sewerage that would allow maximum coverage of the project area; financial consideration to ensure there is a return on investment; environmental impact where environmental damages will be minimized; and avoidance of displacement and compulsory acquisition by using the public riparian and road wayleave. A comprehensive stakeholder and public consultation engaging the local administration, project beneficiaries, relevant government institutions, and various stakeholders including the community forest association and interested public citizens was undertaken to inform of meetings, administer questionnaires, and key informant interviews. The consultative process was to disseminate information and gather their views and concerns about the proposed project that were incorporated in this study report.

The selection of the "No Action Alternative" Option with respect to the Proposed Project would mean the sanitation and living standard for the targeted beneficiaries would remain at a status quo and/or continue to deteriorate. It would imply that there would be neither employment creation nor opportunities for residents to earn an income through the supply of materials and services. Consequentially, there will be an economic loss to the proponent, local and national economies, and loss in terms of financial commitments already made in the design and planning of the project.

The following four (4) main alignment options were identified and analyzed;

a) OPTION 1: Use of the Motoine River Riparian Reserve (from Kibera to Karinde) through Ngong Road Forest.
b) OPTION 2: Use of the Southern By-Pass, Ngong Road, and Miotoni Roads Reserve.
c) OPTION 3: Diverting Some Flow along the Ngong Road Reserve then through Ngong Road and outfall at Kibera Trunk Sewer.
d) OPTION 4: Use both the Motoine River Riparian Reserve and Southern By-Pass Road Reserve through the Ngong' Road Forest.

It was observed and established that the proposed project would have negative and positive impacts. Negative impacts during the construction phase included vegetation loss, dust emission, air pollution, noise pollution, impact on eco-tourism, and risk on health and safety. Most of the negative impacts on the environment are rated short to medium term. They can be mitigated and/or reversible. Potential negative environmental and social impacts associated with this project have been identified in this report and adequate mitigation measures have been proposed to address any impacts arising from the project. the positive impacts are highly rated and will benefit all stakeholders at large. this would include employment opportunities, an increase in national economic growth, an increase in local economic activities, improved sanitation, reduction of waterborne diseases health risks, and improved standards of living. From the foregoing analysis, the social and economic rating for this project is highly positive.

An evaluation of the four alignment Options, that is, OPTION 1: Use of the Motoine River (from Kibera to Karinde) Riparian Reserve through Ngong Road Forest; OPTION 2: Use of the Southern By-Pass, Ngong Road, and Miotoni Roads Reserve; OPTION 3: Diverting Some Flow along the Ngong Road Reserve then through Ngong Road and outfall at Kibera Trunk Sewer; and OPTION 4: Use of both the Motoine River Riparian Reserve and Southern By-Pass Road Reserve through the Ngong' Road Forest, shows that the second, third, and fourth options (Option 2, 3 and 4) and the "No Project" Alternatives are limited and costly. Option 1: Use of the Motoine River (from Kibera to Karinde) Riparian Reserve through Ngong Road Forest is recommended for adoption and execution. Therefore, further delay of the project is denying all stakeholders the anticipated benefits of the investment.

Having considered the information collected, collated, and analyzed, it is the Expert's considered opinion that:

- The proposed project will lead to the improvement of livelihoods in the area. This will be through direct and indirect employment of skilled, semi-skilled, and unskilled personnel.
- The project is vital for the improvement of public health and sanitation in the project area. Access to proper sanitation is a right for all citizens.
- The proposed ESMMP is adequate to mitigate the potential negative environmental impacts identified and those that would arise in the project cycle.
- The positive environmental impacts far outweigh the negative ones, which shall be mitigated by following the proposed ESMMP. The ESMMP provides the impacts, mitigation measures, responsible parts, and indicators for monitoring evaluation.
- The proposed project will not compromise the well-being of the neighboring communities.
- The project should be allowed to commence and activities managed within the provided ESMMP in cooperation with the various actors identified in the report and who will have diverse responsibilities depending on the stage of the project.
- The proposed project is a viable public investment that should be given due support.

9.2 Recommendations

Implementation: It is recommended that the proposed project be implemented in compliance with all the relevant legislation and planning requirements of Kenya. In line with this, the proponent Athi Water Works Development Agency (AWWDA) and the contractor China Road and Bridge Corporation (CRBC) must take the legislative and institutional framework provided in this report into consideration, during the Construction and Operation Phases of the project, as will be appropriate.

Adherence to ESMMP: In addressing the environmental, social, health, and safety issues, the Contractor, Proponent, and Consultant must follow the mitigation guidelines provided under ESMMP. Adherence to the management and monitoring of the ESMMP will be done in liaison and collaboration with other local authorities and stakeholders. All the proposed mitigation measures should be implemented to ensure the sustainability of the project throughout its lifecycle. The contractor will formulate a Solid and Liquid Waste Management Plan; Soil and Sedimentation Control Plan; Spoil Management Plan; and Occupational Health and Safety in approval of the proponent that will be utilized during the implementation of the construction.

The contractor will ensure that workers are trained in Occupational Health and Safety, HIV/AIDS awareness, Gender- Based Violence awareness, and environmental conservation as appropriate. The contractor will provide appropriate personal protective equipment to prevent accidents and injury. It is also recommended that an Environmental and Safety Officer should be stationed at the proposed project site, during the whole construction phase. The safety officer will make sure that all the workers follow the safety rules. A grievance redress mechanism for all concerns from the community will be provided for proper monitoring and implementation of the project throughout its lifecycle.

Annual Environmental Monitoring and Audit: During the construction phase, the Consultant and the Contractor are required to undertake Environmental Monitoring to ensure that the Construction is carried out in compliance with the provisions of the EIA License and in line with the financing agreement with AfDB. During the Operational Phase, the proponent should conduct an annual environmental audit (EA) of the project. This will be in compliance with the Environmental Management and Coordination Act, Amendments (2015 and 2019), and the Environmental Impact Assessment and Audit Regulations, 2003. It will also ensure that the project does not lose track of its environmental management record achieved during construction.

The study for the proposed project is recommended for approval by NEMA and issuance of an EIA license subject to adherence to the environmental management and monitoring plan proposed in this report and an annual environmental audit during the operational phase.

REFERENCES

Dahl, C. et al (2004). Guidelines for Ecotourism in Environmental Impact Assessments Infrastructure Projects in Sub-Saharan Africa.

GOK, (2019). Sessional Paper No. 02 of 2019 on National Policy on Gender and Development.

Kenya gazette supplement Acts Physical Planning Act, 1999. Government Printer, Nairobi

Kenya Gazette Supplement Acts Public Health Act (Cap. 242). Government Printer, Nairobi.

Kenya gazette supplement Acts The Occupational Safety and Health Act 2007, Government Printer, Nairobi.

Kenya Gazette Supplement Acts, (2000). Environmental Management and Coordination Act Number 8 of 1999. Government Printer, Nairobi.

Kenya National Bureau of Statistics, (2019). http://www.knbs.go.ke/

Kenya Population-based HIV Impact Assessment, (KENPHIA) 2018

Kenya Soil Survey, (2013). Soils of Motoine/Ngong River Catchment. Ministry of Agriculture, Livestock, and Fisheries.

Maundu, P. and Tengnas, B. (Eds)(2005). Useful Trees and Shrubs for Kenya. World Agroforestry Centre, Technical Handbook No.35. ISBN 9966-896-70-8.

Micheka K.M. (2018). Waste Oil Management By Petroleum Business Operators: An Analysis of the Legal and Institutional Framework

Monene, A.K. (2014). Effects of Land-use Change on Streamflow, Channel Erosion, and River Geomorphology: A Case Study of Motoine/Ngong River Sub-catchment, Nairobi River Basin, Kenya.

Nairobi City County (2014). Nairobi County Integrated Development Plan 2014. Nairobi, Government Printer

Republic of Kenya (1999). Environmental Management and Coordination Act. Nairobi, Government

Republic of Kenya (2002). County Governments Act, No. 17 of 2012. Nairobi, Government Printer.

Republic of Kenya (2003). The Environmental (Impact Assessment and Audit) Regulations, 2003. Legal Notice No. 101. Nairobi, Government Printer.

Republic of Kenya (2004). Factories and Other Places of Work (Safety and Health Committees) Rules, 2004. Nairobi, Government Printer.

Republic of Kenya (2005). Factories and Other Places of Work (Medical Examination) Rules, 2005. Nairobi, Government Printer.

Republic of Kenya (2005). Factories and Other-Places of Work (Noise Prevention and Control) Rules, 2005. Nairobi, Government Printer.

Republic of Kenya (2006). Environmental Management and Coordination, (Water Quality) Regulations 2006. Legal Notice No. 120. Nairobi, Government Printer.

Republic of Kenya (2006). Environmental Management and Coordination, (Waste Management) Regulations 2006. Legal Notice No. 121. Nairobi, Government Printer.

Republic of Kenya (2006). HIV and AIDS Prevention and Control Act, No 14 of 2006. Nairobi,

Republic of Kenya (2007). Employment Act, No. 11 of 2007, and the Employment Act Subsidiary Legislation. Nairobi, Government Printer

Republic of Kenya (2007). Factories and Other Places of Work (Fire Risk Reduction) Rules, 2007. Nairobi, Government Printer.

Republic of Kenya (2007). Kenya's Vision - 2030. Government Printers, Nairobi.

Republic of Kenya (2007). Work Injury Benefits Act (WIBA), 2007 Act No. 13 of 2007. Nairobi, Government Printer.

Republic of Kenya (2009). Environmental Management and Coordination, (Noise and Excessive Vibration Pollution) (Control) Regulations 2009. Legal Notice No. 61. Nairobi, Government Printer.

Republic of Kenya (2010). Physical Planning Act, 2010 (Revised Edition 2012). CAP 286.

Republic of Kenya (2010). The Constitution of Kenya 2010. Nairobi, Government Printer.

Republic of Kenya (2011). Environment and Land Court Act, No. 19 of 2011. Nairobi, Government Printer.

Republic of Kenya, Legal Notice 31: Factories and Other Work Places (Safety and Health Committees) Rules, 2004, Government Printer, Nairobi.

Saggerson, E. P. (1991). Geology of Nairobi Area. Mines and Geological Department, Nairobi.

Sustainable Waste Management Act, 2022 No. 31 of 2022, Government Printer, Nairobi.

The Kenya National and Biodiversity Starategy and Action Plan, (2000) Government Printer, Nairobi.

The Republic of Kenya, (1986). Sessional Paper No. 1 of 1986 on Development Prospects and Policies, Government Printers.

The Republic of Kenya, (1999). Sessional Paper No 6 of 1999 on Environment and Development.

The Republic of Kenya, (2009). Environmental Management and Coordination (Air Quality) Regulations, 2009. Printed and Published by Government Printer, Nairobi.

The Republic of Kenya, (2012), Rev. 2014. National Land Commission Act, Nairobi, Government Printer.

The Republic of Kenya, (2012). Land Registration Act, No. 3 of 2012. Nairobi, Government Printer.

The Republic of Kenya, (2012). The Land Act 2012. Legal Notice No. 6. Printed and Published by Government Printer, Nairobi.

The Republic of Kenya, (2013). Environmental Management and Coordination, (Air Quality) Regulations 2013. Legal Notice No. 34. Nairobi, Government Printer.

The Republic of Kenya, (2014). Penal Code, CAP. 63. Nairobi, Government Printer.

The Republic of Kenya, (2014). Sessional Paper No. 10 of 2014 on the National Environment Policy.

The Republic of Kenya, (2015). Environmental Management and Coordination (Amendment) Act, 2015. Kenya Gazette Supplement No. 74 (Act No. 5). Nairobi, Government Printer.

The Republic of Kenya, Forest Act (2005), Government Printer, Nairobi.

The Republic of Kenya, National Water Master Plan: 1980, MWI, Government Printer, Nairobi.

The Republic of Kenya, Water Act (2002), Government Printer, Nairobi.

The Republic of Kenya, Water Supply Design Manual (MWI, 2005), Government Printer, Nairobi.

UNEP and ACTS (2001), Making of Framework Environmental Law in Kenya, ACTS Press, Nairobi, 2001.

UNEP, (2003).The Nairobi River Basin Project – Phase III. Resource Booklet on Pollution Monitoring Activities.

Ying Zheng et.al (2021). Effects of Rock Fragments on the Soil Physicochemical Properties and Vegetation on the Northeastern Tibetan Plateau.

ANNEXES

Annex 1: Environmental Impact Assessment License for NaRSIP Phase II

nema

mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

CERTIFICATE OF VARIATION OF ENVIRONMENTAL IMPACT ASSESSMENT LICENSE

Certificate No: **NEMA/EIA/VC/1376**

Application Reference No: **NEMA/EIA/VEIA/2100**

This is to certify that the Environmental Impact Assessment License No **NEMA/EIA/PSL/5318** issued on 10/9/2017

to **Athi Water Services Board.**

of

P.O Box 45383-00100, Nairobi.

regarding

Proposed Nairobi River Sewerage Improvement Project (NARSIP) Phase II.

whose objective is

Implementation of the phase II of the NaRSIP programme, with extension and duplication of the existing sewerage system and construction of lateral sewers involving 81km trunk sewers, 190km lateral and reticulation sewers, anaerobic, facultative and maturation ponds at DESTP site, associated facilities and amenities.

located at

Within Nairobi County.

has been varied to

Extension of EIA License validity period by an additional twenty four (24) months subject to the conditions on EIA License No. NEMA/EIA/PSL/5318.

with effect from **11 May, 2020** in accordance with the provisions of the Act.

Date: **11 May, 2020**

Signature

(Seal)

Director-General

The National Environment Management Authority.

P.T.O

ISO 9001: 2015 Certified

Annex 2: Expert Practicing Licenses

FORM 7 (r.15(2))

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/16546

Application Reference No: NEMA/EIA/EL/21492

M/S **Eng. William M. Kamau**
(individual or firm) of address

P.O. Box 22993-00400 Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **0312**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **2/16/2022** Expiry Date: **12/31/2022**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2015 Certified

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/17055

Application Reference No: NEMA/EIA/EL/22041

M/S **Loise Nyambura Mugo**
(individual or firm) of address

P.O. Box 47-00605 UTHIRU

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **11681**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **4/1/2022** Expiry Date: **12/31/2022**

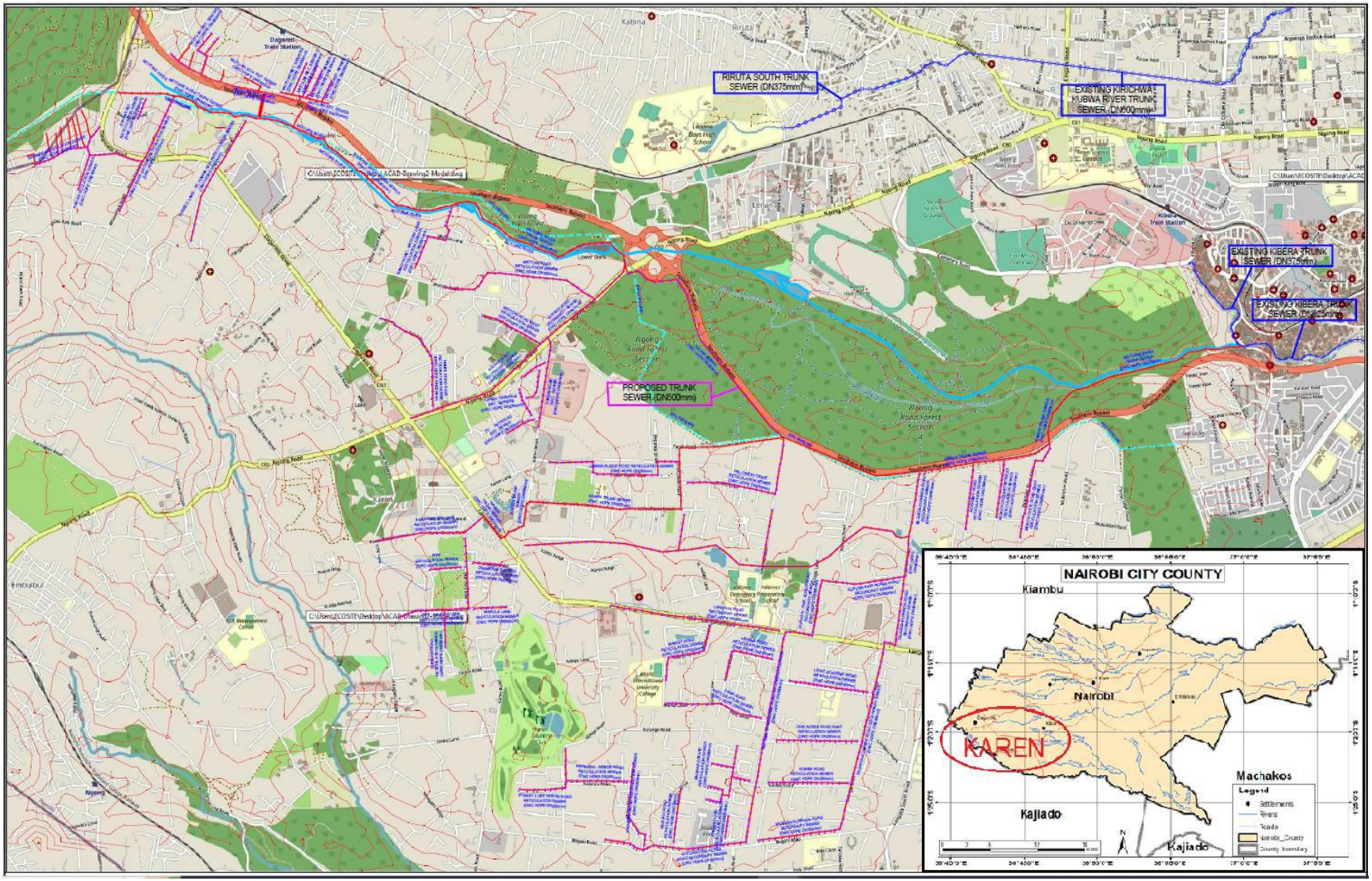
Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

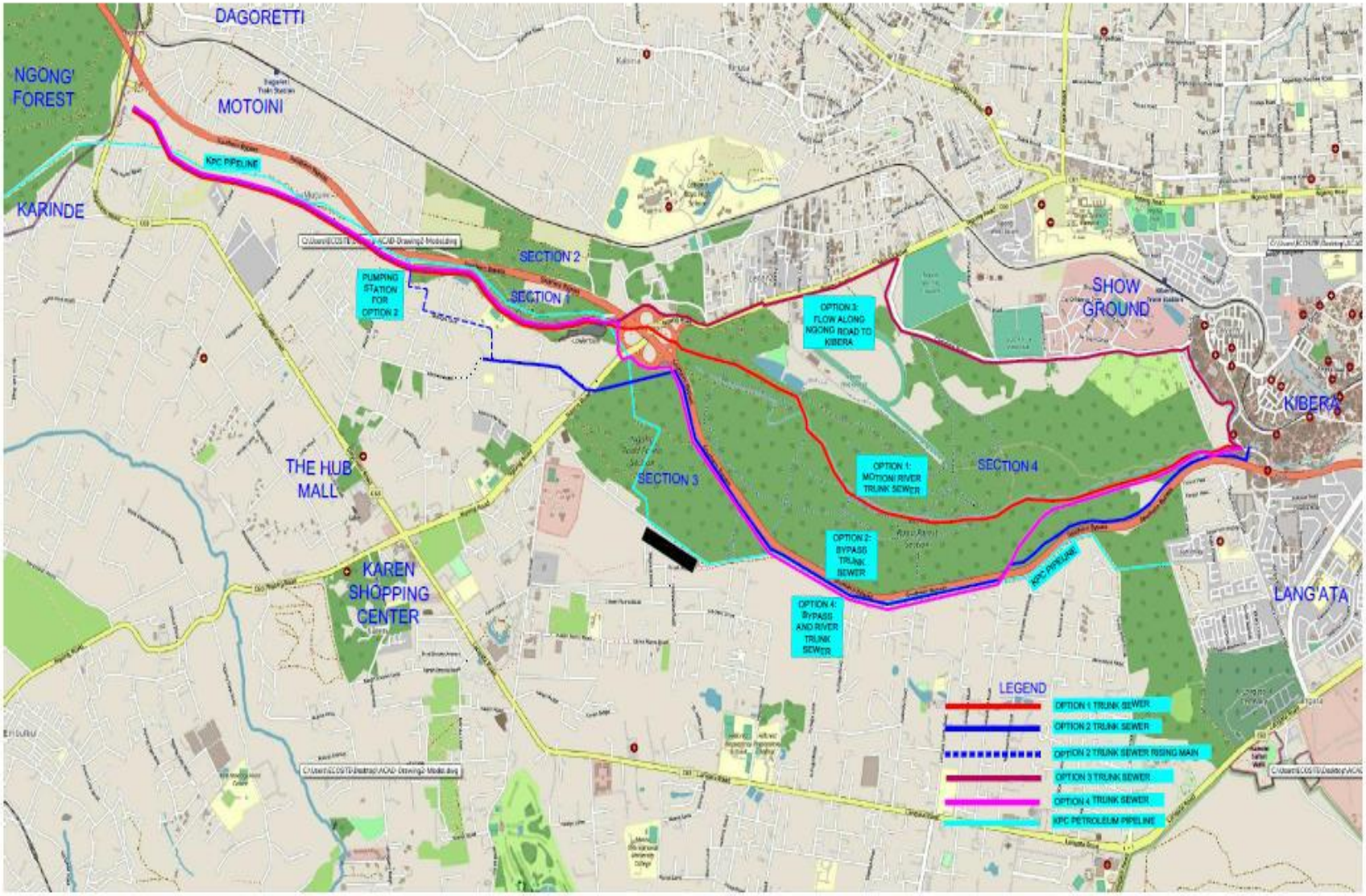
ISO 9001:2015 Certified

Annex 3: Project Area Map

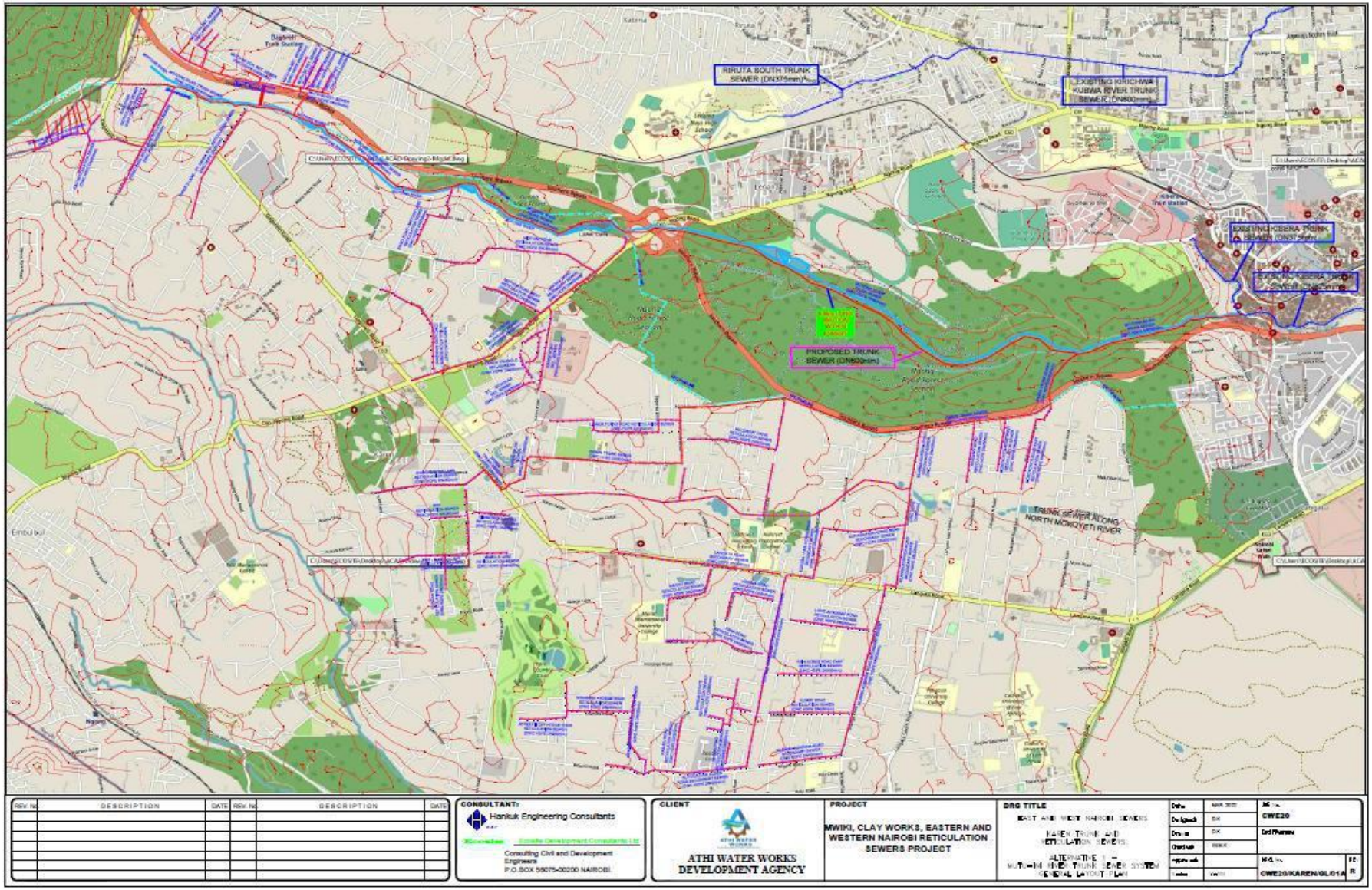


Location of the Project

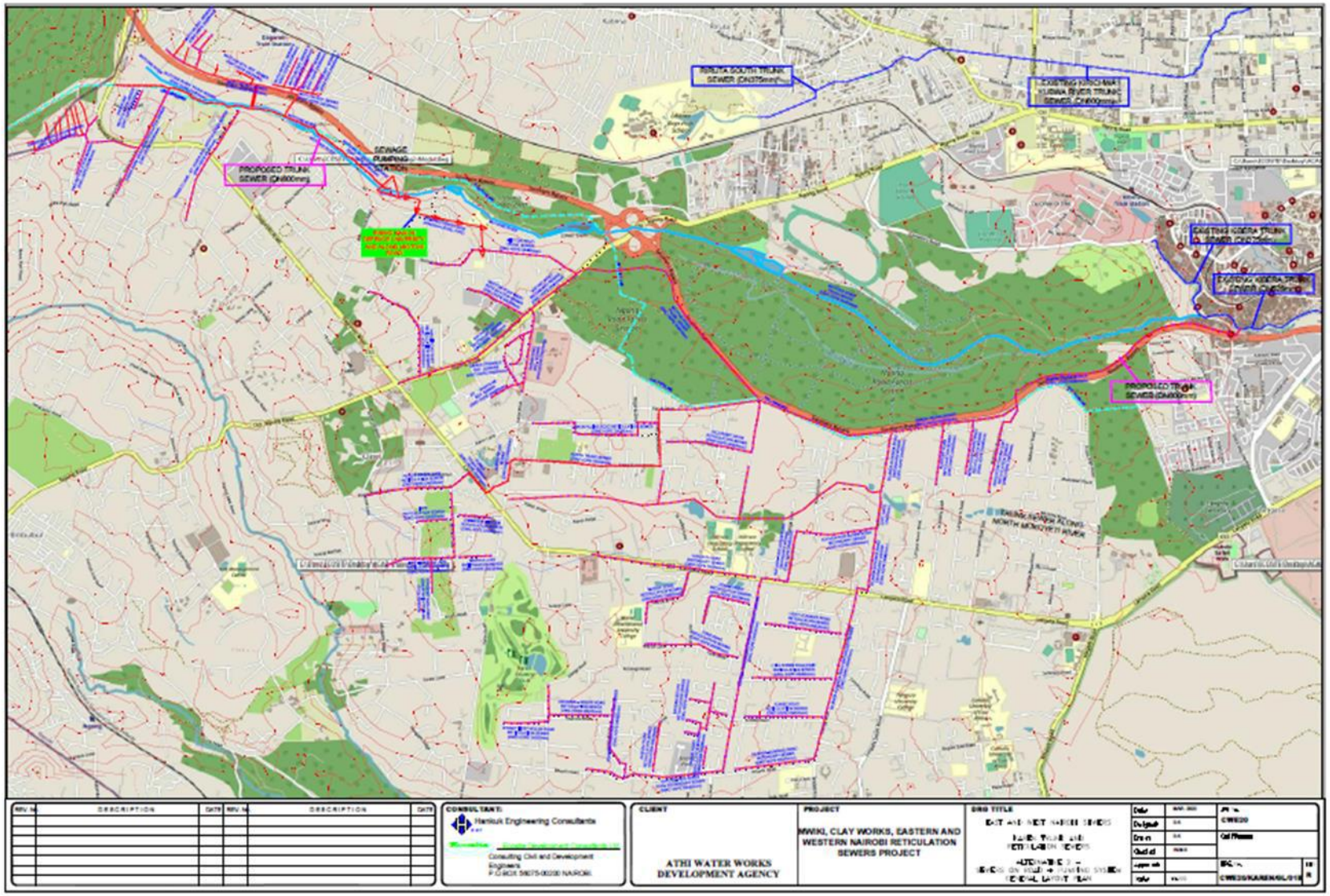
Annex 4: Alternative Routes Layout



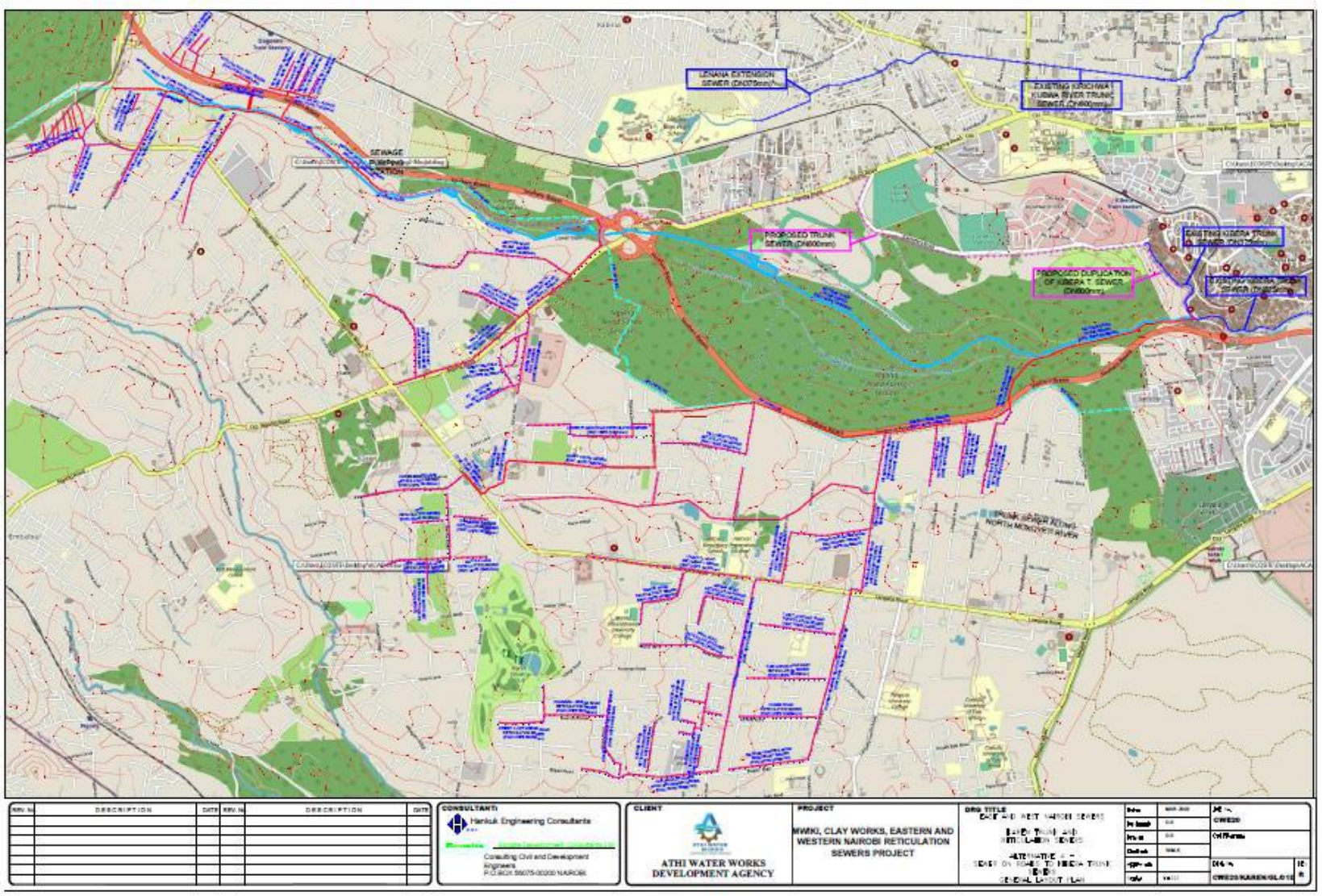
Annex 5: Option 1 Alternative Route (Drawing CWE20/KAREN/GL/01A)



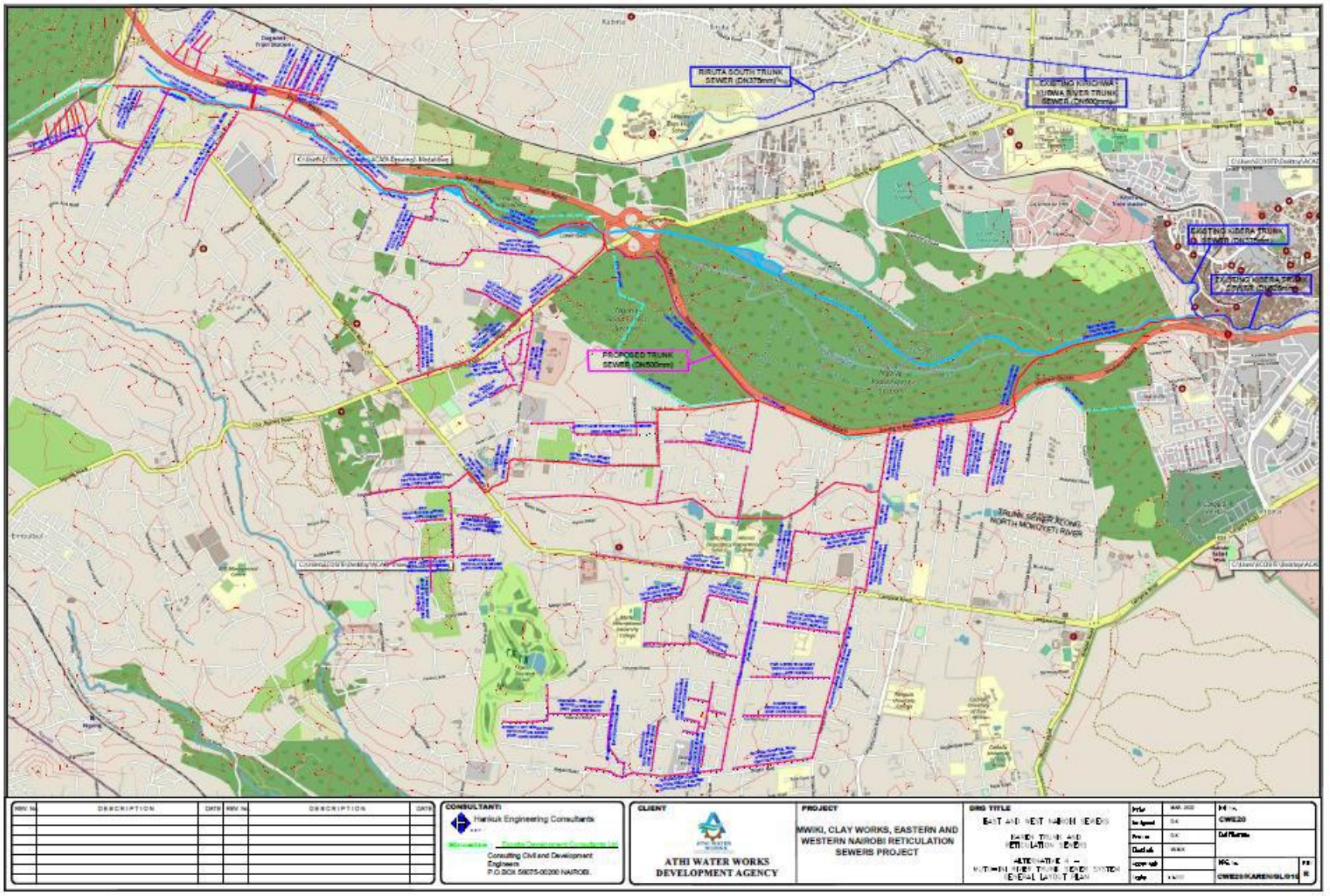
Annex 6: Option 2 Alternative Route (Drawing No. CWE20/KAREN/GL/01B)



Annex 7: Option 3 Alternative Route (Drawing No. CWE20/KAREN/GL/01D)



Annex 8: Option 4 Alternative Route (Drawing No: CWE20/KAREN/GL/01G)



Annex 9: Public Participation Records

Annex 9. A: STAKEHOLDER ENGAGEMENT MEETING FOR LOT 4 – CONSTRUCTION OF EAST AND WEST OF NAIROBI RETICULATION SEWERS HELD ON 30TH AUGUST 2021 AT KLDA OFFICE IN KAREN

PRESENT

Name	Organization	Designation	Phone Number	Email
1. Samuel Kibuchi (Chairing)	HEC/ EDC	Sociologist	0721319611	ecositeconsultants@gmail.com
2. Mwambanga Mtalaki	HEC/ EDC	Design Engineer	0714745504	ecositeconsultants@gmail.com
3. Loise Nyambura	HEC/ EDC	EHS Specialist	0799211780	ecositeconsultants@gmail.com
4. Vincent Kabubi	HEC/ EDC	Engineer	0704546730	ecositeconsultants@gmail.com
5. Wallace Isaboke	HEC/ EDC	EHS Specialist	0726809979	ecositeconsultants@gmail.com
6. Ivy Muthoni	AWWDA	Sociologist	0737434580	imuthoni@awwda.com
7. Daisy Nyakundi	AWWDA	Engineer	0705158183	dnyakundi@awwda.com
8. Winfred Kangai	AWWDA	Sociologist	0786880269	wkangai@awwda.com
9. Rose Karobia	KLDA	Representative	0720438443	rose@klda.or.ke
10. Duncan Munyua	KLDA	Representative	0718923861	info@klda.or.ke
11. Vincent Mbithi	GoK	Senior Ass. Chief	0720886173	

AGENDA

1. Introductions.
2. Opening Remarks from Chairman.
3. Project Brief
4. Issues raised from Project Brief
5. A.O.B.

Minute No.	Item	Action by
1.	**Introduction.** The meeting was called to order at 11.22 a.m. by the chairman who welcomed all to the meeting and requested the participants to introduce themselves.	
2.	**Opening Remarks from the Chairman** The Chairman thanked the members for availing themselves for the meeting and opened the floor to the design engineer to brief the members on the project.	
3.	**Project Brief** The Design Engineer briefed the members on the project scope highlighting on the proposed trunk sewer and other major proposed sewers for Karen Area which included: • Karen Trunk Sewer • Miotoni Trunk Sewer • Motoine River Trunk Sewer • Fair Acres Road Sewer • Kuwinda Road Sewer	
4.	**Issues Raised From The Project Brief** The KLDA representatives asked for clarification on how AWWDA arrived at the decision to construct sewers in Karen as he was concerned that such developments would encourage some investors to start constructing high-rise buildings in the area. AWWDA clarified that it is their mandate to provide water and sewerage services in Nairobi and thus identified the need for the sewers in Karen as the area is not adequately served. In addition to that, the Chairman further pointed out to the members that the meeting was just a public consultation meeting to get the views of the members of the community concerning the proposed project. The KLDA representatives pointed out that they had seen an advertisement of the project on the newspapers in 2018 and sought clarification on what has been happening since and also the proposed project timeline. The Design Engineer clarified that the design for the sewers had been done a few years before and therefore a design review was required and has been going on since 2018.	

	He further informed the meeting that the contractual commencement date for the entire project would be on the 3rd of September 2021 and the project timeline being 18 months. The Chairman noted with concern that the community wasn't aware of the project and kindly requested for the assistance of KLDA to facilitate a public participation meeting to inform the members of the community about the project and also get their views on the same. The KLDA representatives stated that they were ready to help and required the consultants to prepare and send to them, a writeup of the project scope and a softcopy map for them to circulate the same to the members of the community in order for them to understand and prepare their comments. It was agreed that the consultants were to send the same to KLDA by the end of the day and give the members of the community a week to review and thereafter invite them for a public participation meeting. The KLDA representatives informed the meeting that there were 47 neighborhood associations under the KLDA umbrella. It was proposed and agreed that due to the Ministry of Health Covid 19 protocols and guidelines, only 2 members per the individual associations would be invited to the public participation meeting to represent the rest. The tentative date for the public participation meeting was set to be on Thursday, the 9th of September 2021. It was also agreed that KLDA and the office of the Senior Assistant Chief would jointly aid the consultants in finding a venue for the public participation meeting.	**HEC/EDC** **KLDA**
5.	**A.O.B** The KLDA representatives advised the consultants to bring in all their experts on the day of the public participation meeting as they were sure that a lot of questions concerning the project would be raised. The Chairman also pointed out the need for KLDA to encourage their members to embrace the project with a positive attitude as it was meant for the good of the members of the community. There being no other business, the meeting was adjourned at 12:10 pm.	**HEC/EDC** **KLDA**

List of Attendance

STAKEHOLDER ENGAGEMENT MEETING FOR LOT 4 - CONSTRUCTION OF EAST AND WEST NAIROBI RETICULATION SEWERS IN KAREN

Client: Athi Water Works Development Agency Consultant: Ecosite Consultants

Attendance Sheet

Venue: KILDA OFFICE, Karen **Date:** 30th August 2021 **Time:** 11:00AM

S/No.	Name	Designation	Contact	Sign
1.	Ivy Muthoni	Sociologist - Ecosite	0739434580	
2.	DAISY NYAKUNDI	ENGINEER - AWWDA	0705158183	
3.	VINCENT KABUBI	ENGINEER - ECOSITE	0704546730	
4.	KLIFRED KANGAI	Sociologist	0786880269	
5.	DUNCAN MWANGURA	KILDA	0718923861	INFO @ KILDA.OR.KE
6.	MWAMBANGA MTALAKI	ENGINEER – ECOSITE	0714745504	
7.	VINCENT P. MBITHI	STAKEH. OFFICER	0720-886173	
8.	ROSE KABUBIA	KILDA	0720438443	ROSE@KILDA.OR.KE
9.	Wallace Isaboke	Botanist - Ecosite	0726509979	
10.	LOISE NYAMBURA	EHS - ECOSITE	0799211780	
11.	Samuel Kibuchi	Sociologist	0721 319611	
12.				

Annex 9. B: **NAIROBI RIVER BASIN REHABILITATION AND RESTORATION PROGRAM**

CONSTRUCTION OF MWIKI, CLAY WORKS, EASTERN AND WESTERN NAIROBI RETICULATION SEWERS

CONTRACT NO. AWWDA/NARSIPII/W-03/2020

MINUTES OF STAKEHOLDERS ENGAGEMENT MEETING

Contract No.	**AWWDA/NARSIPII/W-03/2020**			
Location	**KENYA SCHOOL OF LAW, KAREN**			
Time:	**4:00PM**			
Date:	**09/09/2021**			
Attendees	**Name**	**Organization**	**Position**	**Email/contact**
	Albert Ocharo	AWWDA	Project Engineer	aocharo@awwda.go.ke
	Winnie Kangai	AWWDA	Sociologist	wkangai@awwda.go.ke
	Ivy Muthoni	AWWDA	Sociologist	imuthoni@awwda.go.ke
	Eunice Jemutai	AWWDA	Senior Environmental Officer	ejumutai@awwda.go.ke
	Rahab King'ori	AWWDA	Senior Engineer	rwambui@awwda.go.ke
	Daisy Nyakundi	AWWDA	Assistant Enginee	dnyakundi@awwda.go.ke
	Duncan Kamau	Ecosite	Civil Engineer	ecositeconsultants@gmail.com
	Samuel Kibuchi	Ecosite	Sociologist	ecositeconsultants@gmail.com
	Isaboke Wallace	Ecosite	Environmentalist	ecositeconsultants@gmail.com
	Loise Nyambura	Ecosite	EHS	ecositeconsultants@gmail.com
	Mwambanga Mtalaki	Ecosite	Civil Engineer	ecositeconsultants@gmail.com
	Stakeholders	See Attached List		
Meeting purpose:	Stakeholders Engagement Meeting			
Minutes Taken by:	Mwambanga Mtalaki			

1. AGENDA

The meeting agenda was as follows:

1. Introduction
2. Presentation on Project
3. Plenary discussions
4. Closing Remarks

2. PURPOSE OF THE MEETING

The purpose of the meeting was to inform, sensitize and seek the opinions of Karen residents with regards to the proposed sewerage project being implemented by AWWDA. The public meeting was a product of the initial consultations held with the area Chief and Karen Langata Districts Association (KLDA) leaders on 30/08/2021.

3. INTRODUCTIONS

The meeting began with the introduction of team members from:

- Members of the Public
- Local Administration
- Athi Water Works Development Agency (AWWDA)
- The Consultant

4. OPENING REMARKS

The Client (AWWDA) gave a brief overview of the mandate of AWWDA and project scope. He stated that AWWDA was originally formed to provide sewerage infrastructure but under the Water Act of 2016, its mandate expanded to include water supply infrastructure. He informed the participants that Nairobi is served by three waste water treatment plants viz Dandora, Kariobangi and Karen. He noted that the water supply demand in Nairobi was 870,000m^3 per day but only 520,000m^3 is supplied per day. Therefore there is a deficit of 350,000m^3 per day to address. He emphasized that increased water supply must be in tandem with increased sewerage infrastructure supply. Poor sewerage infrastructure is a big cause of pollution of Nairobi River, Ngong River, Mbagathi River and others therefore making it necessary to put up adequate sewerage infrastructure.

5. PROJECT DECRIPTION AND SCOPE

The Consultants briefed the meeting on the scope of work like the construction of 130km reticulation sewers as indicated on the gazette adverts inviting contractors to bid on the AWWDA Website. He further stated that the scope of works in Karen comprise of:

1. Karen Trunk Sewer – 8.6 km long
2. Motoine Trunk Sewer – 9.6 km long
3. 27 km of reticulation sewers
4. Fencing with masonry wall of the existing Sewage Treatment works at Karen.
5. Rehabilitation of the existing Karen Sewage Treatment works.

The Consultant informed the meeting that the project was the second phase of the Nairobi Rivers Basin Rehabilitation and Restoration Program which started in 2011 and managed to construct trunk sewers. Phase II was primarily for the construction of reticulation sewers.

The members present were informed that the commencement date for construction was 3rd September 2021 with a construction period of 18 months and a 12 months defects liability period.

6. PLENARY DISCUSSIONS

The following issues were raised and responses were given as follows:

	Question /Comments	**Responses/Action to be Taken**
1.	A member of Karen South Residents Association commended the project and said it was timely since there has been a big problem of sewage management and control from the upper areas. He noted that sometimes sewage was released into storm water drains and hoped that the proposed project will control this menace. He asked whether the new sewerage system was going to use open channels.	The sewage system will be a closed system that will use a network of connected pipes. The pipes will be laid underground – open channels are never used for sewers.
2.	A member of the Mutero-Muhugu Residents' Association asked if Mutero is under consideration for the new sewerage system. She also said the area has not had piped water and have been depending on water vendors for water that is not clean. She asked if there are any plans to supply piped water to their area	Mutero area will not be covered under the current project due to topography and financing issues. However such areas will be considered once an ongoing feasibility study is completed. The client encouraged her to make a formal request/complaint to Nairobi City Water and Sewerage Company (NCWSC) and AWWDA in regard to water issues in the area.
3.	A resident of Fair Acres Rd/Silanga Close area asked of what to expect in terms of disruptions during project implementations in regard to infrastructure such water, electricity, roads etc.	No road will be cut off and micro-tunneling will be applied to avoid disruptions. Access roads, sidewalks and storm water drains will be reinstated to previous conditions. The client is in process of getting maps for the services in the area to minimize damage. The consultant and the contractor will give prior notice to residents where disruptions may happen.

4.	A member of Karen Hardy area wanted to know how the Karen Hardy area is going to be covered given the fact that the population density is high due to schools and universities around in the area. She asked the consultant to provide a detailed map showing all the connections. What will be the cost of connecting to the new sewerage system?	The Karen Hardy area, Lang'ata South Rd will not be covered due to topography issues. The sewage flow in the current project is by gravity only and the hardy area will not be able to discharge to the sewers. However a feasibility study on the Mbagathi River Catchment area is underway and will inform future sewerage installation facilities in the area. The consultant projected a detailed map and promised to circulate it to the participants through KLDA. The beneficiaries will be required to enquire about the cost and application procedures from the NCWSC. It is not expensive.
5.	Miotoni River area is not fully covered by the project scope. The area has also not received water for the past 18 months	The area is not fully covered due to lack of access to the trunk sewer. If way leave is provided, the entire area can be covered. The consultant asks to be allowed access to gated roads in the Karen area to do site visits and surveys. The water supply might have been interrupted by road construction in the area. A formal complaint should be lodged by affected persons to NCWSC to restore the service.
6.	A participant wanted to know the relationship between the old sewer and proposed new sewerage system, if the old system will be removed to pave way for the new or if there will be any connection between the two.	The old sewerage system will not be removed. The old system will be connected to the proposed new system.
7.	A resident of Karen Plains area noted that the area is flat and wanted to know if they will be covered by the project scope.	The proposed Karen trunk sewer passes along Karen Plains Rd so the area will be well covered by the current project designs.
8.	The leader of Karen South Resident Association wanted to know if population growth rates were projected into project designs.	The population growth rates and projections are always incorporated in such projects. Population growth rates and sewage flow calculations for the project were done up to 2045.

9.	Another member of the Karen Plains asked if those who are at the lower end of the plains will be covered by the sewerage project	The consultant explained that behind the plains, the topography was the limiting factor. However the consultant promised to visit the site and consider whether it can be connected.
10.	A resident of Boabab Estate (Kombe Rd) informed the meeting that the estate is densely populated and has many individual plots. Sewage management is already a big problem. She asked if the estate will be connected to the proposed sewerage system.	There is a proposed reticulation sewer along Kombe Rd to serve the area.
11.	What is the total funding for the project? How much is allocated for restoration activities? How will disruptions be communicated to the residents?	The client informed the meeting that the Karen Sewerage component was allocated approximately Kshs. 300 million and the provision for reinstatement (restoration) within that amount is adequate. Information about service disruptions will be channeled through KLDA.
12.	The lower side of Karen Road is swampy and storm water pools in the area after/during heavy rains.	Storm water drainage is the jurisdiction of the county government and the NMS. Persons in the affected area will need to contact NCC/NMS to sort out the issue.
13.	Project progress	Currently, the contractor is setting out and doing trial pits in the area.

7. CLOSING REMARKS AND ANY OTHER BUSINESS

Ms. Rose Karubia of the Karen Langata District Association (KLDA) gave her closing remarks by saying that while the residents welcome the project; on the other hand they fear that it will open up the area to undesirable developments. She emphasized that there is need for policy development to control developments in the area to maintain the kind of Karen the residents want.

There being no other business the meeting was closed at 6.15pm.

List of Attendance

STAKEHOLDER ENGAGEMENT MEETING FOR CONSTRUCTION OF RETICULATION SEWERS IN KAREN AREA

Client: Athi Water Works Development Agency   Consultant: Ecosite Consultants

ATTENDANCE SHEET

Venue: Kenya School of Law Auditorium, Karen   **Date:** 9th September 2021   **Time:** 4:00pm

S/No.	Name	Designation	Contact	Sign
1.	HENRY OGOTE	Chair ILASWA	0722838394	[signature]
2.	Rahab Gichungi	Baobab Estate	0722590908	[signature]
3.	Samuel M. Kuguru	SLAMGA KAMBE ROAD	0715031334	[signature]
4.	[illegible] OCHARO	Engineer CRBC	[illegible]	[signature]
5.	JIANG YAMIN	Contract Manager	0768339930	[signature]
6.	FLORENCE MALALA	KAREN PLAINS	0725149779	[signature]
7.	DUNCAN MUNYUA	K.L.D.A	0718923826	[signature]
8.	JAMES NGUO	Baobab Karen	0733 888 164	NGUO
9.	Peter Kasime	West Nairobi School	0721815087	[signature]
10.	BRUNO ILLI	KLDA/Miotoni	0722745325	[signature]
11.	Nancy Kanyago	KLDA	0731 430319	NK
12.	ANTHONY NYAKIAMO	KAPRA	0706557555	[signature]

S/No.	Name	Designation	Contact	Sign
13.	Patrick A Altime	Facility Manager Karen Hospital	0722924781	[signature]
14.	Kimani Gatich	MARA	0722 681 780	[signature]
15.	C. Muriuki	Kaswa.	0733600588 ~~0720781001~~	[signature]
16.	Rose Kawbia	KWDA	0720438443	[signature]
17.	Kawira Bwaka	Muteero-Muhugu R.A	0723 81084	[signature]
18.	CHEGE MUCHIRI	KWARARA RD	0722521725	[signature]
19.	Angeline Lamo	Mazingira Close	0710435177	[signature]
20.	Alfred Gitonga	Muhongu close	0708535216	[signature]
21.	Christopher Mbunga	Sandalwood Waterfront	0723 015493	[signature]
22.	Eng. Syphila Mumenya	WECO CONSULTING ENGINEERS	0722705191	[signature]
23.	JAMES MOTOGE	KLDA	0722952139	[signature]
24.	Susan Karuhiu	Resident	0731868400	[signature]
25.	Moses Oduori	Sandalwood Waterfront	0706344425	[signature]
26.	DAISY NTAKUNDI	AWWDA-Ass. Eng	0705158183	[signature]
27.	Rahab Kingori	AWWDA	0723515444	[signature]

S/No.	Name	Designation	Contact	Sign
28.	Samuel W. Kibuchi	Sociologist	0721 319611	
29.	Herman Gaitho	Baobab	0722781454	
30.	Wallace Isaboke	Environmentalist	0726 809979	
31.	LOISE NYAMBURA	EHS	0799211780	
32.	Eunice Jemutai	SRO	0721772120	
33.	Klinnie Kangai	Sociologist	0786880269	
34.	Ivy Mutnoni	Sociologist	0737434580	
35.	Duncan Kamau	Engineer	0720104815	
36.	Mwambanga Mtaki	Engineer	0714745504	
37.				
38.				
39.				
40.				
41.				
42.				

Annex 9. C: **MINUTES OF THE MEETING HELD ON 4/11/2021 ON CONSTRUCTION OF SEWER LINE THROUGH NGONG ROAD FOREST AT EC'S BOARDROOM, NAIROBI COUNTY**

Attendance List

No	Name	Organization	Contacts
1	Benedict Omondi	KFS- Head of Watershed (Chairman)	0722796950
2	Simon Woods	Chairman NRFA	0721623855
3	Johnstone Nguyai	Forest Manager Ngong Road	0722604102
4	Margaret Wanjiru	EC NRB – KFS (secretary)	0722533423
5	Simon Nga'nga	Vice chairman (NRFA)	0729840715
6	Roo Woods	NRFA member	0733655077
7	Aruna Hicks	Secretary, NRFA	Aruna.hicks@gmail.com
8	Douglas Wakihuri	NRFA Member	Dwakihuri1963@gmail.com
9	Fred Mutoma	NRFA Member	kkalima55@yahoo.com
10	Victor Odhiambo	CRBC	Victorodhiambo53@gmail.com
11	Mark Ngao	CRBC	markngao@telceurified.com
12	Daisy Nyakundi	AWWDA- Engineer	dnyakundi@awwda.go.ke
13	Dr. John Sercombe	Joykey Club	johnssercombe@gmail.com
14	Dr. Paul Mbugua	Joykey Club	paul@macnaughton.co.ke
15	Eng. Duncan Kamau	Ecosite Development Consultants	duncan.kamau@ecositeconsultants.com
16	George Muchugia	Ecosite Development Consultant	gkmuchugia@gmail.com
17	Winnie Kangai	AWWDA	wkangai@awwda.go.ke
18	Eunice J Cherotich	AWWDA	ejemutai@awwda.go.ke
19	Loise Nyambura	Ecosite Consultant	loise.nyambura@ecositeconsultants.com
20	Albert Ocharo	AWWDA	aucharo@awwda.go.ke

Absent with Apology

Francis Kariuki - Head of Conservancy Nairobi

AGENDA

1. Introduction
2. Proponent's brief about the project
3. Stakeholders views and comments
4. Way forward

MIN/1/04/11/2021 INTRODUCTION

The meeting was called to order at 1430hrs by self-introduction from members. The chair went ahead and informed members that the main agenda of the meeting was to appraise the stakeholders on the proposed construction of sewer line project through Ngong Road Forest ecosystem to serve the Karen area. He informed the members that the KFS and the Athi Water Works Development Agency (AWWDA) had mobilized a technical team to survey and assess the forest materials along the proposed wayleave for the sewer line project. However, it was noted that the Ngong Road CFA members and the general public had not been notified about the project.

The meeting was convened at the request of KFS so that CFA members and other interested stakeholders could be enlightened on the proposed project particularly on the alignment of the sewer line within the forest reserve which is under the jurisdiction of KFS and co-managed with CFA members.

The proponent (AWWDA) was present together with the Consultant and the contractor to enlighten the members on the alignment of the proposed sewer line in order for the members to make an informed decision regarding the proposed project.

MIN/2/04/11/2021 THE BRIEF BY THE PROPONENT

The proponent who is Athi Water Works Development Agency (AWWDA) is one of the eight Water Works Development Agencies established under the Ministry of Water, Sanitation and Irrigation.

The agency is responsible for the development, maintenance and management of water and sewerage infrastructure in the Counties of Nairobi, Kiambu and Murang'a. The agency main mandate is to undertake the development, maintenance and management of the national public waterworks within their area of jurisdiction.

The Project Engineer, Eng. Ocharo went ahead and informed members that the demand for water in Nairobi is about, 800,000M³ per day and only 534,000M³ per day is supplied to households. Out of this supply, only 180,000M³ per day is collected for treatment. Therefore, more sewer line infrastructure is required to close this huge gap that is obviously the cause of water pollution in Nairobi City and beyond.

The program under which the project is being implemented is known as Nairobi Rivers Improvement Program Phase II (NARSIP II) which has four works contracts:

1. Githurai, Kahawa West sewers,

2. Mwiki and Kasarani sewers,

3. Karen and Westlands sewers and

4. Inlet works at Dandora treatment plant.

The government of Kenya and the African Development Bank are funding the projects. The sewer line is designed to follow the riparian and public land due to minimizing on cost issues of compensation to the affected private individuals. The sewer is designed to flow by gravity thus rivers becomes the best option. The proponent will request approval from the Water Resources Authority to use the riparian land.

The proponent added that the EIA for the whole project was done in 2018 but due to funding issues, it took time to kick off. The proponent shared the EIA report with members a day before the meeting. They also noted that some components were missing in the EIA Study Report. This included the proposed Karinde to Kibera component.

The Consulting Engineer, Eng. Kamau added that the sewer is following the river to mitigate river pollution within Nairobi. The whole sewer line for Karen works will be 52km. He further emphasized that aligning the sewer line along the river courses is the easiest way to connect sewers because it uses gravity.

The proponent clarified that they will compensate for damage and disturbance and help in the conservation of the forest.

MIN/2/04/11/2021 STAKEHOLDERS VIEWS AND COMMENTS

The CFA strongly felt that there are other alternative routes to follow without passing through the forest. The CFA Chair added that through the google earth app he discovered the trunk line can pass through Southern Bypass through gravity without primarily passing through the forest and which could be much easier and cheaper.

Stakeholders felt that Motoine Trunk Sewer had not been mentioned in the EIA from Karinde to Kibera therefore the EIA Study Report is not valid. It was observed that the EIA Study Report was for the whole of Nairobi Rivers Improvement Program Phase II (NARSIP II).

The members of CFA added that at the riparian zone, there would be major civil works thus creating massive destruction of trees both exotic and indigenous and disturbance of biodiversity. This area will take time to regenerate and thus funding for rehabilitation and maintenance is required to restore the forest into its original state. Heavy machines require a minimum zone of 6 metres to be able to move during construction thus increasing forest degradation. Sewer line being on the forest along Miotoni block, the plots along Miotoni Road will have to run the pipes across the river to connect to the trunk sewer. This will be very ugly and will block the flood level of the river. The consulting Engineer added that it couldn't have been avoided because it was very expensive to acquire space from the other side. He also added that there is the provision of sewer laterals for plot owners before joining the main trunk.

There is an anticipation of the loss of revenue due to civil works disturbances by sewer trunk installation. Ngong Road forest station's major revenue collection is from ecotourism thus the project will affect the flow of visitors into the forest.

The CFA added that the compensation for damage caused will be used towards fencing of the forest.

The chair added that according to the EIA license, the minimum distance from the river is 6m and a maximum of 30m depending on the highest flood marked should be followed strictly.

There are two dams along the trunk line at the Jockey Club side, which are very deep. The Jockey Club felt that it would be very expensive to make protective walls against it. The movement of the construction machines will also be difficult.

MIN/3/03/11/2021 WAY FORWARD

1. The proponent to cause a supplementary EIA Report covering Karinde to Kibera trunk sewer line to be developed to serve Karen Area. This will be in consultation with all stakeholders and should include the alternative routes for the proposed project.

2. The consulting Engineers on behalf of the proponent (AWWDA) to come up with a technical report for the alternative routes providing a justification for the most preferred route. The technical report is to be submitted to the proponent on Monday 8th Nov 2021. The proponent to review the report and share it with KFS on Tuesday 9th Nov 2021. KFS to share the same with the CFA Members and Jockey Club ahead of the next meeting.

3. KFS, AWWDA, CFA and Jockey Club of Kenya to form a team to ground truth and agree on the alignment of the proposed sewer line. This team is to be accompanied by Consulting Engineers and the Contractor.

4. The meeting ended at 1530hrs. The Chair added that more stakeholders should be involved for a wider stakeholders' consultation and consensus-building since the project is meant to benefit the people of the Karen area who currently are not connected to the sewer line.

5. The next meeting will be on 15th November 2021.

List of Attendance

Attendance list sheet

Construction of Sewer line through Ngong Road Forest

Meeting Held on 4th Nov 2021

No.	Name	Organization	Email address	Signature
1	Benedict Omondi	KFS HQs	bfomondi@gmail.com	
2	Margaret Wanjiru	KFS. EC NRB	wanjiruko7@yahoo.com	
3	JOHNSTONE NGUYAI	forester NGONG ROAD FOREST	Ztnguyai@gmail.com	
4	DOUGLAS WAKIIHURI	NRFA	douakiihuri1963@gmail.com	
5	ROO WOODS	NRFA	roo.woods@gmail.com	
6	ARUNÉ HICKS	NRFA	arune.hicks@gmail.com	
7	Victor Odhiambo	CRBC	victorodhiambo93@gmail.com	
8	Mark Ngao	CRBC	markingaogtlcertified.com	
9	DAISY NYAKUNDI	KWUSA-ENGINEER	dnyakundi@kwusa.go.ke	
10				

Attendance list sheet

Construction of Sewer line through Ngong Road Forest

Meeting Held on 4th Nov 2021

No.	Name	Organization	Email address	Signature
1	Dr. John. Serecomba	JCK	johnsserecomba@gmail.com	[signature]
2	Dr Paul Mbugua	JCK	paul@macnaughton.co.ke	[signature]
3	SIMON WOODS	NGONG ROAD FOREST ASSOCIATION.	simm@beglinwoods.com	[signature]
4	Fred Mutomo	Ngong Road CFA	Kkalung55@yahoo.com	[signature]
5	Simon Nkonolea	NGONG ROAD FOREST ASSOCIATION	skimandi77@gmail.com	[signature]
6	Eng Duncan Kamau	ECOSITE DEVELOPMENT CONSULTANTS	duncan.kamau@ecositeconsultants.com	[signature]
7	LOISE NYAMBURA	ECOSITE CONSULTANTS	loise.nyambura@ecositeconsultants.com	[signature]
8	GEORGE MUCHUGIA	Ecosite	gkmuchugia@gmail.com	[signature]
9	Winnie Kangai	AWWDA	wkangai@awwda.go.ke	[signature]
10	Eunice J. Chelimo	AWWDA	ebenutai@awwda.go.ke	[signature]

Attendance list sheet

Construction of Sewer line through Ngong Road Forest

Meeting Held on 4th Nov 2021

No.	Name	Organization	Email address	Signature
1	ALBERT OCHARO	AWSB	aocharo@awsb.go.ke	
2				
3				
4				
5				
6				
7				
8				
9				
10				

Annex 9. D: MINUTES OF THE MEETING HELD ON 15/11/2021 ON CONSTRUCTION OF KAREN SEWERAGE PROJECT THROUGH NGONG ROAD FOREST AT ECOSYSTEM CONSERVATOR'S BOARD ROOM - NAIROBI COUNTY

LIST OF ATTENDEES			
NO.	**NAME**	**ORGANAZATION**	**CONTACT**
1.	Margaret Wanjiru	EC –Nairobi (Chairperson)	wanjiruk07@yahoo.com
2.	Simon Woods	Chairman NRFA	simon@beglinwoods.com
3.	Simon Ng'ang'a	Vice-Chairman NRFA	skimandi77@gmail.com
4.	Johnstone Nguyai	Forest Manager Ngong Rd (Taking minutes)	ztnguyai@gmail.com
5.	Aruna Hicks	Secretary NRFA	arunahicks@gmail.com
6.	Roo Woods	NRFA Member	roowoods@gmail.com
7.	Douglas Wakihuri	NRFA Member	dwakiihuri1963@gmail.com
8.	Dr Paul Mbugua	Jockey Club	Paul@macnaughton.co.ke
9.	Eng. Albert Ocharo	AWWDA	aucharo@awwada.go.ke
10.	Eunice Jemutai	AWWDA	ejemutai@awwda.go.ke
11.	Daisy Nyakundi	AWWDA – Engineer	dnyakundi@awwda.go.ke
12.	Eng. George Muchugia	Ecosite Development Consultant	gkmuchugia@gmail.com
13.	Eng. Duncan Kamau	Ecosite Development Consultant	duncankamau@ecositeconsultants.co.ke
14.	Duncan Munyua	Resident	info@kcda.or.ke
15.	Bruno Illi	Resident Miotoni	billi@norconsult.co.ke
16.	Daniel Mariga	Resident Mutuini	seekariga@gmail.com
17.	Simon W. Thuo	Resident	simwaks@gmail.com
18.	Evans Kimulai	Water Resources Authority	kimulaievansion@gmail.com
19.	Catherine Mwikali	Water Resources Authority	cathymwikali@gmail.com
20.	Okungi F. Muturi	Water Resources Authority	moturifitzgerald@gmail.com
21.	Midina Etama	Student University of Eldoret	adanoimidina40@gmail.co.ke
22.	Loise Nyambura	Ecosite D.C	loise.nyambura@ecositeconsultants.co.ke
23.	Nicholas Rono	NGAO	nichorono1@gmail.com
24.	Mark Ngao	C.R.B.C	markngao@gmail.com
25.	Victor Odhiambo	C.R.B.C	victorodhiambo53@gmail.com
26.	Sudina Kabera	Resident	sudinakabera@gmail.com
27.	Paul Kanja	Resident	kayakamau20@gmail.com

ABSENT WITH APOLOGIES

1. **Benedict Omondi** – KFS - Head of Watershed Management
2. **Francis Kariuki** – Head of Forest Conservancy Nairobi
3. **Dr John Sercombe** – Jockey Club of Kenya

AGENDA

1. Introduction
2. Confirmation of Minutes of Previous Meeting
3. Stakeholders Views and Comments
4. Matters Arising
5. Way Forward

MIN 1/ 15/11/2021 INTRODUCTION

- The meeting was brought to order by the chairperson at 2:17 PM. She requested the attendees to make a self-introduction.

MIN 2/15/11/2021 CONFIRMATION OF THE PREVIOUS MINUTES

- Madam Eunice Jemutai of Athi Water Works Development Agency (AWWDA) read the minutes of the previous meeting. Simon Woods confirmed the minutes as a true copy of matters discussed and they were seconded by Dr Paul Mbugua.

MIN 3/15/11/2021 STAKEHOLDERS VIEWS AND COMMENTS

- The chairperson requested the proponent to report on the progress made on the proposed supplementary Environmental Impact Assessment (EIA) report for the proposed Motoine River Trunk Sewer. The Environmental Officer from the consultant team informed the members that the outcome of the meeting would dictate the progress of the supplementary EIA. She also added that the engagement meetings held would be considered as having marked the beginning of the process of developing the EIA report.

- The members were informed that the consultant was in the process of identifying relevant stakeholders along the sewer route. The consultant would inform and engage the affected communities for their views in the process of preparing a supplementary EIA Report. It was agreed that the supplementary EIA would be carried out for the area between Karinde to Kibera.

- The consultant's engineer gave a summary of the technical report on all the possible options considered in the design of the Karen Sewerage project.

He explained to the members the advantages and disadvantages of each of the two possible options;

OPTION I

- The participants were informed that the main advantage of this option is that it can serve a larger area on both sides of the valley by gravity. In addition, it would facilitate the construction of the sewerage infrastructure at a reasonable depth of between 1.5m – 3.0m.
- The consultant informed the members that various factors including social, safety, health, and cost of operation and maintenance had been considered in all the alternative routes to identifying the most viable option.
- He also noted that there would be a loss of vegetation along the alignment corridor and that some specialized machinery may be employed to work in rocky areas. This would be counteracted by an adequately environmental management and monitoring plan that would be implemented to the latter.

OPTION II

- The meeting was informed that the main advantage of this option was that it would avoid cutting down trees within the Ngong Road forest but it will not serve the highly-dense residential areas targeted by the project.
- It was noted that the second option would result in the excavation of deep trenches of about 11m, making the operation and maintenance cost very expensive. Considering the operation and maintenance cost, Option I was more viable.

MIN 4/15/11/2021 MATTERS ARISING

- The consultant informed the meeting that the work ongoing in some areas in Karen had an approved EIA license. Proper stakeholder's engagement meetings had been carried out for those areas. He reported that the challenge they had experienced in planning for public participation meetings is that there are people who do not pay heed to the call of attending the meetings during the initial stages of proposed projects.
- The meeting was informed that several public consultation meetings had been carried out in the year 2016, 2019 and a recent one in September 2021 at the Kenya School of Law.
- A member reported that there was a breakdown in communication since there were interested parties who were not informed of the meetings. The consultant informed the member that they will use local administration offices and key resident leaders to convey information.
- It was also noted that there was a need to connect the water supply in Karen areas. The client informed the members that the process of supplying water to the Karen area is in its initial stage. There are plans to supply the area with water.

WAY FORWARD

1. E.I.A report should be prepared first on the entire sewer trunk course i.e. Karinde to Kibera as the report would be used as reference of all the future engagements. It should also include both options.
2. The CFA signify that no physical work should start within the forest area without completion of E.I.A report.
3. The report should give details of what is to be affected and it should give the mitigation measures.
4. Since, Ngong Road Forest is an eco-tourism area the consultant should address how he would minimize the damages without interfering with any laid down infrastructures near the proposed sewer line.

There being no other business, the meeting was adjourned at 3:46 PM.

The next meeting will be held once the supplementary EIA report is ready.

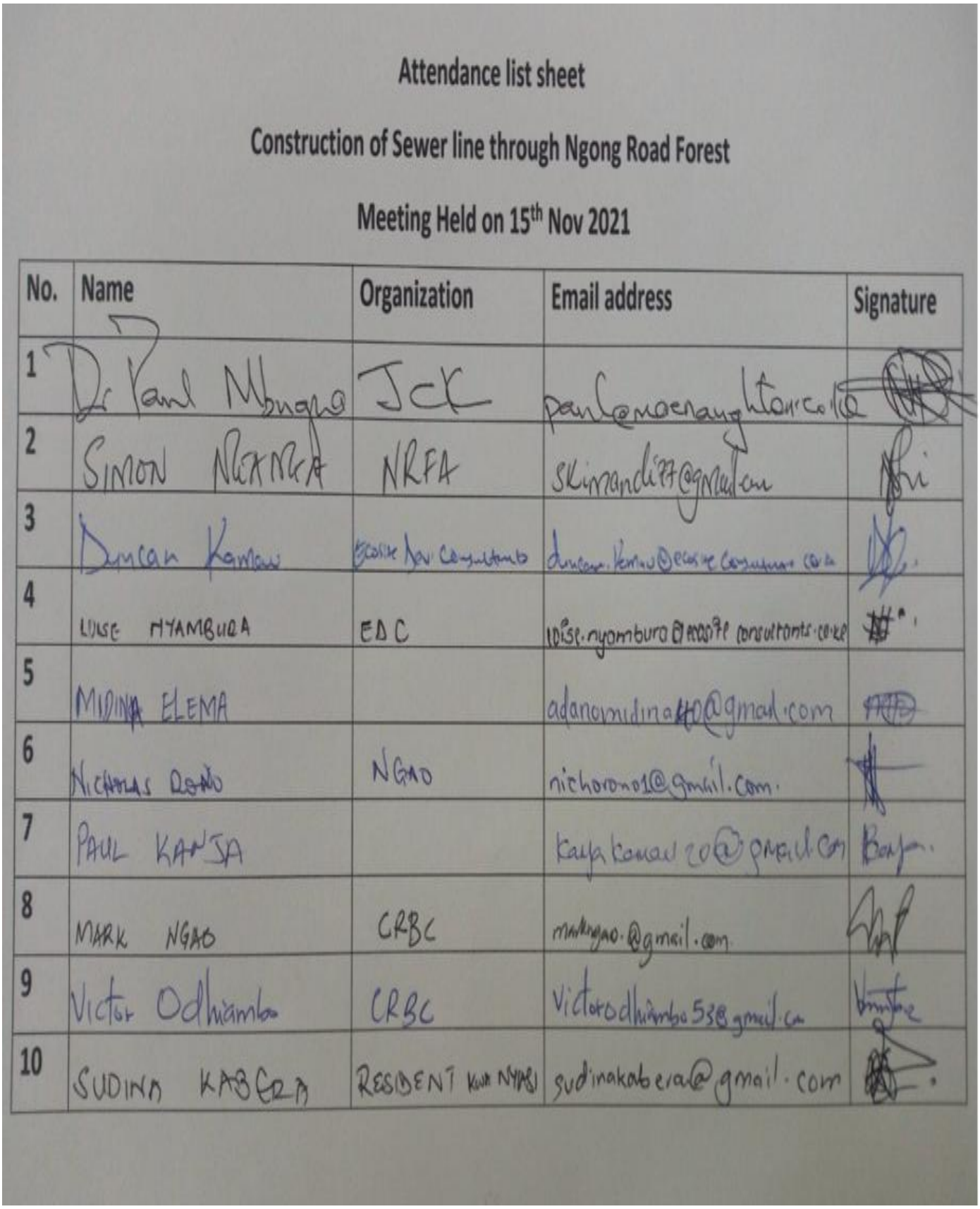
CONFIRMED: -

Name..Margaret Wanjiru..Signature.....Date....15/11/2021
For: Kenya Forest Service - EC Nairobi

Name..ALBERT OCHARO.....Signature.....Date....15/11/2021
For: ATH WATER WORKS

Name..Simon Woods.....Signature.....Date....17/02/2022
For:

List of Attendance



Attendance list sheet

Construction of Sewer line through Ngong Road Forest

Meeting Held on 15th Nov 2021

No.	Name	Organization	Email address	Signature
1	Dr Paul Mbuga	JCK	paulomaenaughton.co.ke	
2	SIMON NKANKA	NRFA	skimandi27@gmail.com	
3	Duncan Kamau	Ecosite Env. Consultants	duncan.kamau@ecosite consultants.co.ke	
4	LOISE NYAMBURA	EDC	loise.nyambura@ecosite consultants.co.ke	
5	MIDINA ELEMA		adanomidina40@gmail.com	
6	NICHOLAS ODHO	NGAO	nicholaso21@gmail.com.	
7	PAUL KANJA		kanjakamau20@gmail.com	
8	MARK NGAO	CRBC	markngao.@gmail.com	
9	Victor Odhiambo	CRBC	victorodhiambo538@gmail.com	
10	SUDINA KABERA	RESIDENT KWA NYABI	sudinakabera@gmail.com	

Attendance list sheet

Construction of Sewer line through Ngong Road Forest

Meeting Held on 15th Nov 2021

No.	Name	Organization	Email address	Signature
1	Johnstone Ngunyai	Kenya Forest Service Ngong Road Forest	ztnguyai@gmail.com	
2	Roo Woods	NRFA	roo.woods@gmail.com	
3	Douglas Wakahuru	NRFA	dwakahui1963@gmail.com	
4	Bruno ILLI	Resident Hiotani	billi@norconsult.co.ke	
5	Duncan Munyua	Resident	info@klda.or.ke	
6	ARUNÉ HICKS	NRFA	arune.hicks@gmail.com	
7	SIMON WOODS	NRFA	simon@beglinwood.com	
8	Daniel Mariga	V. chairman Residence.	seemariga@gmail.com	
9	Kirans Kimulai	WRA	[illegible]@gmail.com	
10	Catherine Mwikali	WRA	Cathymwikali1@gmail.com	

Attendance list sheet

Construction of Sewer line through Ngong Road Forest

Meeting Held on 15th Nov 2021

No.	Name	Organization	Email address	Signature
1	Albert Ocharo	AWWDA	aocharo@awwda.go.ke	
2	Eunice Jemutai	AWWDA	ejemutai@awwda.go.ke	
3	Daisy Nyakundi	AWWDA	dnyakundi@awwda.go.ke	
4	Simon W. Thuo	Comm. Member	simwiks@gmail.com	
5	Okungi F. Moturi	Water Resources Authority	moturifitzgerald@gmail.com	
6	George Muchugia	Ecosite	gkmuchugia@gmail.com	
7				
8				
9				
10				

Annex 9. E: NaRSIP II LOT 4 – CONSTRUCTION OF EAST AND WEST NAIROBI SEWERS

MINUTES FOR PUBLIC CONSULTATION MEETING HELD ON 18TH NOVEMBER 2021 AT SAIGON, MUTUINI

Contract No.	AWWDA/NaRSIP II/W-04/2021			
Location	Saigon, Mutuini			
Time:	12:00 P.M.			
Date:	18/11/2021			
Attendees:	**Name**	**Organization**	**Position**	**Email/contact**
	Mwambanga Mtalaki	Ecosite	Engineer	mtalaki.m@ecositeconsultants.co.ke
	Loise Nyambura	Ecosite	EHS Expert	loise.nyambura@ecositeconsultants.co.ke
	Nicholas Ronoh		Chief	
	Stakeholders	See attached list		
Meeting purpose:	Public Consultation Meeting			
Minutes Taken by:	Loise Nyambura			

1. AGENDA

The following agenda was adopted:

- Introduction
- Project Overview
- Question and Answer Session
- Closing Remarks

2. PURPOSE OF THE MEETING

The purpose of the meeting was to inform residents and Project Affected People (PAPs) about the proposed sewerage project being undertaken by the Athi Water Works Development Agency (AWWDA). This was also to seek their input, view and concerns of the project that would be taken into account in formulating an Environmental Impact Assessment report as provided in the Environmental Management Coordination Act, 1999.

3. INTRODUCTION

The meeting was called into order at 12:00 P.M by the chief. He welcomed all participants and called upon Father Joseph Ndura to offer the opening prayer. A self-introduction was then made before handing over the meeting proceedings to the consultant team.

In her opening remarks, the consultant thanked all attendees for availing themselves for the meeting. It was emphasized that the meeting aimed to inform the people of the area and seek their opinions about the proposed project. The consultant informed the participants that it is a government legal framework policy to engage the public in the planning and implementation of new projects. She encouraged the participants to participate freely by asking questions and airing their concerns.

4. PROJECT OVERVIEW

The consultant engineer explained to the participants the scope of the project. He expounded on the proposed routes and lengths of the project.

OPTION 1 would use the Motoine River Riparian Reserve while **OPTION 2** would use the Southern By-Pass, Ngong Road and Miotoni Roads Reserve.

He explained that the Motoine Trunk Sewer as **OPTION 1** will run for 11.421 km. This would be laid along the Motoine river riparian reserve with a roughly 6 km stretch passing through the Ngong road Forest Section 1 and 3.9 km at the Sanctuary section. It would begin at Kibera Trunk Sewer. The trunk sewer will terminate at Karinde at the point where the KPC wayleave meets Dagoretti Road.

- A significant area will be served by the trunk sewer on both sides of the valley by gravity.
- The excavated depth would be about 1.5m-3.0m

The disadvantage of the option was that it would lead to the loss of vegetation along the alignment corridor. However, this would be mitigated by a feasible restoration program using a detailed environmental management plan.

OPTION 2 that use the Southern By-Pass, Ngong Road and Miotoni Roads Reserve would run for about 10.32 km long. The advantage of this option is that it is shorter and it would avoid the loss of vegetation.

However, this OPTION 2 had several disadvantages.

- A large area would not be served especially the Karinde high-density residential area.
- The cost per capita of the sewer would be extremely expensive with low returns on the investment.
- A sewerage pumping system would be required that is not feasible in terms of sustainability.
- OPTION 2 would also require deep excavations of up to 11m to maintain a gravity sewage flow system.
- It may cause social upheaval especially within the Raila Village of Kibera since the demolition of houses would be required.
- This would also result in interference with other public utilities including the Petroleum pipeline, ICT cables, water lines and stormwater drainage systems.

The consultant reported that OPTION 1 was more viable having considered several factors including Technically and Economically Feasibility; Social Tranquillity; Health and Safety during Construction and Operation of the Project; Cost of Operation and Maintainance; and the Sustainability of the Project.

5. QUESTION AND ANSWER SESSION

The participants were invited to ask questions or give comments relating to the proposed project. The following table gives a summary of the questions asked and responses given.

	QUESTION/COMMENT	**RESPONSE/ACTION TO BE TAKEN**
1.	Will the Mutuini Area be served by the proposed trunk sewer?	The section of Mutuini adjacent to the river will be served under the current design. However, Mutuini residents on the opposite side of the bypass are not served under the current design.
2.	How will people close to the trunk sewer be served?	There are reticulation sewers from the trunk to serve nearby areas. Additionally, there is a household connections component that will be used to connect houses that are right next to the trunk sewer.
3.	During construction, will people's land be touched?	The sewers in the project have been designed entirely on public land, mainly road and riparian reserves.
4.	What happens if the contractor damages crops on their land?	The residents would need to request compensation directly from the contractor in the event that they damage crops or property on private land.
5.	Will there be compensation for crops on riparian land?	Athi Water is currently not compensating for any property on public wayleaves whether on-road

		reserves or riparian land. Notices will be given in due time to farmers who have crops along the riparian reserves to remove their produce.
7.	Request for lateral to be laid to serve people on the Muchugia Rd – Muraba Rd area.	The members were informed that the request had been noted and would be forwarded to the consultant and the client for consideration. Feedback would be given.
8.	Request for the area to be considered in future water projects. The primary water source is currently wells and boreholes.	The consultant advised the meeting to write their requests as an association or community to Nairobi Water and/or AWWDA in consideration of connection in their next projects for water supply.
9.	A member appreciated the proposed project and requested that they be considered in available job opportunities.	Local residents will be a priority in unskilled or skilled employment opportunities. However, workers must be of above 18 years to avoid child labour.
7.	Request for lateral to be laid to serve people on the Muchugia Rd – Muraba Rd area.	The members were informed that the request had been noted and would be forwarded to the consultant and the client for consideration. Feedback would be given.

6. CLOSING REMARKS

The chairman of the residents of the Old Mutuini area stated that they are in favour of the project and assented to OPTION 1 as the most viable. He reinstated that the other side of the Southern bypass should be considered for sewer reticulation as well. The closing prayer was offered by Pastor John Waweru.

There being no other business the meeting was adjourned at 1:30 P.M.

CONFIRMED:-

Name: PAUL KAMAU KANJI Signature: [signature] Date: 25/01/2022
For: Chairman Mutuini residents.

Name: Daniel Muriju Signature: [signature] Date: 25/01/2022
For:

Name: Nicholas Ronoh Signature: [signature] Date: 25/01/2022
For:

PHOTO PLATE

Engagement Session with Participants

PUBLIC CONSULTATION MEETING

LIST OF ATTENDANCE

Venue: SAIGON, MOTOINE Date: 18/11/2021

No	Name	Organization	Contacts
1	PAUL K KANJA	RESIDENT	0723872078
2	JAMES K. WANGUGI	RESIDENT	0726509333
3	Samuel Gitau	RESIDENT	0726666677
4	David Wangoo		0716200271
5	Alex Kobiti	ALLIANCE CONCRETE LTD	0705884581
6	GLADYS NGURE	ALLIANCE CONCRETE LTD	0721634261
7	JAMES KIMITI	RESIDENT	0792118977
8	Grace Kamau	resident	0729802351
9	George matta	resident	
10	Anthony K. Njagi	Resident	0722748143
11	MARTIN GITHUKU	Resident	0722325892
12	MARIGA DANIEL	RESIDENT	0716371293
13	PETER Ethan	Resident	0729612585
14	NTENGA KAMAU	RESIDENT	0700728712
15	Fr. Joseph Ndura	RESIDENT	0722261370
16	JOHN WAWERU	Resident	0715490815
17	PETER MUIGAI	Resident	0721770258
18	KAMAU KIMITI	Resident	0725695067
19	Margret Wanjiru	resident	0723748141
20	Lucy Wambui	resident	0722 537481
21	Edward N. Mahon	Resident	0720335186
22	Grace Nalanyu	Resident	0723396123
23	Lucy Njeri	Resident	0727719566
24	Mary Njoki	Resident	0725156237

PUBLIC CONSULTATION MEETING

LIST OF ATTENDANCE

Venue: SAIBON, MOTOINE Date: 18/11/2021

No	Name	Organization	Contacts
1	NICHOLAS RONOI	Chief	0725259998
2	Mwambanga Mlaki	ECOSITE	ecosite consultants @gmail.com
3	LOISE NYAMBURA	ECOSITE DEVELOPMENT CONSU[illegible]	loise.nyambura@ ecositeconsultants.co.ke
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

Annex 9. F: NaRSIP II LOT 4 – CONSTRUCTION OF EAST AND WEST NAIROBI SEWERS

MINUTES FOR PUBLIC CONSULTATION MEETING HELD ON 23RD NOVEMBER 20201 AT BUSH PARK HOTEL, KARINDE

Contract No.	AWWDA/NaRSIPII/W-04/2021			
Location	Bush Park Hotel, Karinde			
Time:	11:30 P.M.			
Date:	23/11/2021			
Attendees:	**Name**	**Organization**	**Position**	**Email/contact**
	Sarah Atieno	AWWDA	Sociologist	satieno@awwda.go.ke
	Loise Nyambura	Ecosite	EHS Expert	loise.nyambura@ecositeconsultants.co.ke
	Mwambanga Mtalaki	Ecosite	Engineer	mtalaki.m@ecositeconsultants.co.ke
	Nicholas Rono		Chief	
	Amos Njoroge		Karinde Residents Chairman	
	Stakeholders	See the Attached List.		
Meeting purpose:	Public Consultation			
Minutes Taken by:	Loise Nyambura			

1. AGENDA

The following agenda was adopted:

- Introduction
- Project Overview
- Question and Answer Session
- Closing Remarks

2. PURPOSE OF THE MEETING

The purpose of the meeting was to inform residents and Project Affected People (PAPs) about the proposed sewerage project being undertaken by the Athi Water Works Development Agency (AWWDA). This was also to seek their input, view and concerns of the project that would be taken into account in formulating an Environmental Impact Assessment report as provided in the Environmental Management Coordination Act, 1999.

3. INTRODUCTION

The meeting was called into order by the chairman, Mr Amos Njoroge at 11:30 PM with a prayer. He welcomed all participants present and invited the consultant who would introduce the agenda of the meeting. The consultant requested the attendees to make a self-introduction.

The consultant explained that it's a government policy under the EMCA 1999 to hold engagement meetings that involve the public on planned projects that fall under the second schedule as per the legal framework. This was in line with formulating an Environmental Impact Assessment (EIA) report. She urged the members to participate fully by asking questions and airing their concerns and comments that would be taken into account in decision making.

The client explained that the role of AWWDA is to supply bulk water and construct sewerage infrastructure which is then handed over to water service providers (WSPs) for distribution and charging consumers. The scope of AWWDA is in Nairobi, Kiambu and Murang'a counties.

4. PROJECT SCOPE AND ALTERNATIVE ROUTES

The consultant engineer explained to the participants the scope of the project. He explained that two options were considered as routes for the sewerage infrastructure.

OPTION 1 would use the Motoine River Riparian Reserve while OPTION 2 would use the Southern By-Pass, Ngong Road and Miotoni Roads Reserve.

He explained that the Motoine Trunk Sewer as **OPTION 1** will run for 11.421 km. This would be laid along the Motoine River riparian reserve with a roughly 6 km stretch passing through the Ngong road Forest Sanctuary. It would begin at Kibera Trunk Sewer. The trunk sewer will terminate at Karinde at the point where the KPC wayleave meets Dagoretti Road.

- A significant area will be served by the trunk sewer on both sides of the valley by gravity.
- The excavated depth would be about 1.5m-3.0m

The disadvantage with the option was that it would lead to the loss of vegetation along the alignment corridor. However, this would be mitigated by a feasible restoration program using a detailed environmental management plan.

OPTION 2 that use the Southern By-Pass, Ngong Road and Miotoni Roads Reserve and would run for about 10.32 km long. The advantage of this option is that it is shorter and it would avoid the loss of vegetation.

However, this OPTION 2 had several disadvantages.

- A large area would not be served especially the Karinde high-density residential area.
- The cost per capita of the sewer would be extremely expensive with low returns on the investment.
- A sewerage pumping system would be required that is not feasible in terms of sustainability.
- OPTION 2 would also require deep excavations of up to 11m to maintain a gravity sewage flow system.
- It may cause social upheaval especially within the Raila Village of Kibera since the demolition of houses would be required.
- This would also result in interference with other public utilities including the Petroleum pipeline, ICT cables, water lines and stormwater drainage systems.

The consultant reported that OPTION 1 was more viable having considered several factors including Technical and Economical Feasibility; Social Tranquility; Health and Safety during Construction and Operation of the Project; Cost of Operation and Maintenance; and the Sustainability of the Project.

5. QUESTION AND ANSWER SESSION

The participants were invited to ask questions or give comments relating to the proposed project. The following table gives a summary of the questions asked and the response given.

	QUESTION/COMMENT	**RESPONSE/ACTION TO BE TAKEN**
1.	Who will be served by the sewerage project?	Everyone in the Mutuini River catchment basin will be served by the sewers. The sewer system relies on gravity and thus all the land that slopes towards the river can be served as long as there is access.
2.	What will be the depth of the sewer?	The sewer will be an average of 1.5 to 3m deep. It may, however, be deeper in some areas due to topography and design constraints.
3.	Where will the sewers pass? Whose land would be used in the construction of the sewerage?	The sewers will be placed on public land only; either road reserves or riparian reserves. Therefore, there won't be any compensation. Where private land is utilized, the landowner must grant access and sign a consent form to lay a sewer through the land. However, this project will only utilize public reserves.

4.	How will people connect to the sewers?	Anyone who wishes to connect will need to contact Nairobi Water (NCWSC). They are in charge of sewer connections.
5.	When will the project commence?	The Karen project commenced on 3rd August 2021. However, for the proposed trunk sewer, project works will begin when the EIA procedurals are complete with an approved license.
6.	When will the project be completed?	The Karen Component of the sewerage project is scheduled to be completed 6 months from the commencement date.
7.	Will the people further upstream (Kiambu County) be served under this project?	There is no provision for areas outside Nairobi County within this project. However, after construction of the trunk sewer, residents of Kiambu County who are further upstream can contact Kiambu Water to connect them to the sewer line.
8.	How will people whose areas are not being served by the sewers in the layout be connected?	The layout only details the trunk sewers and major reticulation lines. All residents in the area who can be served by gravity sewers will be served under the current project.

6. CLOSING REMARKS

The residents remarked that they were fully behind the project and they have needed the sewerage services in the area especially because of the black cotton soil in the area that doesn't favour the use of on-site sanitation systems like septic tanks. The participants present all fully endorsed OPTION 1 as the most viable and that would cover their area.

There being no other business the meeting was adjourned at 1:15 P.M.

CONFIRMED:-

Name: H. Mbugua, Rabera ..... Signature ..... Date 22/1/2022.
For: Residence.

Name: Ames Kimani ..... Signature ..... Date 22/1/22
For:

Name: Mr Waithi ..... Signature ..... Date 22/1/2022
For:

PHOTO PLATE

Consultant Explaining the Scope of the Project.

Engagement Discussions with Participants Present.

Question and Answer Session with Participants

NaRSIP II LOT 4 – CONSTRUCTION OF PROPOSED MOTOINE RIVER TRUNK SEWER

Contract Number: AWWDA/NaRSIPII/W-03/2020

PUBLIC CONSULTATION MEETING

LIST OF ATTENDANCE

Venue: BUSH PARK Date: 23/11/2021

No	Name	Organization	Contacts
1	JAMES NYAUTHI	GICUNGO Mutvini	0711182038
2	KANJIKU MUIRU	"	0769358 233
3	Stanley Nganga	"	0733840427
4	GEOFFREY NJUGUNA	"	0724864275
5	BONIFACE KAMAU	"	0792 199555
6	Amos N. GMANI	"	0726892951
7	Mbugua Kabera	"	0721-705697.
8	ESTHER ATIENO	"	0715489 270
9	Peter Kimani	"	0726332731
10	John Ngugi	"	0712 088417
11	Mungai GUTRU		0716 247 109
12	MARION KARIUKI	MUTUINI	0722398108
13	Sarah D. Atieno	AWWDA Sociologist	0719575662
14	LOISE NYAMBURA	ECOSITE CONSULTANTS DEVELOPMENT	0799211780
15	DENNIS WAWERU	RESIDENT	0722527769
16	Mwambonga Mtalaki	ECOSITE	0700 177954
17	NICHOLAS RONO	CHIEF	0725259998
18			
19			
20			
21			
22			
23			
24			
25			

Annex 9. G: NaRSIP II LOT 4 – CONSTRUCTION OF EAST AND WEST NAIROBI SEWERS

MINUTES FOR PUBLIC CONSULTATION MEETING HELD ON 16TH DECEMBER 2021 AT THE KAREN CHIEF'S OFFICE HALL, KAREN

Contract No.	AWWDA/NaRSIPII/W-04/2021			
Location	Karen Chief's Hall, Karen			
Time:	11:20 A.M.			
Date:	16/12/2021			
Attendees:	**Name**	**Organization**	**Position**	**Email/contact**
	Sarah Atieno	AWWDA	Sociologist	satieno@awwda.go.ke
	Duncan Kamau	Ecosite Development Consultants (EDC)	Engineer	Duncan.kamau@ecositeconsultants.co.ke
		EDC		
	Mwambanga Mtalaki	EDC	Engineer	mtalaki.m@ecositeconsultants.co.ke
	Loise Nyambura	EDC	EHS Expert	loise.nyambura@ecositeconsultants.co.ke
	Stakeholders	See the Attached List.		
Meeting purpose:	Public Consultation			
Minutes Taken by:	Loise Nyambura			

AGENDA

1. Introduction
2. Project Overview
3. Stakeholders Views and Comments
4. Way Forward

MIN 1/ 16/12/2021 INTRODUCTION

- The meeting was brought to order by the consultant at 11:20 A.M who offered a word of prayer. The consultant requested the members present to make a self-introduction.

MIN 2/16/12/2021 PURPOSE OF THE MEETING

- The Consultant explained the purpose of the meeting was to inform the Community Forest Association, and interested public members present about the proposed sewerage project being undertaken by the Athi Water Works Development Agency (AWWDA). This is per the government policy under the Environmental Management Coordination Act (EMCA), 1999 to hold engagement meetings that involve the public on planned projects that fall under the second schedule as per the legal framework. This was also to seek their input, view and concerns of the project that would be taken into account in formulating an Environmental Impact Assessment report as provided in the EMCA, 1999.

- The client explained that Athi Water Works Development Agency (AWWDA) is one of the nine (9) Water Works Development Agencies (WWDA) established under the Ministry of Water and Sanitation. It was established under the Water Act 2016. AWWDA is responsible for the development, maintenance and management of bulk water and sewerage infrastructure in the counties of Nairobi, Kiambu and Muranga Counties. AWWDA then hand over the infrastructure to Nairobi City Water and Sewerage Company (NCWSC) - a Water Service Provider- for distribution and charging consumers. The Water Resource Authority established also under the Water Act 2016, has been mandated with the responsibility of regulating and managing (surface and ground) water resources including rivers.

MIN 3/16/12/2021 PROJECT OVERVIEW

The consultant engineer described the project which is under the Nairobi Rivers Basin Rehabilitation and Restoration Program Phase II (NaRSIP II). The programme is being conducted in phases. Sewerage coverage remained significantly low with the implementation of NARSIP Phase I, resulting in highly polluted rivers from domestic and industrial waste that are sources of water within Nairobi City. Thus the need to scale up the works to Phase II. The first Master Plan for sewerage expansion in Nairobi was developed in 1973 and reviewed and updated in 1998. The programme is in consideration of the growing population, urbanization and industrialization thus, the demand to expand the wastewater infrastructure.

The mandate of the Phase II programme was to construct the main sewer along the various proposed routes. Phase II (NaRSIP II) is engrossed in sewerage improvement projects. The aim is to increase access to sanitation facilities for Nairobi residents, improve the quality of water, and reclaim riparian ecosystems of the city's rivers. Phase II conducted in five Lots has the objective of constructing reticulation and lateral sewers.

- Lot 1 is to build the capacity of water companies.
- Lot 2 involves the construction of reticulation and lateral sewers in Githurai, Ruiru
- Lot 3 covers mainly Kasarani and Mwiki areas.

- Lot 4 project areas are Karen, Westlands, Kilimani, Kileleshwa, Utawala, Kangemi, Mountain View and Uthiru, Ngara and Eastleigh.

  The proposed project area along the Motoine River is among the Karen areas covered under this Lot.

- Lot 5 objective is the rehabilitation and expansion of the water treatment plant at Ruai.

The consultant explained that the total scope of works for laying sewers in Karen areas is 52.19km sewers. The original project scope in the previously approved and licensed EIA involved the laying of 36.6km sewers in the Karen areas. The additional 15km were not in the approved EIA license whose works are ongoing, therefore the need for a new EIA study report for the proposed project area and the public participation meetings been conducted.

The consultant explained that several factors had been considered in identifying project alternative routes. The alignment corridor to lay the trunk sewers were designed to follow the public wayleave as much as possible within depressions to allow for maximum drainage of the raw sewer. Gradient factor was the main consideration to ensure that raw sewer flow by gravity. Cost-benefit analysis in consideration of depths in excavation, health and safety, and sustainability during construction and operation of the project were factored in identifying the project route alternatives. The consultant explained that two options were considered as routes for the sewerage infrastructure.

OPTION 1 would run for 11.421 km using the Motoine River Riparian Reserve while OPTION 2 would use the Southern By-Pass, Ngong Road and Miotoni Roads Reserve. He explained Option 1 was the most viable having considered the factors stated. This would be laid along the Motoine River riparian reserve with a roughly 6km stretch passing through the Ngong Road Forest Section 1 and 3.9km at the sanctuary section. It would begin at Kibera Trunk Sewer and terminate at Karinde at the point where the KPC wayleave meets Dagoretti Road. The consultant recommended Option 1 as most viable since a larger population will be served by the trunk sewer on both sides of the gravity including the high-density residential areas of Karinde and Motoine as well as vital institutions. It will also be more sustainable in terms of operation and maintenance with high returns on investment.

MIN 4/16/12/2021 STAKEHOLDERS VIEWS AND COMMENTS

The participants were invited to ask questions or give comments relating to the proposed project. The following table gives a summary of the questions asked and the response given.

1.	Why are there current project activities undertaken in some areas in Karen?	The sewerage project activities undertaken in Karen areas are under the approved ESIA study report conducted and ESIA License issued and extended in 2020. Consultations and public participation meetings were conducted in 2016, 2018 and 2020. A stakeholder's engagement meeting through KLDA was conducted on 9th September 2021 at Kenya School of Law. The approved ESIA document can be retrieved from the NEMA portal and the Client (AWWDA) website www.awwda.go.ke. It was

		reported and confirmed that the consultant had previously shared the EIA and technical reports with several stakeholders through the CFA and KLDA representatives.
2.	What is expected in the new ESIA report?	Environmental Impact Assessment is required for all projects that are likely to have a negative impact on the environment. The ESIA study report is being developed by the consultant-led by a team of environmental registered and licensed experts. It will comprise a general framework of an expected EIA report including baseline data; assessed potential environmental and social impacts, determined magnitude and significance of the potential impacts and recommended suitable mitigation measures; possible alternatives of project design; and a developed environmental management and monitoring plan including the cost for management.
3.	What are the procedures in developing and approving the ESIA report?	The report is then submitted to NEMA for processing. NEMA reviews the report. During this stage, the community and other stakeholders are provided with an opportunity to comment on the report. In addition, a notice is made in widely circulated newspapers and radio to inform the public about the availability of the report. The community can access the Environmental Impact Assessment reports at NEMA County Office, NEMA headquarter, and NEMA website.
4.	How will the stakeholders have their input in ensuring compliance with the Environmental Management Plan as per the ESIA Report?	A committee will be formed comprising of various stakeholders and relevant local authorities to ensure adherence to the management and monitoring plan and provide corrective measures for the identified negative effects of the project.
5.	Who will be served by the sewerage project?	Everyone in the Mutuini River catchment basin will be served by the sewers. The sewer system relies on gravity and thus all the land that slopes towards the river can be served as long as there is access. The Karinde area that has a high-density population will also benefit from the project.

6.	What will be the depth of the sewer?	The recommended option will be an average of 1.5 to 3m deep. Option 2 will require excavation depths of about 12m in some areas.
7.	Why are trees in the proposed project alignment corridor marked with red paint?	During the feasibility study, identification of alignment corridor requires data records of affected biodiversity. The paint used is non-hazard used by KFS only in marking identified trees to be cut or removed as stipulated in Section 65 and Section 71 of the Forest Conservation and Management Act 2016.
8.	What method will be used in the proposed project?	The contractor will employ the cut and fill excavation method in the project. The contractor has mobilized personnel and equipment for the project activities. If other methods are likely to be utilized like blasting, the required procedure in applying for a permit through the Department of Mines and Geology will be followed. Though the project may not likely use this method.
9.	A participant recommended that documents like maps and reports should have been used for credibility and understanding of the project.	A technical report with maps, EIA reports had been circulated to another of participants through the KLDA and CFA representatives. However, projection of the maps would be considered in subsequent meetings.
10.	There is an online petition by NRFA with 1,200 signatories requesting the preservation of the Ngong Road Forest. Where do they send the document?	The document can be sent to AWWDA Project Manager engineer Joseph Kamau email address: jkamau@awwda.go.ke and copy the consultant info@ecositeconsultants.co.ke
11.	There is a need for transparency going forward in acknowledgement that the cheapest and easiest way is to follow the water gradient.	A committee group will be formed involving various stakeholders to ensure adherence to the management and monitoring of the ESMP (Environmental and Social Management Plan).

12.	What is the time frame for the proposed area?	The contractor has given a 6 months' time frame in his programme of works for the Karen Sewerage Project.
13.	A comment that everyone has a septic tank so there is no need for sewerage lines.	A very small section of the Karen project area of about 1.72% around the Karen Shopping Center, is served with a sewerage system. There is a need for the sewerage infrastructure in Karen.
14.	Have alternatives been considered where the trunk sewer won't run through the forest?	Alternative routes were technically considered in the project design. Option 1 is recommended as more viable factoring in the use of public wayleave, the gradient of the sewer to ensure gravity flow of the sewer, and cost-benefit analysis and sustainability during construction and operation of the project. Option 2 would utilise road reserve but with more disadvantages. A significant area will not be served by the trunk sewer, it will require deep excavations of up to 11m to maintain the gravity sewerage flow and a pumping station that would increase the capital cost, and operation and maintenance cost. All projects have an impact, therefore, a need for an impact assessment report. The impacts are reversible with the implementation of the environmental and social management plan.

MIN 5/16/12/2021 MATTERS ARISING

1.	A comment by a participant that water supply is of more priority in Karen and Mbagathi ridges.	The Client laid HDPE water pipes of DN 900mm in the supply of water to Karen and its environs. There are however some works in progress at Kabete that are being acted on in the supply of water.
2.	Why is the contractor marking culverts and working on Sunday without informing the residents at Marula Lane?	Corrective measures will be taken to ensure affected residents are informed of prior project activities in their area through the Karen-Lang'ata District Association (KLDA) and Mbagathi Ridges Residents Association (MRRA). Project activities will be carried out as per construction conditions provided in the EIA license on time and on days.

WAY FORWARD

1. It was agreed that the minutes of the meeting will be circulated to the stakeholders on Wednesday 23rd December 2021.
2. The developed ESIA Report will be circulated to the stakeholders and the public for their input.
3. There will be no project activities within the forest until the EIA study report has been approved and a license issued by NEMA.

There being no other business, the meeting was adjourned at 1:15 PM.

CONFIRMED:-

Name: Simon Woods ..... Signature ..... Date 17/02/2022
For: HRFA

Name: DUNCAN KAMAU ..... Signature ..... Date 17/02/2022
For: ECOSITE DEVELOPMENT CONSULTANTS

Name: ALBERT OCHARO ..... Signature ..... Date 17/02/2022
For: AWNSA

PHOTO PLATE

Project Overview Session with Participants

Question and Answer Session

NaRSIP II LOT 4 – CONSTRUCTION OF PROPOSED MOTOINE RIVER TRUNK SEWER

Contract Number: AWWDA/ NaRSIP II/W-04/2021

PUBLIC CONSULTATION MEETING

LIST OF ATTENDANCE

Venue: KAREN CHIEF'S HALL, KAREN Date: 16/12/2021

No	Name	Organization	Contacts
1	Kogi Nyugana	Private	0726639059
2	Christine Macharia	N/A	0722408727
3	Linda Garner	N/A	0733-739637
4	Sharon Hays	School of Stanley	0722 519727
5	GEORGE BRUTON	HEMINGWAYS	0705 717 383
6	Fevika	MRRA	0722 516121
7	DR. R. Dolan	MRRA	0733 744311
8	Derek Dawes	MRRA	0721394622
9	Evy van Weezendonk	Private / Citizen.	0727523244
10	Johnstone Nguyai	KFS-Ngong Road Forest	0722 604102
11	Peter Anayo	KE-RC's Office Nairobi	0710592517
12	Cynthia Ryan	MRRA	0723508899
13	PAUL IMISON	RESIDENT, FOREST LANE	0728935088
14	ROO WOODS	NRFA	0733 655077
15	SIMON NKARRA	NGONG RD FOREST	0729840715
16	Daniel Murigu.	Motoini / K END.	0716371243
17	ARUNE HICKS	NRFA	0733/22-789137
18	Martha Githui	Rotary Club of Karen	0723773974
19	Mbugua Kabera.	Resident. Dagoretti Road	0721-705097
20	Lucy Wambui	Resident Near Motoini Forest	0722 537481
21	VINCENT P. MAGETH	NGAO	0720886173
22	Sarah D. Atieno	AWWDA Sociologist	0719575662
23	Mwambanga Mtalaki	ECOSITE	0700177954
24	LOISE NYAMBURA	ECOSITE CONSULTANT	0799211780.
25	Duncan Kamau	"	0720-104-815

Annex 9. H: NaRSIP II LOT 4 – CONSTRUCTION OF EAST AND WEST NAIROBI SEWERS

MINUTES FOR PUBLIC CONSULTATION MEETING HELD ON 24TH JANUARY 2022 AT THE ATHI WATER WORKS DEVELOPMENT AGENCY (AWWDA) OFFICE

Contract No.	AWWDA/NaRSIP II/W-04/2021			
Location	AWWDA Boardroom			
Time:	9:10 A.M.			
Date:	24/01/2022			
Attendees:	**Name**	**Organization**	**Position**	**Email/contact**
	Eng. Joseph Kamau	AWWDA	Project Engineer (Chairing)	jkamau@awwda.go.ke
	Keziah Adhiambo	AWWDA	Environmental Expert	kadhiambo@awwda.go.ke
	Eng. Albert Ocharo	AWWDA	Engineer	aocharo@awwda.go.ke
	Edelquin Wanjala	AWWDA	Environmental Officer	ewanjala@awwda.go.ke
	Winnie Kangai	AWWDA	Sociologist	wkangai@awwda.go.ke
	Eng. William Kamau	Ecosite Development Consultants (EDC)	Team Leader	ecositeconsultants@gmail.com
	Eng. George Muchugia	EDC	Engineer	gkmuchugia@gmail.com
	Eng. Duncan Kamau	EDC	Engineer	duncan.kamau@ecositeconsultants.co.ke
	Loise Nyambura	EDC	EHS Expert	loise.nyambura@ecositeconsultants.co.ke
	Chris Maina	EDC	Engineer	chris.maina@ecositeconsultants.co.ke
	Francis Kariuki	Kenya Forest Service (KFS)	Head of Forest Conservancy	frankkariuki2015@gmail.com
	Margaret Wanjiru	KFS	Ecosystem Conservator	wanjiruk07@yahoo.com
	Johnstone Nguyai	KFS		ztnguyai@gmail.com
	Simon Woods	Ngong Road Forest	chairman	simon@beglinwoods.com

		Association (NRFA)		
	Simon Ng'ang'a	NRFA	Vice-Chairman	skimandi77@gmail.com
	Roo Woods	NRFA		roo.woods@gmail.com
	Arune Hicks	NRFA	Secretary	arune.hicks@gmail.com
	Derek Dames	MRRA/KLDA		derek@derekdames.com
	Daniel Mariga	Mutuini Residence	Vice- Chairman	seekariga@gmail.com
	Chrispus Mbai Ndung'u	Mutuini Residence	Resident	
	Amos Njoroge	Mutuini Residence	Resident	amoskim4199@gmail.com
	Karurue K. Kimiti	Mutuini Residence	Resident	kanjakamau20@gmail.com
	Charles Mugo	Mutuini Residence	Resident	
Meeting purpose:	Community Forest Association (CFA) Engagement Meeting			
Minutes Taken by:	Loise Nyambura			

AGENDA:

1. Introductions
2. Project Overview
3. Project Routes Alternatives
4. Matters Arising
5. Way Forward
6. Any Other Business (AOB).

DISCUSSIONS:

MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
1.	**INTRODUCTION**	
	The meeting was called into order by the Project Manager, Eng. Joseph Kamau at 9:10 A.M. This was followed by a self-introduction by members present.	

MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
2.	**PROJECT OVERVIEW**	
	Eng. Ocharo gave an overview of the project. He explained that the Karen Sewerage Project aims at increasing the sewerage coverage and effluent collection efficiency in the city hence ensuring that the objectives of the Nairobi Rivers Rehabilitation Programme are fully achieved. He explained that the project involved laying sewer lines and rehabilitation of the Karen sewerage treatment plant. The consulting engineer expounded that a very small section of the Karen project area is served with a sewerage system. Larger sections of the area are served by on-site sewage management systems that have their share of challenges. Effluent from the onsite sewage treatment methods practised in the area drains into the nearby water bodies polluting dams inside the Nairobi National Park that are used as watering points for wildlife. The consulting engineer mentioned that the total scope of works for laying sewers in Karen areas is 52.19km. This comprised of the trunk sewers, secondary and lateral sewers lines. It was requested that a technical report with the layout should be shared with members. The client undertook to share the technical report and layout map with the Mbagathi Ridges Resident Association (MRRA) representative.	**AWWDA/ EDC**
3.	**PROJECT ROUTES ALTERNATIVES**	
	The chairman clarified that the discussions were not precisely about the riparian reserves but on a feasible route for the sewerage project. He explained that the original plan was designed to facilitate sewage flow by gravity following the river course which paved the way into the forest. The consultant was then tasked to identify an alternative route. The Southern-bypass road, Ngong Road and Miotoni roads reserve was identified as an alternative. The technical analysis established that the road reserve alternative would require deep excavations. This alternative would	

MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
	necessitate a pumping station that is not sustainable. Previous experience on the use of pumping stations in various parts of the country has proved that they are not sustainable therefore not suitable for the proposed project. The chairman explained that there is a challenge of getting riparian reserves that do not go into the forest. Ruiruaka and Gitathuru rivers are examples of river riparian reserves that pave way into the forest. CFA informed the meeting that they have experts look into the alternative and from their findings they are certain that it's technically possible to use the road reserves. The terrains and topography inside the forest would make it difficult for the project. The project activities would lead to the loss of vegetation inside the forest. He mentioned that their interest was protecting the forest. He also stated that there was no mention of rehabilitation or compensation in the EIA. The chairman acknowledged that it's in their interest as a government agency to protect the environment and that a new EIA study report will be developed. He mentioned it was the responsibility of the Kenya Forest Service (KFS) as a government agency to protect the forest and its resource by which AWWDA must comply with KFS set regulations including identification of trees and marking alignment corridors. He tasked the consulting engineers to exhaustively evaluate the feasibility of the provided alternative route by CFA. The Mutuini residence representative suggested that factoring in the technical analysis and cost-effectiveness, there is a need to consider the number of people who will be served by the sewer. Areas of Mutuini and Karinde should be considered due to the black cotton soil that cannot withstand septic tanks. They own lands on both sides that was sub-divided by the southern by-pass road project. The client assigned the consultant engineer to conduct a ground survey on how the suggested areas would be connected.	**EDC** **EDC** **25th January at 10:00 A.M**
4.	**MATTERS ARISING**	

MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
	The Marula lane representative mentioned that their area does not appear in the initial EIA scope of work. Public participation was not conducted for Marula lane residents yet the contractor is working in the area on Sundays. It was mentioned that the contractor has been marking pavements, damaged water pipes and in some sections cut-off road assess. The chairman responded that the Marula lane was covered under the initial Karen areas scope of work. Proper communication with residents will be done where project activities are ongoing and access points will be provided. The consultant responded that per the signed contract agreement, the contractor should not be working on Sunday. He will ensure that supervision of work is well done and that the contractor has repaired any property he would have damaged at his cost. The Marula lane representative mentioned that their area is one zone regulated. They, therefore, use septic tanks. Water should be considered a priority for Marula lane residents. The chairman responded that the water transmission pipeline has already been laid from Kabete. The challenge was at the northern collector system that will supply the water, is not yet fully operational. The CFA reiterated the need to use alternatives outside the forest. This is a result of the southern by-pass project that affected the forest yet there were neither rehabilitation programmes nor compensations for the impacts caused. They also mentioned the Forest Conservation and Management Amendment on Section 34 Bill to water down the forest law has affected their income as CFA from Kes 20,000 to no income. It was also mentioned that running	**EDC**

MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
	trails have been installed in the forest that they fear would be distorted by the proposed project. The chairman stated that the agency intentions are to serve the communities with the much-needed infrastructure. Thus the purpose for holding the meeting with an aim of finding the best viable route in consideration of all the suggestions and factors. The KFS head of conservancy suggested that there was a need to do a ground survey and identify route alternatives for the project. All stakeholders should have representatives present for the exercise. The exercise will guide on the way forward with the EIA. He mentioned that all projects have cost and environmental implications. Therefore it's vital to assess the potential impacts, provide mitigation measures and ensure that they are adhered to. He asked the consultant to ensure that mitigation measures have been well factored in the new EIA. CFA requested that NEMA guidelines on EIA development should be adhered to. It was also mentioned that Kenya signed the COP26 agreement to protect forests in an effort to mitigate climate change. KFS and CFA have a responsibility to protect the forest.	**Convene at the KFS office on 3rd Feb. 2022 at 10:00 A.M** **EDC**
5.	**WAY FORWARD**	
	1. A new environmental and social impact assessment (ESIA) will be developed. 2. A technical report with a layout will be submitted to MRRA. 3. Evaluation of various alternatives will be done together with the stakeholders. The exercise will guide the trajectory of the new EIA. The evaluation exercise was scheduled for Thursday 3rd February at 10:00 A.M. 4. The client will organize the transport logistics for the exercise. 5. The consultant will bring a layout map for the exercise.	**EDC** **EDC** **STAKEHOLDERS** **AWWDA** **EDC**

MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
	6. The consultant will inform the community where they are bound to work and will engage the community. 7. It was agreed that no project activities will be conducted in the forest until an EIA has been developed and approved. 8. Identification exercise for lateral sewers at Karinde and Mutuini would be done on 25th January 2022 at 10:00 A.M by the consultant engineer (Eng. Muchugia) and Mutuini residence representatives.	**EDC** **EDC/ STAKEHOLDERS**

There being no other business, the meeting was adjourned at 11:30 AM with a word of prayer.

CONFIRMED: -

Name……SIMON……WOODS…………..Signature……[signature]……Date……3/02/22……
For: NRFA – CFA

Name……CHARLES……MUGO…………Signature……[signature]……Date……3/2/22……
For: Muniini residents

Name……ALBERT……OCHARO…………Signature……[signature]……Date……3/2/22……
For: ATHI WATER WORKS DEVELOPMENT AGENCY

Annex 9. I: **MINUTES FOR PUBLIC CONSULTATION MEETING HELD ON 3RD FEBRUARY 2022 AT NAIROBI ECOSYSTEM CONSERVATOR'S BOARDROOM**

Contract No.	AWWDA/NaRSIP II/W-04/2021			
Location	EC OFFICE NAIROBI, BOARDROOM			
Time:	9:45 A.M.			
Date:	03/02/2022			
Attendees:	**Name**	**Organization**	**Position**	**Email/contact**
	Eng. Albert Ocharo	AWWDA	Engineer	aocharo@awwda.go.ke
	Daisy Nyakundi	AWWDA	Engineer	dnyakundi@awwda.go.ke
	Sarah Atieno	AWWDA	Sociologist	satieno@awwda.go.ke
	Eng. George Muchugia	EDC	Engineer	gkmuchugia@gmail.com
	Eng. Duncan Kamau	EDC	Engineer	duncan.kamau@ecositeconsultants.co.ke
	Loise Nyambura	EDC	EHS Expert	loise.nyambura@ecositeconsultants.co.ke
	Peter Sirayo	KFS	Ass. EC	petersirayo@yahoo.com
	Meymuna Abdi	KFS	Ass. Forest Manager	meymunagedow@gmail.com
	Andrew Matindi	KFS	Conservator of Forests-HQ	andrewmuriithim@gmail.com
	Francis Kariuki	Kenya Forest Service (KFS)	Head of Forest Conservancy	frankkariuki2015@gmail.com
	Margaret Wanjiru	KFS	Ecosystem Conservator	wanjiruk07@yahoo.com
	Johnstone Nguyai	KFS	Forest Manger	ztnguyai@gmail.com
	Simon Woods	Ngong Road Forest Association (NRFA)	Chairman	simon@beglinwoods.com
	Simon Ng'ang'a	NRFA	Vice-Chairman	skimandi77@gmail.com
	Roo Woods	NRFA	Member of NRFA	roo.woods@gmail.com
	Arune Hicks	NRFA	Secretary	arune.hicks@gmail.com

	Daniel Mariga	Mutuini Residence	Vice- Chairman	seekariga@gmail.com
	Chrispus Mbai Ndung'u	Mutuini Residence	Resident	
	Charles Mugo	Mutuini Residence	Resident	
	Pau Kamau Kanja	Mutuini Residents		
Meeting purpose:	Evaluation Exercise of Alternative Routes for the Proposed Motoine Trunk Sewer			
Minutes Taken by:	Andrew Matindi			

AGENDA:
1. Introductions
2. Matters arising
3. Project Routes Alternatives
4. Way Forward

DISCUSSIONS:

MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
1.	**INTRODUCTION**	
	The EC Nairobi called the meeting to order at 9:45 A.M. This followed a self-introduction by members present. She also informed the members that HoC, Mr Kariuki was attending another official commitment but would join the meeting as we proceed.	
2.	**Matters Arising**	

	Loise Nyambura from Ecosite Development Consultant took members through previous meetings minutes held on 24th January 2022. The minutes were confirmed as a true copy of the deliberations that had taken place by Mr. Charles Mugo (Resident) and by Mr. Simon Woods, CFA Chairman. Matters arising from the minutes were as follows: • It was reported that an ESIA report for the project was being developed. The report is currently at the stage of data collection. • The representative of ECOSITE who is carrying out the ESIA study elaborated on the process being undertaken in developing the ESIA report. It was clarified that views of all persons who will be impacted by the project shall be captured after involving the concerned individuals through public participation. • AWWDA presented an updated design layout map that shows the route to be followed by the proposed project.	EDC

MINUTE NO.	DISCUSSON	ACTION BY/ TIME FRAME
	A representative from CFA enquired about the process of EIA and how stakeholders are involved. o The consultant responded that public participation meetings are conducted as one of the processes in developing the ESIA study report. The opinions suggestions, concerns and comments are incorporated in the ESIA report. A stakeholders committee will be formed to ensure that the environmental and social management plan is implemented as per the recommendations in the ESIA report or as necessary. The consultant also mentioned that it is a challenge to have a detailed layout for the sewer lines to be connected to the trunk sewer since normally there are requests and identification of new areas to connect as the project progresses. The consultant mentioned that a major part of the Mutuine and Karinde area will be connected to the proposed trunk sewer. He also mentioned that the micro-tunnelling technique will be used in all intersections. Therefore there will be neither disruption along the highway nor laying of the pipelines along the surface area. CFA representative enquired how contracts are awarded in consideration of the anticipated rock excavation. o The Consultant responded that the client has criteria that he uses as a yardstick to award the best bidder. The East and West Nairobi reticulation sewers project contract including the Karen areas was awarded to China Road and Bridges Corporation (CRBC). Residents of Mutuini also wanted to know whether the sewer would serve them. The consultant noted that a large part of Mutuini area will benefit from the sewer based on the topography of the area.	
3.	**PROJECT ROUTES ALTERNATIVES**	
	The CFA Chairman presented their proposed alternative route for the project. This route would however require the construction of pumping	

	stations since the topography of the route cannot allow the sewer to drain through gravity. According to the CFA chairman, the proposed construction of pumping stations along the proposed route will ensure that the sewer does not pass through the forest. The consultant and representatives from AWWDA elaborated that such a system will have several challenges. i) The need to procure land for the construction of the pumping stations. Such land would be acquired from private individuals and this will be very expensive. ii) The availability of such land was also not guaranteed. iii) The project will also be hampered by the challenge of high maintenance costs for running the sewer project. iv) Pumping stations for sewerage systems are not sustainable. Previous projects in Kenya have failed due to the high cost involved. v) Failure by the pumps to drain the sewer would be catastrophic not only to the people dwelling along the project site but also to the environment.	
	A site visit was carried out by the participants' right from Karinde to Kibera. During the visit, members were able to appreciate the proposed project route and compare the alternative proposed route by the CFA. The main concern was how the Project Proponent will ensure the construction of the project takes place without destroying trees and the environment that has been there for many years. The project proponent pointed out they will use machinery that will reduce the impact. The ESIA study that is being carried out will identify what will be impacted and suggest ways to ensure there is a minimal negative impact on the environment. In addition, the proponent was open to ideas, and suggestions from both CFA, KFS, and other stakeholders that will ensure that mitigation measures are properly laid out. The negative impacts caused by the project on the forest will be captured in the ESIA report.	**Stakeholders**
4.	**WAY FORWARD**	

	• KFS and CFA to have a joint meeting and prepare a proposal for the project proponent. • The team also to incorporate inputs from ECOSITE as the company that is carrying out the ESIA study. • The proposals by the two main stakeholders are to be presented to project proponents for consideration.	**KFS, CFA** **ECOSITE**

There being no other business, the meeting was adjourned at 3:30 PM

CONFIRMED:-

Name: Margaret Wanjiru Signature..... Date 03/02/2022
For: Kenya Forest Service FC Nairobi

Name: Simon Woods Signature..... Date 17/02/2022
For: MRFA

Name: Albert Ochieng Signature..... Date 17/02/2022
For: AWNSA.

Photo Log

Evaluation Exercise of Alternative Routes for the Proposed Motoine Trunk Sewer

List of Attendance

VENUE: NAIROBI ECOSYSTEM CONSERVATOR'S BOARDROOM

DATE: 03/02/2022.

S/No	Name	Designation	Organization	Email	Sign
1	Margaret Wanjiru	EC – KFS	KFS	Wanjiru k 07@yahoo	[signature]
2	Andrew M. Matindi	Forest Officer – KFS HQ	KFS	andrewmurithi@[illegible].com	[signature]
3	Peter Sirinyo	[illegible] EC	KFS	[illegible]sirinyo@yahoo.com	[signature]
4	Johnstone Nguyai	KFS-Ngong Road	KFS	ztnguyai@gmail.com	[signature]
5	SIMON WOODS - CHAIRMAN	NRFA - CFA	NRFA	simon@beglinwoods.com	[signature]
6	ROO WOODS	NRFA	"	roo.woods@gmail.com	[signature]
7	SIMON NGANGA	NRFA	NRFA	skimandi77@gmail.com	[signature]
8	ARUNE HICKS	NRFA	NRFA	arune.hicks@gmail.com	[signature]
9	GEORGE MUCHUGIA	~~ECOSITE~~ ARE	ECOSITE	gkmuchugia@gmail.com	[signature]
10	PAUL KAMAU KANJA	Resident Muthaiga		kanja kamau120@gmail	Kanjo.
11	CHARLES MUGO	Resident Muthaiga	Resident Muthaiga	charlesmugo50@gmail.com	[signature]
12	Daniel MARIGA.	Resident Muthaiga		SEKungu@gmail.com	[signature]
13	CHRISPUS MBAH	Resident Muthaiga	"	spaceworld@yahoo.com.	[signature]
14	Eng. Duncan Kamau	Civil Engineer	ECOSITE DEV CO.	duncan.kamau@ecositedevelopment.co.ke	[signature]
15	Meymuna Abdi	KFS – Ngong Road	KFS	meymunagedow@gmail.com	[signature]
16	LOISE NYAMBURA	EHS - Ecosite Development	EDC	loise.nyambura@ecositedevelopment.co.ke	[signature]
17					
18					
19					
20					
21					
22					
23					
24					
25					

Annex 9. J: NaRSIP II LOT 4 – CONSTRUCTION OF EAST AND WEST NAIROBI SEWERS

MINUTES FOR ENGAGEMENT MEETING HELD ON 7TH FEBRUARY 2022 AT SOWETO, KIBERA

Contract No.	AWWDA/NaRSIP II/W-04/2021			
Location	Ngong River, Soweto, Kibera			
Time:	10:00 A.M.			
Date:	07/02/2022			
Attendees:	**Name**	**Organization**	**Position**	**Email/contact**
	Sarah Atieno	AWWDA	Sociologist	satieno@awwda.go.ke
	Loise Nyambura	Ecosite Development Consultants (EDC)	EHS Expert	loise.nyambura@ecositeconsultants.co.ke
	Mwambanga Mtalaki	EDC	Engineer	mtalaki.m@ecositeconsultants.co.ke
	Edwin Otwori	NGAO	Senior Chief	
	Joseph Sonsa	NGAO	Assistant Senior Chief	
	George Owegi		Community Leader	
	Clifford Okeyo		Community Leader	
	James Omondi		Community Leader	
	David Onyango		Community Leader	
	Walter Onyango		Community Leader	
Meeting Purpose:	Engagement Meeting			
Minutes Taken by:	Loise Nyambura			

AGENDA

The following agenda was adopted:

- Introduction
- Project Scope and Alternative Options
- Assess Public Wayleave
- Matters Arising
- Way Forward
- Closing Remarks

1. PURPOSE OF THE MEETING

The purpose of the meeting was to inform the administration of Kibera about the proposed sewerage project being undertaken by the Athi Water Works Development Agency (AWWDA), assess the wayleave for the trunk sewer and identify Project Affected People (PAPs). The exercise was also an opportunity to seek the administration input, view and concerns of the project that would be taken into account in formulating an Environmental Impact Assessment report as provided in the Environmental Management Coordination Act, 1999.

2. INTRODUCTION

The meeting was called into order at 10:30 A.M by the senior chief, Mr Edwin Otwori. He welcomed all participants and called upon every member present to make a self-introduction.

The client informed the meeting that the wayleave assessment exercise aimed to identify project affected persons. This would facilitate the administration together with the various relevant stakeholders including the community leaders to assist in issuing a public notice for public wayleave clearance.

3. PROJECT SCOPE AND ALTERNATIVE OPTIONS

The consultant engineer explained that the project would use the riparian reserve and connect to an existing manhole per the original designs. He mentioned that there was a proposed trunk sewer project that was still in the process of development and approval. He mentioned the proposed routes. He explained that the Motoine Trunk Sewer would be laid along the Mutuini river riparian reserve passing through the Ngong road Forest Sanctuary. The existing manhole at Kibera would serve as the outfall and would terminate at Karinde at the point where the KPC wayleave meets Dagoretti Road. The route would lead to loss of vegetation along the alignment corridor, however, this would be mitigated by a feasible restoration program using a detailed environmental management plan. This route was recommended since it would a significant area will be served by the trunk sewer on both sides of the valley by gravity and would also avoid demolishing of houses in Kibera.

The alternative option was to use the Southern By-Pass, Ngong Road and Miotoni Roads Reserve. The advantage of this option is that it is shorter and it would avoid loss of vegetation. However, this alternative route would not serve a large area, would require the use of a pumping station that may not be sustainable and may affect some households in Kibera.

4. MATTERS ARISING

The senior chief informed the client and consultant that there were blocked existing manholes that required maintenance servicing. The client mentioned that the matter would be escalated for repair and maintenance service.

The senior mentioned that it was important for the District Officer (D.O) to be informed about the project who would trickle the information to relevant administrations within the project area.

5. WAY FORWARD

- The community leaders will inform and issue wayleave clearance to people who have encroached on the riparian reserve. The consultant will inform the senior chief of the time frame for the project activities within the area.
- The consultant will notify the D.O about the project and submit a copy of the "Introductory Letter".
- The client to inform the relevant engineers in a plan to fix the blocked manhole.

6. CLOSING REMARKS

There being no other business the meeting was adjourned at 12:45 P.M.

PHOTO PLATE

Assessment of Wayleave with the Chief and Community Leaders

Encroached Ngong River Riparian Reserve

Annex 9. K: NaRSIP II LOT 4 – CONSTRUCTION OF EASTERN AND WESTERN NAIROBI SEWERS

MINUTES FOR STAKEHOLDERS ENGAGEMENT MEETING HELD ON 16TH JUNE 2022 AT THE NGONG ROAD FOREST GROUND-SECTION 1

Contract No.	AWWDA/NaRSIP II/W-04/2021			
Location	NGONG ROAD FOREST- SECTION 1			
Time:	9:10 A.M.		Date:	16/06/2022
Attendees:	**Name**	**Organization**	**Position**	**Email/contact**
	Eng. Joseph Kamau	AWWDA	Project Engineer (Chairing)	jkamau@awwda.go.ke
	Eng. Albert Ocharo	AWWDA	Engineer	aocharo@awwda.go.ke
	Eunice Jemutai	AWWDA	Senior Environmental Officer	ejemutai@awwda.go.ke
	Eng. William Kamau	Ecosite Development Consultants (EDC)	Team Leader	ecositeconsultants@gmail.com
	Eng. George Muchugia	EDC	Engineer	gkmuchugia@gmail.com
	Eng. Duncan Kamau	EDC	Engineer	duncan.kamau@ecositeconsultants.co.ke
	Loise Nyambura	EDC	EHS Expert	loise.nyambura@ecositeconsultants.co.ke
	Johnstone Nguyai	KFS		ztnguyai@gmail.com
	Simon Woods	Ngong Road Forest Association (NRFA)	chairman	simon@beglinwoods.com
	Simon Ng'ang'a	NRFA	Vice-Chairman	skimandi77@gmail.com
	Arune Hicks	NRFA	Secretary	arune.hicks@gmail.com
	Caleb Shitikho	NRFA		
	Gilbert Maina	NRFA		
	Phestus Mangicho	Jockey Club of Kenya		
	Evy Van Weezendonk	Green Kids' Museum		evy@greenkidsmuseumkenya.com

Meeting purpose:	Community Forest Association (CFA) Engagement Meeting
Minutes Taken by:	Loise Nyambura

AGENDA:

1. Introductions
2. Project Overview and ESIA Report
3. Sewer Pipe Alignment Corridor
4. Matters Arising
5. Way Forward
6. Any Other Business (AOB).

DISCUSSIONS:

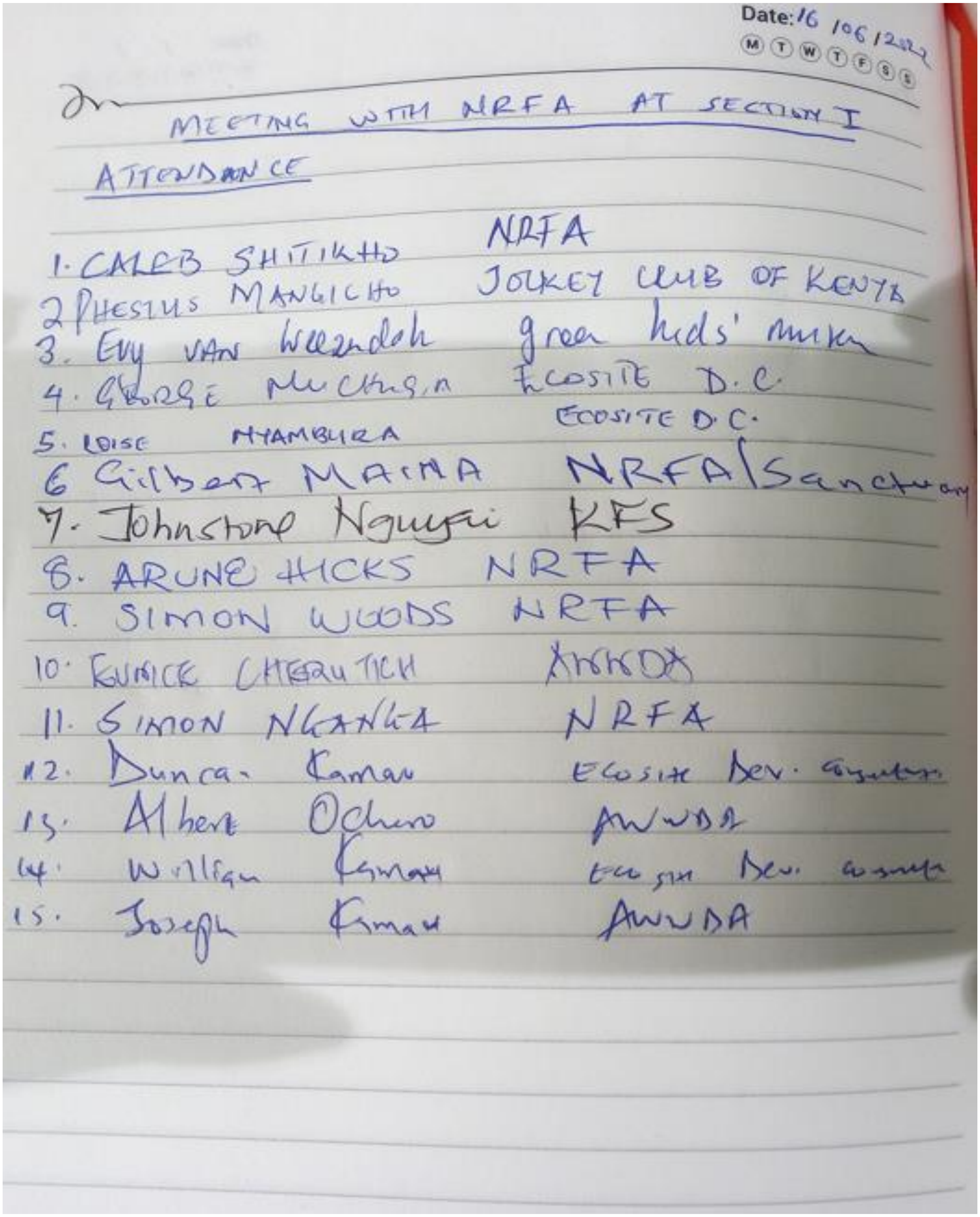
MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
1.	**INTRODUCTION**	
	The meeting was called into order by the Project Manager, Eng. Joseph Kamau (chairing the meeting) at 9:10 A.M. This was followed by a self-introduction by members present.	
2.	**PROJECT OVERVIEW AND ESIA REPORT**	
	Eng. Kamau explained that the Karen Sewerage Project aims at increasing the sewerage coverage and effluent collection efficiency in the city hence ensuring that the objectives of the Nairobi Rivers Rehabilitation Programme are fully achieved. He stated that analysis had been made on the various routes factoring in the agency's intentions to serve the communities with the much-needed infrastructure; consideration of the proposed routes with an objective of minimally destroying any resource or infrastructure; return on investment benefits; and cost of operation and maintenance. CFA representative mentioned that a copy of the drafted ESIA report had not been shared by the KFS. The client environmentalist took it upon herself to share a soft copy of the drafted ESIA report by the end of the day. Two had copies were shared with the CFA groups during the meeting.	**AWWDA/ EDC**

MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
	The CFA secretary mentioned that they will review the document and send their inputs.	**CFA**
3.	**SEWER PIPE ALIGNMENT CORRIDOR**	
	CFA wanted to know the methodology that will be used in the excavation works and the pipe alignment corridor route. The chairman mentioned that they will be using the riparian reserve. However, the pipe alignment will be routed in a manner that will ensure minimal trees or structures like benches are damaged. He explained that their objective was to adopt methods they've used in other sewer projects like within Karura forest where they successfully minimized damages in the forest. Manual labour will be employed where possible to minimize damage in the forest. The project committee formed will work together with the Client and the Consultant to ensure that mitigation measures are adhered to. Eng. Kamau stated that the resident engineer, Eng. Muchugia will be on the site to ensure that the project is implemented as agreed. CFA chairman mentioned that they still opted for the Southern bypass road, Ngong Road and Miotoni roads reserve alternative route and that the agency should still consider installing a pumping station. The chairman, Eng. Kamau, reiterated that from previous experience in various parts of the country, it had been proved that the use of pumping stations is not sustainable and therefore not suitable for the proposed project. One of the NRFA members wanted to know examples of pumping stations in Kenya that have not worked. The chairman, mention that the installed sewage pumping stations at Mombasa City, Karatina in Nyeri County and Ruai for pumping sewage into the Dandora Sewage Treatment Plant inlet works, are examples that had not worked in the past and even some for pumping clean water like the one at Uhuru Park next to Serena Hotel in Nairobi City.	
4.	**MATTERS ARISING**	

MINUTE NO.	DISCUSSION	ACTION BY/ TIME FRAME
	CFA chairman mention that they were yet to receive technical drawings for the proposed project. The client stated they will share via email the layout maps together with the ESIA report. The consultant was tasked to do a ground survey and share the data collected with the Client and CFA. The alignment corridor will be marked with white pegging for every 20m. CFA wanted to know the security measures that will be taken during the project activities since it may attract people from outside CFA requested the Client to support them on an electric fencing wall project around the forest that they had. The chairman asked the CFA to write a proposal addressed to the CEO in a request for funds for the proposed electric wall fencing project around the forest.	**AWWDA/EDC** **EDC**
5.	**WAY FORWARD**	
	i. Share a soft copy of the draft ESIA report and map layouts for the proposed project. ii. The consultant to carry out a ground survey and share the data collected with the Client. iii. The alignment corridor will be marked with white pegging during the ground survey exercise. iv. CFA to review the ESIA document and share their input with the Consultant to be incorporated in the report. v. CFA to write a letter addressed to the AWWDA CEO in a request for funds for a proposed electric wall fencing around the Ngong Road Forest.	**AWWDA** **16th June 2022** **EDC** **EDC** **CFA** **CFA**

There being no other business, the meeting was adjourned at 11:30 A.M.

List of Attendance



Date: 16/06/2022

MEETING WITH NRFA AT SECTION I

ATTENDANCE

	NRFA
1. CALEB SHITIKHO	
2. PHESTUS MANGICHO	JOCKEY CLUB OF KENYA
3. Evy van Weezendonk	green kids' mukin
4. GEORGE MUCHUGIA	ECOSITE D.C.
5. LOISE NYAMBURA	ECOSITE D.C.
6. Gilbert MAINA	NRFA/Sanctuary
7. Johnstone Nguyai	KFS
8. ARUNE HICKS	NRFA
9. SIMON WOODS	NRFA
10. EUNICE CHERUTICH	ANKKDA
11. SIMON NGANGA	NRFA
12. Duncan Kamau	Ecosite Dev. Consultants
13. Albert Ochuro	AWWDA
14. William Kamau	Ecosite Dev. Consults
15. Joseph Kamau	AWWDA

Annex 10: Summary of Negotiation meeting with KFS held on 27.4.2022

Athi Water Works Development Agency (AWWDA) Sewer Line at Ngong Road Forest Station

SUL Negotiations (27.4.2022)

In addition to Fees & Other Charges, the following are other Obligations agreed Upon:

Other Obligations

1. *The Licencee will meet the cost of repairing the affected/damaged forest nature trails and related infrastructure.*
2. *The Licencee will meet the cost of restoration the affected sections of the electric fence at Miotoni Forest Block.*
3. *The Licencee will construct one rangers' camp and refurbish an existing one at Santuary Forest Block.*
4. *The Licencee will construct one ablution block at Miotoni Forest block.*
5. *Installation with water and electricity at a rangers' camp at Miotoni Forest block.*

Way forward

No.	***Activity***	***Timeline***	***Entity***
1.	*Share draft SUL with AWWDA*	*27.4.2022*	*KFS*
2.	*Share estimates for rangers' camps and ablution block*	*4.5.2022*	*KFS*
3.	*Request for an exemption from the moratorium on tree harvesting in Ngong Road Forest*	*28.4.2022*	*KFS*

Annex 11: KFS Approval Letter

KENYA
Forest Service

Kenya Forest Service Hqs
Karura, Off Kiambu Rd
P.O. Box 30513 - 00100
Nairobi, Kenya

Ref: No WATER/1/KFS/VOL.XIX (19)

Date: 24th March, 2022

Chief Executive Officer
Athi Water Works Development Agency
P. O. Box 45283-00100,
NAIROBI

RE: APPROVAL TO CONSTRUCT A SEWER LINE WITHIN NGONG ROAD FOREST RESERVE TO SERVE KAREN AREA OF NAIROBI CITY COUNTY

Your letter Ref. No. AWWDA/NARSIP II/W-04/2021Vol.(72) PE-ao dated 2nd September 2021 on the above request refers.

The Kenya Forest Service Board of Directors during the 53rd meeting held on 8th March, 2022 considered and approved your request for authority to construct the proposed Karen Sewer Line within Ngong Road Forest Station.

You are therefore invited to engage Kenya Forest Service for negotiation and issuance of a Special Use License to allow implementation of the proposed project on the forest land.

For any further clarification, please contact **Mr. Jafferson Kitti,** using any of the following contacts: **0721765430 and jkitti@kenyaforestservice.org**

Julius Kamau, EBS
CHIEF CONSERVATOR OF FORESTS

Copy to: - Regional Forest Conservator – Nairobi Conversancy
County Forest Conservator – Nairobi County

Annex 12: Ngong Road Forest Trees Inventory

KENYA
Forest Service

INTERNAL MEMO

TO: Chief Conservator of Forests

THRO': Deputy Chief Conservator of Forests (P&E)

REF: CONF/FIS/09/01/VOL.18/130

DATE: 29th November, 2021

REF: ASSESSMENT REPORT FOR TREES TO BE AFFECTED BY ATHI WATER WORKS DURING THE SEWER CONSTRUCTION WITHIN KAREN AREA IN NAIROBI COUNTY

Reference is made to Chief Executive Officer, Athi Water Works letter Ref: No. AWWDA/NARSIP H/W 04/2021 Vol. 1 (72) PE dated 2nd September 2021 on the above subject.

Forest Inventory officers visited the site and filed the following report.

Sub-Compt.	Portion	Species	No. of stems	Area (Ha.)	MDBH (cm)	Royalty rate m^3/ pole	Volume (M^3)/or No. of poles	Chargeable Royalty (Ksh)	Remarks
Miotoni Block	Whole	Other indi. spp	518		22	4588	201.06	922,463.30	Timber
	Whole	Other indi. spp	1412		10-15	350	1412	490,200.00	B/poles
	Whole	Other indi. spp	1126		5-10	60	1126	67,560.00	B/poles
	Whole	Other indi. spp	677		>5	10	677	6,770.00	Withies
	Whole	Bamboo	46			100	46	4,600.00	Bamboo
	Whole	Olea spp.	44		19	7234	12.65	91,510.10	Timber
	Whole	Olea spp.	66		10-15	350	66	23,100.00	B/poles
	Whole	Olea spp.	119		5-10	60	119	7,140.00	B/poles
	Whole	Olea spp.	103		>5	10	103	1,030.00	Withies
	Whole	Croton mega.	43		21	3053	14.82	45,245.50	Timber
	Whole	Croton mega.	51		10-15	350	51	17,850.00	B/poles
	Whole	Croton mega.	112		5-10	60	112	6,720.00	B/poles
	Whole	Croton mega.	79		>5	10	79	790.00	Withies
	Whole	Podo	3		47	5578	6.04	33,691.10	Timber
	Whole	Podo	6		5-10	60	6	360.00	B/poles
	Whole	J. procera	4		48	8345	10.33	86,203.90	Timber
Sanctuary Block	Whole	Other indi. spp	157		23	4588	60.40	277,115.20	Timber
	Whole	Other indi. spp	641		10-15	350	641	224,350.00	B/poles
	Whole	Other indi. spp	1232		5-10	60	1232	73,920.00	B/poles
	Whole	Other indi. spp	693		>5	10	693	6,930.00	Withies
	Whole	Bamboo	40			100	40	4,000.00	Bamboo
Ngong Road 36(D)	Whole	E. paniculata	155		29	2972	155.29	461,521.90	Timber
	Whole	E. paniculata	92		10-15	350	92	32,200.00	B/poles
	Whole	E. paniculata	130		5-10	60	130	7,800.00	B/poles
	Whole	E. paniculata	34		>5	10	34	340.00	Withies
Ngong Road 38(E)	Whole	E. paniculata	213		28	2952	171.72	506,917.40	Timber
	Whole	E. paniculata	137		10-15	350	137	47,950.00	B/poles
	Whole	E. paniculata	169		5-10	60	169	10,140.00	B/poles
	Whole	E. paniculata	126		>5	10	126	1,260.00	Withies
Sub Total			**8228**					3,463,678.30	

VAT (16%)								554,188.50	
Total								**4,017,866.90**	

This report is for ***compensation*** purpose only.

This is therefore to request you to approve the chargeable royalty of **Kshs. 4,017,866.90** to be paid by Athi Water Works as compensation for forest materials to be affected during the easement for sewer construction within Karen Area in Ngong Road Forest Station in Nairobi County as referenced.

F. B. Ojuang
Head: Forest Management Inventory

Annex 13: Ngong Road Forest CFA Inputs on ESIA Report

Ngong Road Forest CFA Action list for smooth execution of the implementation of the sewage line through the Forest

1. Minimise disruption to ecotourism;

a. Do not construct the sewage line too close to the footpaths. Where possible keep at a minimum 2m distance in order to not soil the footpaths and create a nuisance to the visitors.

b. Miotoni section has a picnic area along the dam which is frequented on weekends by lots of people. This is a huge attraction for visitors to the forest and an important revenue stream for the CFA.

We request that the AWWDA team ensure:

- That the work in this specific section is done quickly and efficiently (forward planning).
- Push back from the water edge - minimize mess and rubble and soil
- avoid damage to large trees and shading
- avoid damage to benches and installations

c. No unannounced closures or obstruction to forest access routes.

2. Minimize the destruction of native tree species with special consideration to mature trees.

a. The forest is full of old and mature native tree species. If trees are to be chopped, sewage line to avoid old mature tree types at all times. Invasive species such as gum trees are the preferred trees for removal.

b. Where possible, try to remove shrubs and bushes rather than trees. (If anything we are delighted if you remove Lantana as it is an invasive nonindigenous species)

3. Manage disruption and nuisance caused by staff

a. Provide badges or identification for staff to show they are part of the AWWDA team (and not opportunistic criminals)

b. Be respectful to our visitors

c. No music or shouting on site

d. Do not litter or create a mess. We do not want to find any rubbish left behind on-site

e. Fires for cooking are strictly prohibited at all times (also for cooking staff selling to the workers)

f. At lunch/breakfast/break time, staff are NOT to lie around willingly anywhere in the forest, they are to rest out of sight and gather in 1 place.

g. Security officer on site for AWWDA to check that no opportunistic woodcutters 'join' the team to chop trees in the guise of being part of the AWWDA team.

4. Work methods

a. Hand digging is the preferred method at ALL times.

b. NO tree removal in order to create access routes for machinery. Tree removal should be for sewage pipelines ONLY.

c. DO NOT bring in 20-tonne excavators or big trucks. Lift materials over to smaller vehicles such as pick-ups. DO NOT bring large trucks into forest areas that require the removal of trees for access purposes only

d. Machinery to be properly and securely ‘put aside at the end of each work day, especially in downtime (eg holidays). Designated areas to be identified in consultation with the CFA. We do NOT want to see random diggers etc left behind in the middle of paths, and parking areas.

e. If any casuals are needed on-site, ask the CFA if we have any to call on. Recruitment of local residents that are on CFA record is a good way to ensure community engagement for forest protection.

5. There should ALWAYS be a consultation in advance with CFA to walk and agree marked/pegged route of sewer installation. No digging of routes prior to sharing with CFA members.
6. AWWDA to check with CFA of existing management roads for access. In some forest areas, there are some 'hidden' access routes that are not marked or known to the public. These roads could be used as a 'backroad' to some of the work areas. Close coordination with the CFA is advisable for this.
7. Provision of works schedule.

8. Weekly site works inspection meetings with CFA nominated representative (suggest Simon Nganga or colleague).

9. Monthly progress/issues meetings with CFA Management Committee.

10. AWWDA site manager phone number numbers shared with CFA, in case of any issues must be available.

11. If too many problems are identified, the CFA may request for a dedicated Liaison Officer to be appointed to the AWWDA team to ensure smoother coordination and adherence to the works.

12. Upon completion of the work, ensure that no building materials, culverts, or manholes are left on site. All construction materials are to be removed.

Annex 14: Questionnaire

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name EDWARD NGOTHO MUHORO

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence MUTHUINI

4. Tel No 0720335186 I.D NO 20087229

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

None

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? ....

b). would you wish the site to be protected? Yes ( ) No (✓)

If yes, how?

N/A

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

Lateral Sewage Along Muthigiri Road

Signature of the respondent: ....

Thank you for your response!

Hankuk Engineering Consultants HEC JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name..Peter W. Mungai.....

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence..Mutwiri.....

4. Tel No ..0721770258..... I.D NO ..0560910.....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and ~~minimize any~~ negative effects?

Build lateral sewers along to serve Muchungia Mwaba road area.

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? N/A

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how? N/A

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

Building of lateral sewer line to serve Mutuini residents beyond the Southern bypass

Signature of the respondent: [signature] 18/11/21

Thank you for your response!

Hanlok Engineering Consultants JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name.. Rev. Fr. Joseph Kamau.....
2. Gender (tick where appropriate) (✓) Male ( ) Female
3. Place of residence..... MUTUNI - MURABA ROAD.....
4. Tel No 0722261370..... I.D NO ..... 9347595.....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

Hankuk Engineering Consultants JV Ezaina Development Consultants Ltd ATHI WATER WORKS

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

....

....

....

....

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? ....

b). would you wish the site to be protected? Yes (✓) No ( )

If yes, how?

....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

.........Additional of lateral sewer along.....

.........Muchugia Road and Muraba Road.........

Signature of the respondent: ....[signature]..........

Thank you for your response!

Hankuk Engineering Consultants JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name..... Daniel Mariga .....

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence..... Mlolongo .....

4. Tel No ..... 0716371293 ..... I.D NO ..... 29469234 .....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

Protection of our forest covers.

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes (✓) No ( )

If yes, where? Ngong Rd ~~water~~ forest Sanctuary.

b). would you wish the site to be protected? Yes (✓) No ( )

If yes, how?

Taking care of the trees.

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

To ~~be~~ bring up the project into the neighbours [illegible] Muthaiga [illegible] Mombasa Rd.

Signature of the respondent: [signature]

Thank you for your response!

Hankuk Engineering Consultants JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name..... JAMES K WANGUGI .....

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence..... MUTHINI .....

4. Tel No ..... 0726509333 ..... I.D NO ..... 4855367 .....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

Hankuk Engineering Consultants JV

ATHI WATER WORKS

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

A BILATERAL SEWER SYSTEM BETWEEN THE SOUTHERN BY PASS AND MURABA ROAD

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No (-)

If yes, how?

.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

1). LOCALS TO BE EMPLOYED BY THE CONTRACTOR

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants HEC JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name.....Grace.....Nalangu.....

2. Gender (tick where appropriate) ( ) Male (✓) Female

3. Place of residence.....Mutuma.....

4. Tel No ...0.7.2.3...3.9.6...1.2.3..... I.D NO .....1.1.2.1.3.4.9.3.....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

NON

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how?

.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes ( ) No (✓)

b) What other issue would you wish to be addressed during the implementation of this project?

Location other Sides by Pass

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants JV Esaki Development Consultants Ltd ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name PAUL KAMAU KANJA

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence MUTHINI

4. Tel No 0723 87 20 78 I.D NO 31365936

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

good maintenance plan so as not to pollute the river

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how?

.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

avoid the other side of the by-pass to the project by constructing a lateral crossing the by-pass.

Signature of the respondent: .....

Thank you for your response!

Hanbuk Engineering Consultants JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name James Kangoro Kimiti

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence Mutuini

4. Tel No 0792118977 I.D NO 0966107

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

Taking care of the forest cover & our waters in the clean drives.

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes (✓) No ( )

If yes, where? Ngong Rd forest Sanctuary.

b). would you wish the site to be protected? Yes (✓) No ( )

If yes, how?

Saving the trees.

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

By extending the sewer in the area of [illegible] Mirema Rd.

Signature of the respondent: [signature]

Thank you for your response!

Hankuk Engineering Consultants JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name..Samuel Gitau.....

2. Gender (tick where appropriate) ( ) Male ( ) Female

3. Place of residence.....Mutu-ini.....

4. Tel No 0726666677..... LD NO ...10977346.....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) ( ) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

.....It will help us.....
.....
.....
.....

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No ( )✓

If yes, where? .....

b). would you wish the site to be protected? Yes ( )✓ No ( )

If yes, how?

.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes ( )✓ No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

.....We want Relative - our Side.....

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants H.E.C JV Ecosite Development Consultants Ltd

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name......EVY VAN Weezendik......

2. Gender (tick where appropriate) ( ) Male (X) Female

3. Place of residence......KAREN......

4. Tel No ..0727523244.. I.D NO ......BXP08T800......

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes ( ) No (X)

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes ( ) No (X)

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes ( ) No Yes, the devastation to the forest is irreversable!
WE NEED Trees to Breath! kenya signed the Forest protection Act!

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

go Around the Forest or clox
to plantation trees only.
Not Close to River.

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes(X) No ( )

If yes, where? NYONY ROAD Forest

b). would you wish the site to be protected? Yes(X) No ( )

If yes, how?

It is protected by the Forest Protection Act.

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes(X) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

Signature of the respondent:

Thank you for your response!

Hankuk Engineering Consultants JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name.....Hindrison Mbugua Kasera.....

2. Gender (tick where appropriate) ( ) Male ( ) Female

3. Place of residence.....Gicungo.....

4. Tel No .....0721-705697..... I.D NO .....4841061.....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

Maximum Consultation

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how?

.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

Hope will not ~~take~~ interfere with peoples land and that it will be completed within a short period

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants HEC JV Ecosite Development Consultants Ltd

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name... Mungai Gitau .....

2. Gender (tick where appropriate) (✓ Male ( ) Female

3. Place of residence... Mutuma .....

4. Tel No ... 0716.247.109 ..... I.D NO ... 8845985 .....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓ No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓ No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓ No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

Accomodate all the neighbours on the project and Make sure they are well informed

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how?

.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

.....

.....

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants HEC JV Ecosite Development Consultants ltd

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name JAMES W. WAUTH

2. Gender (tick where appropriate) (M) Male ( ) Female

3. Place of residence. KAGERETU/MUTUINI/639

4. Tel No 0711182038 I.D NO 0287794

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (M) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (M) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (M) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

Connection point to all residents to be fixed to each land.

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No (✓)

If yes, how?

.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

LAND COMPENSATION OF FARMLAND.

Signature of the respondent: .....

Thank you for your response!

Hanhuk Engineering Consultants H.E.C JV Ecosite Development Consultants Ltd

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name..MARION KARIUKI.....

2. Gender (tick where appropriate) ( ) Male (✓) Female

3. Place of residence..MUTUINI.....

4. Tel No ..0722398108..... I.D NO ..13426805.....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

ENSURE THE SEWERAGE COVERS THE AREA PROPERLY AND DOES NOT AFFECT DRAINAGE

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how?

.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

.....

.....

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants H.E.C JV Ecosite Ecosite Development Consultants Ltd

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name DR. R. DOLAN

2. Gender (tick where appropriate) ( ) Male ( ) Female

3. Place of residence MBAGATHI RIDGE

4. Tel No 0733 746 311 I.D NO .....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes ( ) No ✓ NOT THROUGH THE FOREST.

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )

Yes ( ) No ✓ NOT IN THE FOREST.

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

✓ Yes ( ) No TO ALL FOREST USERS

Hankuk Engineering Consultants H.E.C JV Ecosite Ecosite Development Consultants Ltd ATHI WATER WORKS

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

FIND AN ALTERNATIVE ROOTE WHICH DOESN'T INVOLVE DESTROYING A SMALL FOREST

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No ( )

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how? THE FOREST SHOULD BE PROTECTED.

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes ( ) No (✓)

b) What other issue would you wish to be addressed during the implementation of this project?

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants E.E.C JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name..... Esther Kloo .....

2. Gender (tick where appropriate) ( ) Male (✓) Female

3. Place of residence..... Wattnaka .....

4. Tel No ..... 0715 429 270 ..... I.D NO ..... 29310637 .....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

.....Use...of...durable...and...quality.....Infrastructure.....
.....
.....
.....

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes (✓) No ( )

If yes, how?

.....Continuous...monitoring...by...the...Local...authorities.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

.....Provision...of...adequate...water...to...the...entire...community.....
.....to...ensure...proper...usage.....

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants JV Ecolite Development Consultants Ltd

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name GEOFFREY NDICHU

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence GICHUNGO MUTUINI

4. Tel No ~~07~~ 0724804275 I.D NO 9010335

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

.....
.....
.....
.....

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No ( )

If yes, where? .....

b). would you wish the site to be protected? Yes (✓) No (-)

If yes, how?

ANY MEANS TO AVOID destruction

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

.....
IMPROVED DRAINAGE SYSTEM

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants H.E.C JV Ecosite Development Consultants Ltd ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name....Stanley.....Kimata.....Nganga:.....

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence.....Gichungo.....

4. Tel No ....0733840427..... I.D NO ..24925453:.....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

.....
.....
.....
.....

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No ✓

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how?

.....N/A.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes ✓ No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

.....Speedy.....p.roject.....
.....

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants JV

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name... Wanjiru Muiru.....

2. Gender (tick where appropriate) ( ) Male (✓) Female

3. Place of residence... Gichungo/Mutuini/Dagoretti Rd.....

4. Tel No ... 0769358233 ..... I.D NO ... 3463253 .....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

.....
.....
.....
.....

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how?

N/A

.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

land compensation if necessary or where it would
a use.

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants REC JV Ecosite Development Consultants Ltd

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name..BONIFACE : N : KAMAU.....

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence..GICUGU.....

4. Tel No ..0792-199-555..... I.D NO ..12527471.....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

.....
.....
.....
.....

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how? N/A
.....

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

.....
IMPROVE DRAINAGE IN THE AREA.....

Signature of the respondent: .....

Thank you for your response!

Hankuk Engineering Consultants K.E.C JV Ecosite Development Consultants Ltd

ATHI WATER WORKS

QUESTIONNAIRE TO BE ADMINISTERED TO INTERESTED AND AFFECTED PARTIES DURING THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED MOTOINE RIVER TRUNK SEWER

Introduction

The Government of Kenya through AWWDA is implementing the Nairobi Rivers Sewerage Improvement Project (NARSIP II). The main objective of the program is to improve access, quality, availability, and sustainability of an effective sewerage system for Nairobi City and ensure that the vital Athi River Basin remains sustainable as a water source to the communities downstream and upstream centers. The purpose of this questionnaire is to seek opinions of key stakeholders in respect of the proposed project in accordance with the provisions of the Environmental Management and Coordination Act of 1999.

The information obtained through this questionnaire will solely be used in the compilation of the ESIA report that will be submitted to NEMA for approval.

Your cooperation in responding to the questions asked will be highly appreciated. Thank you.

A. Background Information

1. Name..... Dennis Wanderu .....

2. Gender (tick where appropriate) (✓) Male ( ) Female

3. Place of residence..... Matoine .....

4. Tel No ..... 0722252769 ..... I.D NO .....

B. Environmental Matters

1) In your opinion, is the proposed sewerage infrastructure development a good idea?

Yes (✓) No ( )

2a) In your opinion, will the proposed development have any positive impacts in your area? ( )
Yes (✓) No ( )

b) In your opinion, will the proposed development project have any negative impacts on you and your neighbours?

( ) Yes (✓) No

c) In your opinion, what measures would you propose to improve the project and minimize any negative effects?

- Restoration of the forest
- Reinstatement of excavated areas.
- Involve the community in the project

C. Social-Cultural Matters

1. a). As far as you know are there any significant historical, archaeological or cultural heritage sites near the project area? Yes ( ) No (✓)

If yes, where? .....

b). would you wish the site to be protected? Yes ( ) No ( )

If yes, how?

N/A

2. a) In your opinion, is a sewerage project helpful to the person living with disability, the elderly, the minority (e.g. children) or the poor within the community?

Yes (✓) No ( )

b) What other issue would you wish to be addressed during the implementation of this project?

.....

.....

Signature of the respondent: .....

Thank you for your response!