Republic of Kenya
Athi Water Works Development Agency

CKE1135 -NAIROBI WATER AND SANITATION PROJECT

The Proposed Water Transmission Pipeline from Gigiri Reservoir to Karura Reservoir through Karura Forest. Environmental And Social Impact Assessment Study Report

Contract No: AWWDA/AFD/NWSP/CS/02/2021

AUGUST 2023

ARTELIA

MIBP CONSULTING ENGINEERS

AUGUST 2023 / 877 3335

Environmental and Social Impact Assessment Study Report (ESIA) for Proposed Water Transmission Pipeline from Gigiri Reservoir to Karura Reservoir through Karura Forest-

REPUBLIC OF KENYA – ATHI WATER WORKS DEVELOPMENT AGENCY (AWWDA)

VERSION	DESCRIPTION	PREPARED BY	APPROVED BY	DATE
01	Environmental and Social Impact Assessment (ESIA) for Proposed Water Transmission Pipeline from Gigiri Reservoir to Karura Reservoir through Karura Forest - Comprehensive Project Report (CPR)	Godwin L Sakwa, Ranjit S. Rupra	Cyril Rocher	1.12.2022
02	Environmental and Social Impact Assessment Study Report (ESIA) for Proposed Water Transmission Pipeline from Gigiri Reservoir to Karura Reservoir through Karura Forest	Godwin L Sakwa, Ranjit S. Rupra	Cyril Rocher	27.07.23

ARTELIA - Water, Climate and Solid Waste
6 rue de Lorraine – 38130 Echirolles – FRANCE – TEL : +33 (0)4 76 33 40 00

MANGAT, I.B.PATEL LIMITED – Consulting Engineers
P.O. Box 48674, 00100 - GPO - Nairobi, KENYA – TEL : +254 20 2710500

CERTIFICATION

Compiled By:

Signed …… Date…….

Godwin Lidahuli Sakwa
NEMA Registered Lead Expert NEMA Reg No. 2492

Checked By:

Authorized Representative:

Signed …… Date…….

Eng Ranjit S. Rupra

ARTELJA - Water, Climate and Solid Waste
6 rue de Lorraine – 38130 Echirolles – FRANCE – TEL : +33 (0)4 76 33 40 00

MANGAT, I.B.PATEL LIMITED – Consulting Engineers
P.O. Box 48674, 00100 - GPO - Nairobi, KENYA – TEL : +254 20 2710500

Proponent

Signed …… Date…….

Athi Water Works Development Agency P.O. Box 45283-00100, NAIROBI, Kenya.

TABLE OF CONTENTS

TABLES

Figures

ABREVIATIONS AND ACRONYMS

AFD	Agence Francaise de Développement
ASALs	Arid and Semi-Arid Lands
AWWDA	Athi Water Works Development Agency
AoI	Area of Influence
BoD	Biological Oxygen Demand
CCF	Chief Conservator of Forest
C-ESMP -	Construction – Environment and Social management Plan
CoC	Code of Conduct
CHSMP	Construction Health and Safety Management Plan
DMP	Dust Management Plan
ESAAP	Environment and Social Audit Action Plan
EHS	Environment Health and Safety
EA	Environmental Assessment
EIA	Environment Impact Assessment
EMCA	Environment Management & Coordination Act
ESMP	Environment and Social Management Plan
FKF	Friends of Karura Forest
KFS	Kenya Forest Services
IFC	International Finance Cooperation
ILO	International Labour Organization
H&S	Health and Safety
NEMA	National Environmental Management Authority
NOx	Nitrogen Oxides
Sox	Sulphur Oxides
SGR	Standard Gauge Railway
SML	South Mainland
OSHA	Occupational Health & Safety Act
Pm	Particulate Matter
PPE	Personal Protective Equipment
NCWSC	Nairobi City Water and Sewerage Company
TMP	Traffic Management Plan
VOC	Volatile Organic Compounds
WML	West Mainland
WTP	Water Treatment Plant
WBG	World Bank Group
WRA	Water Resources Authority
WMP	Waste Management Plan

EXECUTIVE SUMMARY

E.1 BACKGROUND

Nairobi is the Capital City of the Republic of Kenya, with an estimated Population of approx. 4.4 Million People based on the 2019 Kenya National Bureau of Statistics (KNBS) Kenya Population and Housing Census Data. The City doubles up as the main Economic Hub and the Administrative Capital for the Republic of Kenya. It also hosts Embassies and Consulates to various states as well as International Institutions such as the United Nations Environmental Programme hence serving as centre of regional and international significance.

A Map of Nairobi City is shown in *Figure 1-1* on **Page 2** of the Main Report.

Based on the Nairobi City Water Distribution Master Plan (Seureca/ Veolia, 2017), the year 2020 gross water demand for Nairobi City was 753,769m3/day, projected to increase to 978,024m3/day by the year 2035. The water demand in the City greatly surpasses the current production capacity of 485,500m3/day.

Athi Water Works Development Agency (AWWDA) is currently implementing various Projects for development of New Water Sources, Treatment Facilities and Transmission Pipelines for Nairobi to bridge the current deficit in water supply and to meet the projected future water demands up to year 2035. AWWDA has also commenced implementation of the interventions proposed in the Integrated Sanitation Management Plan for Nairobi and selected Satellite Towns (COWI/ SAMEZ, 2018) in tandem with the Water Supply Projects up to the year 2035 planning horizon. These have been packaged into different implementation lots and are at different stages of implementation.

The Government of Kenya has secured financing from the Agence Française de Développement (AFD) to finance the implementation of some of the interventions identified as Priority Works in the Nairobi City Water Distribution Master Plan and Integrated Sanitation Management Plan for Nairobi and selected Satellite Towns. Part of the financing is planned to be used on Construction of the Kabete-Olesereni Transmission Pipeline, West and South Nairobi Water and Sewerage Project as well as the Gigiri-Karura-Outer Ring Transmission Pipeline and North Nairobi Water and Sewerage Project, with AWWDA as the Implementing Agency.

The Consultancy Contract for Detailed Design, Design Review, Tender Documentation, ESIA/ RAP Implementation and Construction Supervision for the Kabete-Olesereni, West and South Nairobi Water and Sewerage Project was signed between AWWDA and the Consultant, Artelia/ MIBP JV on 13th April 2022.

E.2 PROJECT DESCRIPTION

The objective of the Gigiri-Karura-Outer Ring Road Water Transmission Pipeline as envisaged under the Nairobi City Water Distribution Master Plan is to strengthen water supply within Zone 9 of the NCWSC Supply Zones. The Transmission Pipeline forms an initial phase of a Transmission Pipeline which will in future be extended to the target areas within Zone 9 under other Programmes.

Based on the Nairobi City Water Distribution Master Plan (Seureca/Veolia, 2017), the objective of the Gigiri-Karura-Outer Ring Road Transmission Pipeline is to strengthen water supply within Zone 9 of the NCWSC Supply Zones. Zone 9 of the NCWSC supply zones comprise of the administrative areas detailed in **Table E-1.**

Table E-1: Target Supply Areas

• Umoja	• Njiru	• Gitathuru	• Mathare
• Komarock	• Saika	• Ruaraka	• Mathare 4A
• Kayole	• Kiamaiko	• Utalii	• Mathare North
• Nyayo	• Njathaini	• Garden	• Mabatini
• Savanna	• Kariobangi North	• Roysambu	• Huruma
• Mowlem	• Korogocho	• Kasarani	• Mlango Kubwa
• Kariobangi South	• Dandora A	• Dandora B	• Kiamumbi
• Embakasi			

It should be noted that the Zone is also served by other existing Transmission Pipelines, including the recently commissioned DN 1,000, DN900 Kiambu-Embakasi Water Transmission Pipeline whose target areas are Embakasi, Umoja, Savannah, Kayole, Koma Rocks, etc. The Gigiri-Karura-Outer Ring Road Transmission Pipeline will therefore augment the existing infrastructure**.** *Figure 1-2* **on Page 6** shows the location plan of Zone 9 on the Map of Nairobi County.

Different pipeline route options were analysed. The selected route option is 8.3km long out of which 3.1km traverses Karura Forest within an existing wayleave of an already existing similar pipeline and therefore no tree will be cut within the forest to provide wayleave. The selected route option is described below.

Route Option 1

Gigiri Reservoir Site → UN Avenue → Wispers Avenue → Karura Forest → Crossing Kiambu Road to Karura Reservoir Site →

Access Road to Karura Reservoir Site and AWWDA Head Office → Coffee Garden Drive → Pipeline Estate Road → Thika Superhighway, connecting to the existing network at the terminal point at the Outer Ring Road Interchange

This ESIA Study Report covers the section of the Transmission Pipeline that is within Karura Forest of length **3.1km**. The other pipeline sections are covered in the existing EIA Licences issued by NEMA as detailed in the subsequent sections.

E.3 PROJECT COST

The Estimated rate of construction per meter of the pipeline within Karura Forest is **Kshs. 83,870 (Kenya Shillings Eighty-Three Thousand, Eight Hundred Seventy**). The Total estimated cost of the 3.1km pipeline within Karura Forest is therefore **Kshs. 259,997,000.00 (Kenya Shilling Two Hundred Fifty-Nine Million, Nine Hundred Ninety-Seven Thousand).**

E.4 AVAILABLE ENVIRONMENTAL LICENSES ISSUED BY NEMA

Athi Water Works Development Agency (AWWDA) prepared an Environment and Social Impact Assessment for Gigiri - Karura Water Transmission Pipeline and associated works including installation of bulk meters, control valves, water storage facilities, reservoirs, repair and replacement of pipelines and laying of new water pipelines. The ESIA was approved and an Environment and Social Impact Assessment License No NEMA/EIA/PSL/7512 was issued on **7th March 2019.** A copy of this EIA License is attaches as **Appendix 1.**

E.5 JUSTIFICATION FOR ADDITIONAL ESIA

Karura forest reserve is located in the northern part of Nairobi City, Kenya's Capital. The reserve has an area of 1,041.3 hectares, it is one of the largest urban gazette forests in the world. The reserve comprises of two blocks which are Karura (765.9 hectares) and Sigiria (275.4 hectares). The reserve was originally gazette in 1932 and then in 1964 it became a Central Government Forest Reserve. The management of the reserve is under the Kenya Forest Service (KFS) under the Forest Act of 2005 now repealed by the Forest Management and Conservation Act of 2016.

A section (3.1km) of Gigiri - Karura – Outering Road Water Transmission Pipeline traverses the forest along Prof. Wangari Mathai nature trail as presented in *Figure 1-2* on **Page 6.** Considering the sensitivity of Karura Forest as a gazetted ecosystem, the ESIA prepared and licensed (NEMA/EIA/PSL/7512) for the Project was not explicit on project potential impacts and applicable mitigation measures.

E.6 REVIEW OF COMPREHENSIVE PROJECT REPORT (CPR)

M/S Artelia / MIBP in May 2023 prepared a Comprehensive Project Report (CPR) that focussed on potential environment and Social Impacts likely to be triggered by the pipeline section through the forest. The report also provided appropriate mitigation measures that will be implemented by AWWDA during pipeline construction and operation through the forest. However, NEMA reviewed and report and recommended the report to be upgraded into a Study. Consequently, Terms of Reference was prepared and approved as presented under (Appendix 1)

E.7 LEGAL AND POLICY REGULATORY INSTRUMENTS

The Project is listed under the Second Schedule of the EMCA 1999 cap 387 (and 2015 Amendments) Section 4 (a) and (c), and Section 7 (b), (d) and (e) all of which require that an EIA be carried out to identify the environmental impacts, their significance and mitigation measures be proposed. Also, World Bank OP 4.01 on Environmental Assessment requires that such Projects be subjected to an environment impact assessment. Further, Environmental and Social Risk Management Policy for AFD-funded Operations was also reviewed.

Table E-2 provides a summary of Policy and Legal Statutes that were reviewed in this assessment.

Table E-2: Applicable Policy and Legal Statutes

NO	POLICY
Government Polices	• National Environment Policy (NEP) 2013 • The National Water Policy 2012 (Draft) • Forest Policy 2014 • The National Environmental Sanitation and Hygiene Policy-July 2007: • National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999) • Kenya Vision 2030 • National Climate Change Response Strategy, 2010 • Climate Change Policy Framework 2016 • Economic Recovery for Wealth and Employment Creation Strategy 2006 • Big 4 Agenda • Kenya National Youth Policy 2006

NO	POLICY
	• National Gender and Development Policy, 2019 • National policy for prevention and response to gender based violence, 2014 • The National Occupational Safety and Health Policy, 2012
Acts of Parliament	• Constitution of Kenya (CoK) 2010 • EMCA 1999 Cap 387 • Forest Management and Conservation Act, 2016 • Land Act, 2012 • Environment and Land Court Act, 2011 • Water Act, 2016 • County Government Act No. 17 of 2012 • Physical and Land Use Development Plan Act 2019 • Occupational Health and Safety Act (OSHA 2007) • HIV and AIDS Prevention and Control Act 2011 • Sexual Offences Act 2006 • Child Rights Act (Amendment Bill) 2014 • Labour Relations Act 2012 • National Gender and Equality Commission Act 2011 • The National Museums and Heritage Act 2006 • Energy Act 2019 • Traffic Act 2015 • Public health act, cap 242 • Climate change act 2016 • Penal code CAP 63 • The Standards Act Cap 496 • The National Construction Authority Act, 2011 • Malaria Prevention Act (CAP 246)
Rules and Regulations	• The Environmental (Impact Assessment and Audit) Regulations, 2003 • Environmental Management and Coordination (Water Quality) Regulations, 2006 • (Waste Management Regulations, 2006 • Noise and Excessive Vibration Pollution (Control) Regulations, 2009 • The Environmental Management and Coordination (Air Quality Regulations 2014) • Fire Risk Reduction Rules, 2007 • Medical Examination Rules, 2005 • Safety and Health Committee Rules of 2004 • First-Aid Rules, 1977
World Bank Safeguard Policies	• World Bank OP 4.01 on Environmental Assessment • Word Bank OP 4.12 on Involuntary Resettlement • World Bank OP 4.11 on Physical Cultural Resources
World Bank Environment and Social Standards (ESS)	• (ESS1) Assessment and Management of Environmental and Social Risks and Impacts • (ESS2) Labor and Working Conditions • (ESS3) Resource Efficiency Pollution prevention and Management • (ESS4) Community Health and Safety • (ESS5) Land Acquisition, Restrictions on land Use and Involuntary Resettlement • (ESS6) Biodiversity Conservation and Sustainable Management of Living Natural Resources • (ESS7) Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities • (ESS8) Cultural Heritage • (ESS10) Stakeholder Engagement and Information Disclosure
AFD Safeguards Policy	Environmental and Social Risk Management Policy for AFD-funded Operations

E.8 PUBLIC AND STAKEHOLDER PARTICIPATION

The stakeholders of Karura forest reserve are numerous and broad ranged, but they are concluded to five groups: Government institutions, Private sector, Community based organization, Nairobi council and Faith based organizations. Key stakeholders consulted during preparation of this report included Friends of Karura Forest, Kenya Forest Services and Deputy County Commissioner for Westlands Sub County.
The schedule of consultations is summarized in **Table E-3.**

Table E-3: Schedule of Stakeholder Consultations

STAKEHOLDER	VENUE	DATE
Friends of Karura Forest	Friends of Karura Forest Offices	26th September 2022
Kenya Forest Services (KFS)	Kenya Forest Services (KFS) offices	26th September 2022
Deputy County Commissioner Westland Sub County	Deputy County Commissioner Westland Sub County offices	22nd August 2022
Njadhaini Sub Location	Njadhaini Shopping Centre	13th September 2022
Korogocho Location	Korogocho Chiefs Offices	14th September 2022
Kariobangi South Location	Mowlem Grounds	15th September 2022
Whispers Garden Drive (15 plot owners)	Whispers Garden Drive alignment	7th July 2023

Summary of issues of concerns presented by the stakeholders is summarized in **Table E-4**

Table E-4: Stakeholders Concerns

STAKEHOLDER	RESOLUTIONS
Kenya Forest Services (KFS) and Friends of Karura Forest (FKS)	• AWWDA to formally apply for approval to lay the pipeline within Karura Forest. Application to be addressed to the Chief Conservator of Forest (CCF) • The application should clearly indicate the Scope of Works planned to be undertaken within the forest. • The application should include a clear Layout Plan and indicate the proposed pipeline route • The CCF will review the application and communicate the decision of KFS officially to AWWDA. As at February 2024, the CCF issued authority to undertake survey works, AWWDA will apply authority to lay the pipeline after ESIA is approved by NEMA and Environment license issued for the project • After approval is granted by KFS, AWWDA will undertake survey of the pipeline route. • After Survey works is completed, AWWDA will further apply through the CCF for approval or authority to commence pipeline construction. • This application will be reviewed and approval granted to AWWDA by KFS for construction works. This will be through a lease permit that will be renewed on an annual basis. • AWWDA will ensure that the proposed pipeline is restricted within existing track and the existing water pipeline easement, this approach will ensure that no tree is cleared along the easement. However, at the truncation, any trees that will be affected will be valued and cost included in the permit fees
Deputy County Commissioner Westland Sub County	• The office of County Commissioner supports AWWDA initiative of expanding water distribution networks within Nairobi • The office of County Commissioner is ready to assist AWWDA to mobilise any stakeholder consultations that might be required • Local administration would ask to be involved in any stakeholder workshops that might be organized by AWWDA with regards to the Project

	• The DCC office advises consultations with Kenya Forest Services (KFS) and Friends of Karura Forest (FKS) given that the study is focussed on pipeline section through the forest.
Public Barazas in Roysambu, Korogocho and Kariobangi	• Residents of these areas have continually experienced water shortage due to NCWSC water rationing program, they supported the project and viewed the project as a solution to water shortage problem in their respective areas • They further inquired about connection protocols which they were informed that NCWSC will guide them through the connection procedure including guiding them on tariff issues

E.9 RECEPTORS

The pipeline gets into Karura forest from Gigiri Estate along Wispers Avenue. It is aligned to follow a footpath leading towards Prof. Wangari Mathai Corner, joins Karura Footpath (Wangari Mathai Track) and finally exits the forest near Gate 'C' that is along Kiambu road. Table E-5 illustrates receptors identified during field visit

Table E-5: Receptor at Risk of Impacts Related to Project Activities

RECEPTOR	DETAILS
Biological	Karura Forest Ecosystem
Social Receptors	Gigiri Estate along Wispers Avenue
	Kiambu Road around Karura Forest Gate 'C'
	Visitor walking or jogging along Wangari Mathai Track

E.10 ASSESSMENT OF IMPACTS

The assessment characterized magnitude of impact and sensitivity of receptors. A summary of significance of each impact was designated using the matrix given in Table E-6.

Table E-6: Impact Significance

		SENSITIVITY OF THE RECEPTOR		
Magnitude of Impact		Low	Medium	High
	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all receptors, and all impacts to these receptors, as the receptor-specific considerations are factored into the assignment of magnitude and sensitivity of the receptor. A summary of impact significance discussed in this addendum is presented in Table E-7.

Table E-7: Impact Significance Assessment

ENVIRONMENTAL / SOCIAL RECEPTOR	PHASE	IMPACT TYPE	SEVERITY RATING	
			BEFORE MITIGATION	AFTER MITIGATION
Impacts on Trees (Exotic and indigenous) along the Water Pipeline Alignment within the forest	Construction	Direct	Moderate	Minor
Impacts on Water Resources	Construction	Direct	Minor	Negligible
Impacts on Soil Resources	Construction	Direct	Minor	Negligible

ENVIRONMENTAL / SOCIAL RECEPTOR	PHASE	IMPACT TYPE	SEVERITY RATING	
			BEFORE MITIGATION	AFTER MITIGATION
Noise and Vibration Impacts	Construction	Direct	Minor	Negligible
Community Health Safety and Security Impacts to (Hikers, Joggers, tourists in the forest)	Construction	Direct	Minor	Negligible
Workers Health and Safety	Construction	Direct	Moderate	Minor

A summary of Environment and Social Impacts discussed in this report is summarized in **Table E-8**.

Table E-8: Environment and Social Impacts and Mitigation at Construction Stage

RISK	MITIGATION
Impacts on Trees (Exotic and indigenous) along the Water Pipeline Alignment within the forest. However chances of felling trees are unlikely	• AWWDA will secure a wayleave permit from KFS. Prior to issuance of the permit, KFS will value any trees that are likely to be affected and bill AWWDA alongside requisite permit fees. However, as indicated before no tree will be fell as there exist a wayleave for an existing pipeline where the proposed pipeline will be laid. • The pipeline alignment to be confined to the existing Wangari Mathai Track. However, in circumstances where a tree is to be cut, compensatory tree planting will be undertaken within a degraded area in the forest in Liaison with KFS and Friends of Karura Forest (FKF). • Areas to be cleared shall be agreed by KFS and FKF before demarcation and clearance. • Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible.
Impacts on Water Resources	• Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank • Contractor shall prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to drainage channels • Debris and other material will be prevented from entering watercourses • Discharges to watercourses and water bodies will only be carried out under consent of the relevant governing bodies such as WRA. • At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which shall include among others; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.
Impacts on Soil Resources	• Sheet and rill erosion of soil shall be prevented where necessary through the use of sand bags, diversion berms, culverts, or other physical means. • Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated. • Topsoil shall be evenly spread across the cleared areas when reinstated. • Accelerated erosion from storm events during construction shall be minimized through managing storm water runoff (e.g., velocity control measures). • Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile. • Spread mulch generated from indigenous cleared vegetation across exposed soils after construction • At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which shall include among others; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.
Community Health Safety and Security Impacts to Hikers,	• Contractor will develop and monitor the implementation of a Community Health and Safety Management Plan (CHSMP) • Contractor will develop Emergency Response Plans (ERPs) in cooperation with local

RISK	MITIGATION
Joggers, tourists in the forest, etc.	emergency authorities and hospitals. • Contractor will extend the Worker Code of Conduct to include guidelines on worker – community interactions and will provide training on the worker code of conduct to all employees including drivers as part of the induction process. • Contractor will provide primary health care and first aid at construction office sites to avoid pressure on local healthcare infrastructures. • Contractor will implement a Community Grievance Mechanism. • Contractor will develop and implement a Traffic Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations.
Workers Health Safety and Security Impacts	• 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. • Contractor will implement regular health and safety checks and audits of workers, and subcontractors and implementing sanctions in case of breaches of national standards and the Project's specific standards. • Contractor will develop and implement a Workers Grievance Mechanism for the Project workforce including workers and subcontractors. • Contractor will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. • Contractor will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. • 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.

E.11 FINDINGS

The ESIA findings associated with proposed construction of the Gigiri – Karura – Outer ring Water Transmission Pipeline Section through Karura Forest is presented below.

- Athi Water Works Development Agency (AWWDA) prepared an Environment and Social Impact Assessment for Gigiri Water Reservoir to Karura Water Pipeline and associated works including installation of bulk meters, control valves, water storage facilities, reservoirs, repair and replacement of pipelines and laying of new water pipelines. The ESIA was approved and an Environment License No NEMA/EIA/PSL/7512 was issued on 7th of March 2019.
- Karura forest reserve is located in the northern part of Nairobi city, Capital city of Kenya. By the area of 1,041.3 hectares, it is one of the largest urban gazette forests in the world (3). The forest comprises of two blocks which are Karura (765.9 hectares) and Sigiria (275.4 hectares). The Reserve was originally gazette in 1932 and then in 1964 it became a Central Government Forest Reserve. The management of the forest is due to Kenya Forest Service under the Forest Act of 2005 now repealed by Forest Management and Conservation Act of 2016.
- A section (3.1km) of Gigiri – Karura – Outer Ring Road Water Transmission Pipeline traverses the forest along Prof. Wangari Mathai Nature Trail. Considering the sensitivity of Karura Forest as a gazetted ecosystem, the ESIA prepared and licensed (NEMA/EIA/PSL/7512) for the Project was not explicit on Project potential impacts and applicable mitigation measures.

- *M/S Artelia / MIBP* in May 2023 prepared a Comprehensive Project Report (CPR) that focussed on potential environment and Social Impacts likely to be triggered by the pipeline section through the forest. The report also provided appropriate mitigation measures that will be implemented by AWWDA during pipeline construction and operation through the forest. However, NEMA reviewed and report and recommended the report to be upgraded into a Study. Consequently, Terms of Reference was prepared and approved as presented under (Appendix 1)
-
- The assessment identified that biological resources which present significant receptor along the proposed water pipeline within the forest are exotic and indigenous trees. From literature and field survey done during the assessment, the trees species based on the Importance Value Index within Karura Forest include: *Eucalyptus paniculata, Drypetes gerrardii, Newtonia buchananii, Markhamia lutea, Croton megalocarpus, Teclea trichocarpa, Cupressus Spp, Araucaria heterophylla, Xymalos monospora, Eucalyptus paniculata and Strychno smitis.*
- The pipeline is designed along existing Wangari Mathai Track alongside and existing water pipeline wayleave within Karura Forest which is free[1] from vegetation. The design provides that the new water pipeline will be laid on edge of the road between the existing pipeline and existing road track, this implies that no new route will be opened and that the proposed pipeline will be laid on existing wayleave.
- There are five perennial tributaries of the Nairobi River that passes through Karura forest running roughly west to east and cutting through gently undulating landscape. These are: Ruiruaka, Karura, Gitathuru, Thigiri and Mathare Rivers. Karura River valley offers a precarious and stunning descent through indigenous forest to the large waterfall and the Mau-Mau caves, (Friends of Karura Forest, 2014). The rivers are not within close proximity to the proposed pipeline alignment however Karura and Ruiruaka rivers are within 500m from the alignment. There might be indirect interaction in the case of erosion of soils into storm water drains that flow into Karura and Ruiruaka Rivers.
- AWWDA will secure a wayleave permit from Kenya Forest Services (KFS). Prior to issuance of the permit, KFS will value any trees that are likely to be affected and bill AWWDA alongside requisite permit fees. Nairobi Water and Sewerage Company (NCWSC) will be responsible for annual payments to KFS for lease of the pipeline through Karura Forest.

E.12 PROVISIONS

The ESIA Make Provisions Listed below

- The Environment and Social Management Plan (ESMP) prepared under this ESIA assessment provides a budget of **Kenya Shillings One Million, Seven Hundred Fifty Thousand (Kshs 1,750,000.00)** for mitigation of environment and social impacts identified in this Report. The Bid Documents to be prepared for the project should incorporates the Environment, Social provisions discussed under Chapter 7 (Environment and Social Impact Assessment and Mitigation Measures).
- Project Contract Document to include provisions for the contractor to prepare and implement Construction Environment and Social Management Plan (C-EMSP). Annexes to the C-EMSP will include but not limited to: Soil and Sedimentation Control Plan, Spoil Management Control Plan, Dust Management Plan, Health, Hygiene and Safety Plan, Labour Management Plan, Child Protection Strategy, Gender-based Violence Action Plan, Waste Management Plan, Contractors Code of Conduct, Gender Inclusivity Strategy , HIV/Aid Prevention Strategy. The contractors will be required to engage services of

[1] The arrangement is that the machinery will move along the existing track that is approximately 12m, storage of materials will be outside the forest, an extend map will be prepared and shared before final submission of the ESIA

a qualified Environment, Health and Safety Officers and Social Safeguards Officer at the time of Project implementation.

- At Project implementation stage, the contractor with approval of the supervising engineer will prepare periodic Environmental and Social Implementation Report. The reports will provide status of implementation of risks & impacts management measures to date from the project start to the end of the reporting period. From an Occupational Health and Safety approach, the contractors will ensure they undergo the following; OSH risk assessment, Registration of workplaces, Safety and Health (OSH) Audit, Fitness to work assessment of employees, Training of all workers or workers' representatives in basic Occupational Safety and Health, Accident and incident reporting, Compensation of injured workers who die or get injured and disabled and Examination of Safety Plants and Equipment.
- At Project completion stage, within the Defects Liability Period, Athi Water Works Development Agency (AWWDA) will initiate an Initial Environment and Social Audit for the Project as required by EIA/EA Audit Regulations of the year 2003 and subsequent annual self-audits. The Audit will develop an Environment and Social Audit Action Plan (ESAAP) that will be used to track Project Environment and Social Compliance during Operations Stage

MAIN REPORT

1. INTRODUCTION

1.1. GENERAL

Nairobi is the Capital City of the Republic of Kenya, with an estimated Population of approx. 4.4 Million People based on the 2019 Kenya National Bureau of Statistics (KNBS) Kenya Population and Housing Census Data. The City doubles up as the main Economic Hub and the Administrative Capital for the Republic of Kenya. It also hosts Embassies and Consulates to various states as well as International Institutions such as the United Nations Environmental Programme hence serving as a centre of regional and international significance.

Due to its central location in Kenya, Nairobi City is the main link and transport corridor to other parts of the Country and the East African Region with major highways originating within the proximity of the City. A Map of Nairobi City is shown in *Figure 1-1* on **Page 2.**

Based on the Nairobi City Water Distribution Master Plan (Seureca/ Veolia, 2017), the year 2020 gross water demand for Nairobi City was 753,769m^3/day, projected to increase to 978,024m^3/day by the year 2035. The water demand in the City greatly surpasses the current production capacity of 485,500m^3/day.

In line with recommendations of the Feasibility Study and Master Plan for Developing New Water Sources for Nairobi and Satellite Towns (Egis/ MIBP, 2012), Athi Water Works Development Agency (AWWDA) is currently implementing various Projects for development of New Water Sources, Treatment Facilities and Transmission Pipelines for Nairobi to bridge the current deficit in water supply and to meet the projected future water demands up to year 2035.

In preparation for the additional Water Supply that will be available upon commissioning of the new Sources and other Infrastructure under development, there is urgent need for upgrading, reinforcement and extension of the Water Distribution Network infrastructure within the City. There is also need for upgrading and extension of the Wastewater Collection and Reticulation System within the City to meet the projected additional wastewater generation.

The Nairobi City Water Distribution Master Plan (Seureca/ Veolia, 2017) forms the Blueprint for Water Distribution Network reinforcement and extensions in the medium term up to year 2035. Similarly, the Integrated Sanitation Management Plan for Nairobi and selected Satellite Towns (COWI/ SAMEZ, 2018) proposed Wastewater Management Strategies to be implemented in tandem with the Water Supply Projects up to the year 2035 planning horizon.

AWWDA has commenced implementation of the various interventions proposed in both the Water Distribution Master Plan and the Integrated Sanitation Management Plan. These have been packaged into different implementation lots.

The Government of Kenya has secured financing from the Agence Française de Développement (AFD) to finance the implementation of some of the interventions identified as Priority Works in the Nairobi City Water Distribution Master Plan. Part of the financing is planned to be used on Construction of the Kabete-Olesereni, West and South Nairobi Water and Sewerage Project, with AWWDA as the Implementing Agency.

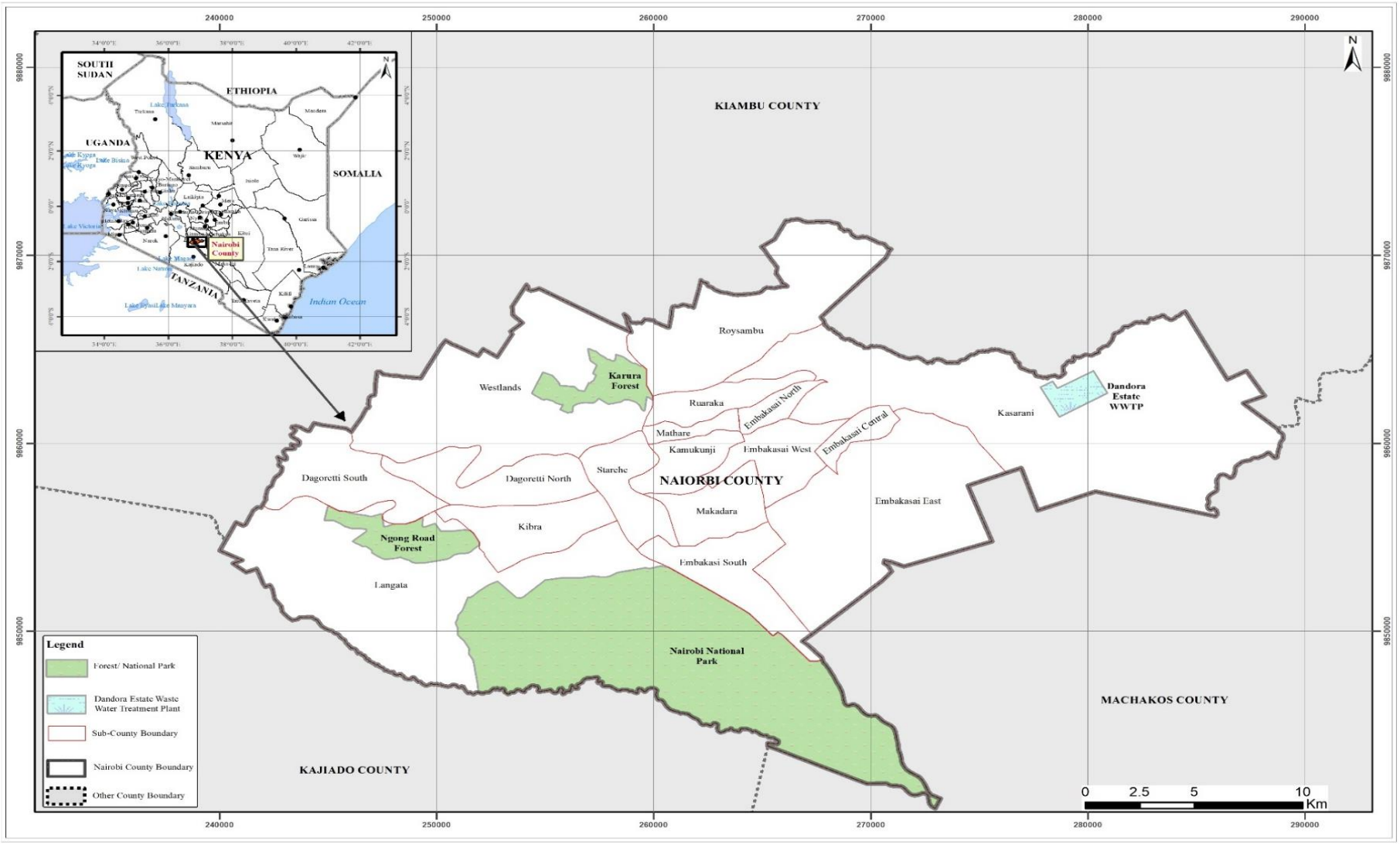


Figure 1-1: Map of Nairobi City (Source: Artelia/ MIBP GIS Data base 2022)

1.2. PROJECT OBJECTIVES

The Objectives of the Kabete-Olesereni, West and South Nairobi Water and Sewerage Project are:

- To extend the Water Distribution Network to selected areas within Western and Southern parts of the City which are currently uncovered or underserved by the existing Network,
- To remove bottlenecks that may arise from low hydraulic capacity pipes in order to improve the hydraulic carrying capacity of the Water Distribution Networks.
- To enhance Sewer Network coverage within Northern and Western Parts of Nairobi by extending the existing Sewer Reticulation Systems and provision of New Household Connections to ensure the collection and disposal of additional wastewater being generated due to improved Water Supply.

1.3. CONSULTANCY SERVICES CONTRACT

1.3.1 Contract Signing and Commencement

The Consultancy Contract for Detailed Design, Design Review, Tender Documentation, ESIA/ RAP Implementation and Construction Supervision for the Kabete-Olesereni, West and South Nairobi Water and Sewerage Project was signed between AWWDA and the Consultant, Artelia/ MIBP JV on **13th April 2022**.

The Contract Commencement Date was 28 days from the date of signing i.e. **11th May 2022.**

1.3.2 Scope of Consultancy Services

The Scope of the Consultancy Services comprises of the following tasks as detailed in the Terms of Reference:

i) Detailed design of water pipeline extensions for the southern and western parts of Nairobi and last mile connections in areas of South C and Wilson area, around St. Marys and Ngong forest, Karen plains, Langata, Western area of Kangemi, Kawangware, Uthiru, Kabiria, Kirigu of approximate length 25.1 Km with approximate 3274 new connections;

ii) Design review of 19 Km DN 600 Kabete Olesereni Water Transmission Pipeline including off takes;

iii) Detailed design of approximately 7.1km DN 800 to 1400mm Gigiri-Karura water transmission pipeline and two reservoirs of capacity 11,000m^3 and 5500m^3 in Uthiru and Karen respectively;

iv) Design review of approx. 175 Km of DN 225mm to 450mm reticulation sewer lines and sewer last mile connections for the areas of Dagoretti, Riruta satellite, Kangemi, Upper Hill and Northern parts of Zimmerman, Babadogo, Kasarani, Roysambu, Lucky summer, Thome, Garden Estate and Marurui, with approximate 11,095 new sewer household connections;

v) Tender Documents preparation for the above project components in two geographically-based works packages (each including water and sewerage interventions);

vi) Assistance in 2 separate procurement processes for Works;

vii) Preparation of Livelihood Restoration Plan (LRP)/Resettlement Action Plan (RAP) as may be applicable;

viii) Review and updating of existing ESIA and RAP reports (a RAP report dated Dec. 2016 is available for the sewerage component) and assistance to the client in obtaining variation to existing NEMA license or new NEMA licence as the case may be;

ix) Construction supervision for the works including implementation of Construction Stage Environmental and Safety Management Plan (C-ESMP) and identification and implementation of the project targeted household connections in liaison with the client, the water service provider and community outreach consultant.

1.4. REQUIRED PROJECT SAFEGUARDS DOCUMENTS.

Various Safeguard Documents for the Kabete-Olesereni West and South Nairobi Water and Sewerage Project have been acquired by Athi Water Works Development Agency (AWWDA). The validity of some of the available safeguards has however lapsed and will require Time Extension Variation. There are however areas within the project that are not covered by the available safeguard documents and will therefore require acquisition of new safeguards. A summary of the required project safeguard documents is given in **Table 1-1**.

Table 1-1: Required Safeguard Documents by AWWDA

#	COMPONENT	SCOPE	SAFEGUARDS INSTRUMENT REQUIRED
1	Water Distribution and Storage Tanks in Karen and Uthiru	Water pipeline extensions for the southern and western parts of Nairobi and last mile connections in areas of South C and Wilson area, around St. Marys and Ngong forest, Karen plains, Langata, Western area of Kangemi, Kawangware, Uthiru, Kabiria, Kirigu of approximate length 47Km with approximate 3274 new connections;	**Status** AWWDA prepared an ESIA for the Project and secured an EIA License No: NEMA/EIA/ PSL/7512 on 7th March 2019 ***Way Forward:*** i) Consultant to apply for time extension variation for the EIA License ii) Consultant to prepare RAP for affected assets under this component
2	Water Transmission Pipelines	19.5Km DN 600 Kabete Olesereni Water Transmission Pipeline including off takes;	**Status** ESIA prepared by AWWDA and an EIA License No. NEMA/EIA/PSL/3821 dated 20th September 2016 was secured. AWWDA applied and secured Time Extension Variation NEMA/EIA/VEIA/2126 on 10th June 2020. **Way forward:** i) Consultant to apply for a second Time Extension Variation iii) Consultant to prepare RAP for affected assets under this component.
		Approximately 8.3km DN 800 to 1400mm Gigiri – Karura - Outer Ring Road Water Transmission Pipeline	**Way forward** ESIA Prepared by AWWDA AND EIA License No. NEMA/EIA/PSL/7512 issued on 7th March 2019. The ESIA was not explicit on the proposed pipeline through Karura Forest which is considered a sensitive receptor and AWWDA will require to apply for easement permit from Kenya Forest Service (KFS). **Way forward:** i) MIBP to prepare Comprehensive Project Report (CPR) ESIA to cover the section of the pipeline proposed to be laid within Karura Forest of approximate length 3.1km.
3	Sewer Reticulations	Reticulation Sewers of total length of approximately 175 Km of DN 225mm to	**Status**

#	COMPONENT	SCOPE	SAFEGUARDS INSTRUMENT REQUIRED
		450mm for the areas of Dagoretti, Riruta satellite, Kangemi, Upper Hill and Northern parts of Zimmerman, Baba Dogo, Kasarani, Roysambu, Lucky summer, Thome, Garden Estate and Sewer Last Mile Connections of approximately 11,095 sewer household connections.	Two EIA Licenses have been acquired covering sewer reticulations: 1. EIA License No. NEMA/EIA/PSL/4871 issued on 21st June 2017 2. EIA License No. NEMA/EIA/PSL/531 Issued on 9th October 2017 The above EIA Licenses do not cover construction of reticulation sewers in the areas of Riruta, Ngando, Kabiria, Kawangware and Roysambu which form part of the project areas under this assignment. **Way forward:** i) MIBP to prepare Comprehensive Project Report (CPR) ESIA for components not covered in the available Licences. ii) MIBP to prepare RAP for affected assets under this component.

1.5. AVAILABLE ENVIRONMENT LICENSE ISSUED BY NEMA

Athi Water Works Development Agency (AWWDA) prepared an Environment and Social Impact Assessment for Gigiri Water Reservoir to Karura Water Pipeline and associated works including installation of bulk meters, control valves, water storage facilities, reservoirs, repair and replacement of pipelines and laying of new water pipelines. The ESIA was approved and an Environmental Impact Assessment License No NEMA/EIA/PSL/7512 issued on 7th of March 2019 **(Copy attached as Appendix 2).**

1.6. JUSTIFICATION FOR ADDITIONAL THE ESIA

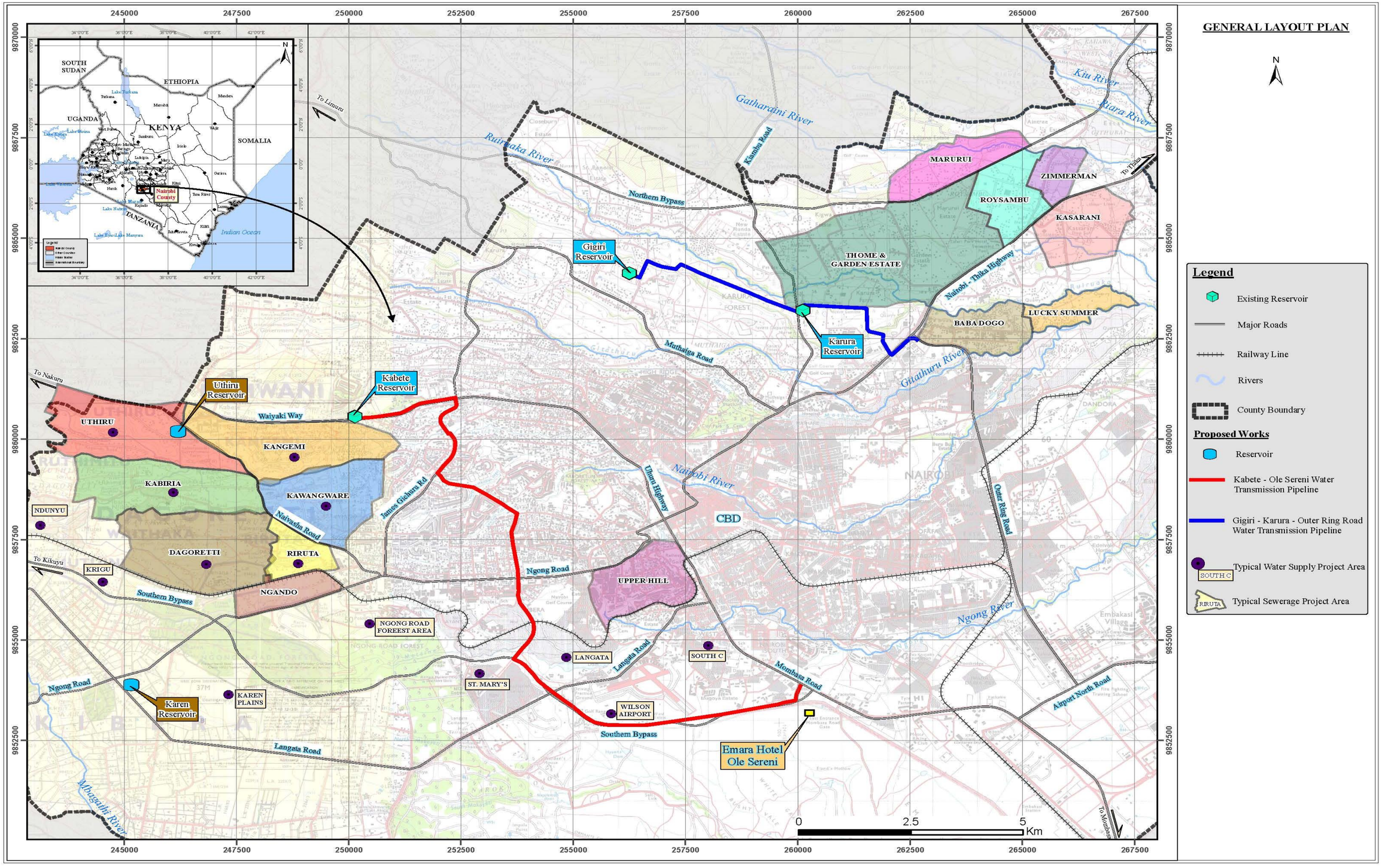
Karura forest reserve is located in the northern part of Nairobi City, Kenya's capital. The Forest covers an area of 1,041.3 hectares making it one of the largest urban gazette forests in the world. The forest comprises of two blocks which are Karura (765.9 hectares) and Sigiria (275.4 hectares). The Reserve was originally gazetted in 1932 and then in 1964 it became a Central Government Forest Reserve. The Forest is managed by Kenya Forest Service (KFS) under the Forest Act of 2005 now repealed by Forest Management and Conservation Act of 2016.

A 3.1km section of Gigiri – Karura -Outer Ring Road Water Transmission Pipeline traverses through the forest along Prof. Wangari Mathai Nature Trail as presented in *Figure 1-2* on **Page 6.** Considering the sensitivity of Karura Forest as a gazetted ecosystem, the ESIA prepared and licensed (NEMA/EIA/PSL/7512) for the Project was not explicit on Project potential impacts and applicable mitigation measures.

1.7. REVIEW OF COMPREHENSIVE PROJECT REPORT (CPR)

M/S Artelia / MIBP in May 2023 prepared a Comprehensive Project Report (CPR) that focussed on potential environment and Social Impacts likely to be triggered by the pipeline section through the forest. The report also provided appropriate mitigation measures that will be implemented by AWWDA during pipeline construction and operation through the forest. However, NEMA reviewed and report and recommended the report to be upgraded into a Study. Consequently, Terms of Reference was prepared and approved as presented under (Appendix 1)

Figure 1-2: Layout Plan of the Project Components and Target Areas as outlined in the ToR (illustrating Gigiri- Karura Water Transmission Line)



2. PROJECT DESCRIPTION

2.1 INTRODUCTION

The objective of the Gigiri-Karura-Outer Ring Road Water Transmission Pipeline as envisaged under the Nairobi City Water Distribution Master Plan is to strengthen water supply within Zone 9 of the NCWSC Supply Zones. The Transmission Pipeline forms an initial phase of a Transmission Pipeline which will in future be extended to the target areas within Zone 9 under other Programmes.

2.2 TARGET SUPPLY AREAS

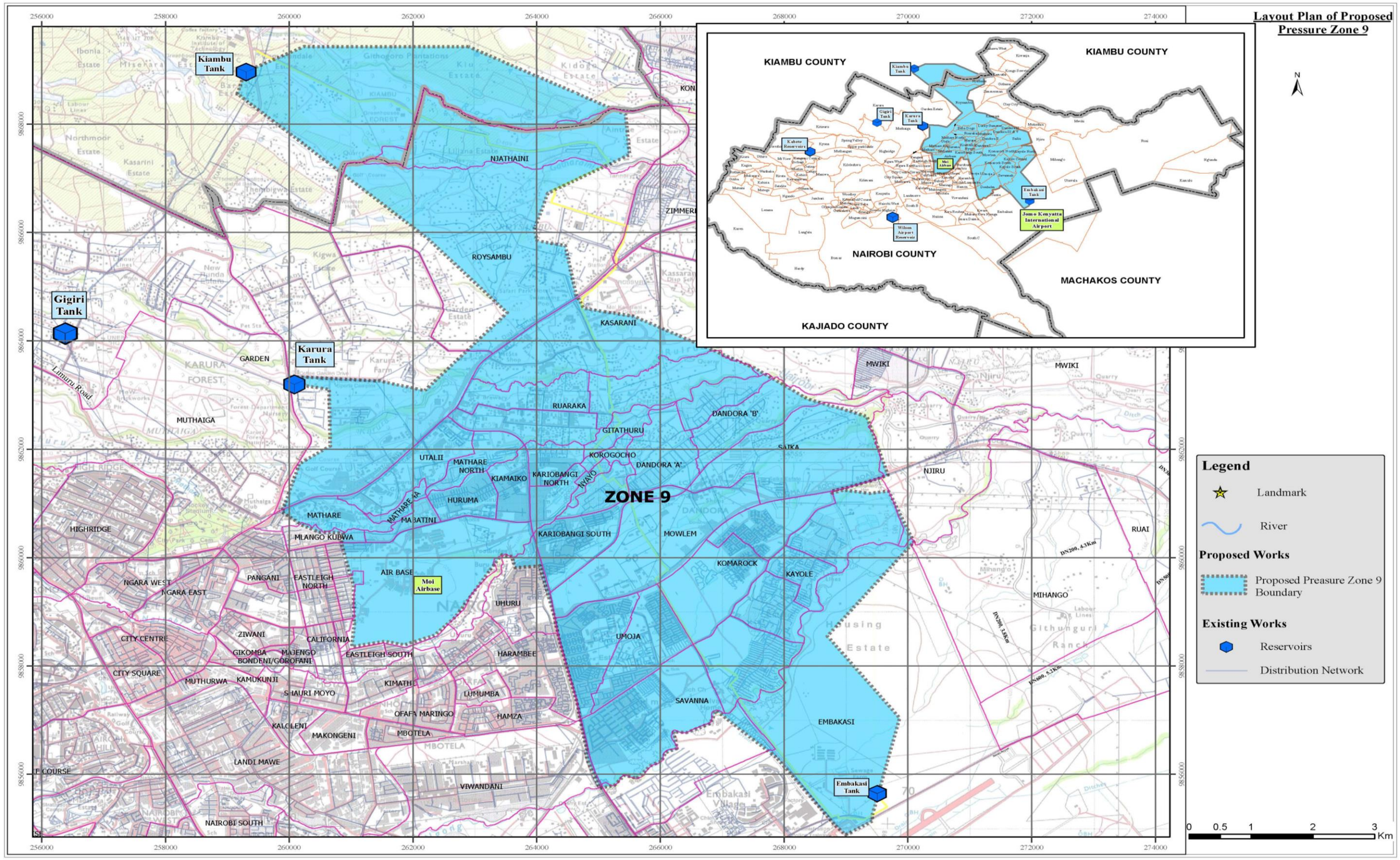
Based on the Nairobi City Water Distribution Master Plan (Seureca/Veolia, 2017), the objective of the Gigiri-Karura-Outer Ring Road Transmission Pipeline is to strengthen water supply within Zone 9 of the NCWSC Supply Zones. Zone 9 of the NCWSC supply zones comprise of the administrative areas detailed in **Table 2-1**.

Table 2-1: Target Supply Areas

• Umoja	• Njiru	• Gitathuru	• Mathare
• Komarock	• Saika	• Ruaraka	• Mathare 4A
• Kayole	• Kiamaiko	• Utalii	• Mathare North
• Nyayo	• Njathaini	• Garden	• Mabatini
• Savanna	• Kariobangi North	• Roysambu	• Huruma
• Mowlem	• Korogocho	• Kasarani	• Mlango Kubwa
• Kariobangi South	• Dandora A	• Dandora B	• Kiamumbi
• Embakasi			

It should be noted that the Zone is also served by other existing Transmission Pipelines, including the recently commissioned DN 1,000, DN900 Kiambu-Embakasi Water Transmission Pipeline whose target areas are Embakasi, Umoja, Savannah, Kayole, Koma Rocks, etc. The Gigiri-Karura-Outer Ring Road Transmission Pipeline will therefore augment the existing infrastructure**.** *Figure 2-1* on **Page 8** shows the location plan of Zone 9 on the Map of Nairobi County.

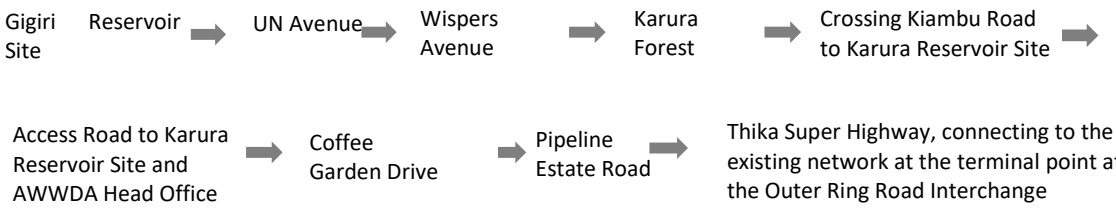
Figure 2-1: *Location Plan of Zone 9 of NCWSC Distribution Zones*



2.3 PIPELINE ROUTE FOR THE GIGIRI-KARURA-OUTER RING ROAD TRANSMISSION PIPELINE

Different pipeline route options were analysed. The selected route option is 8.3km long out of which 3.1km traverses Karura Forest within an existing wayleave of an already existing similar pipeline and therefore no tree will be cut within the forest to provide wayleave. The selected route option is described below.

Route Option 1



This ESIA Study Report covers the section of the Transmission Pipeline that is within Karura Forest of length 3.1km. The other pipeline sections are covered in the existing EIA Licence issued by NEMA as detailed in **Section 1.5** of this Report.

Considering that the pipeline is to be laid beside an existing pipeline along an access road, the impact of the pipeline construction activity to the forest ecosystem will not be severe. Mitigation measures for any impacts have been adequately addressed under the Environmental and Social Management Plan (ESMP). Further, the ESMP provides for budget provision of **Kshs 500,000.00 (Kenya Shillings Five Hundred Thousand)** for compensatory re-afforestation program that will be spearheaded by Kenya Forest Services (KFS) and Friends of Karura Forest (FKF).

2.4 PROJECT COST

The Estimated rate of construction per meter of the pipeline within Karura Forest is **Kshs. 83,870 (Kenya Shillings Eighty Three Thousand, Eight Hundred Seventy**). The Total estimated cost of the 3.1km pipeline within Karura Forest is therefore **Kshs. 259,997,000.00 (Kenya Shilling Two Hundred Fifty Nine Million, Nine Hundred Ninety Seven Thousand)**

3. ENVIRONMENTAL BASELINE INFORMATION

3.1 LOCATION AND HISTORY

According to Orwa (2014), Karura Forest reserve covers 1041.3 hectares and is located North of Central Nairobi County bordering the suburbs of Muthaiga, Gigiri, Runda, Ridgeways, Mathare North, Highridge and Spring Valley. The reserve has two blocks namely Karura block covering 765.9 ha and the western part of the forest also known as Sigiri Forest block covering 275.4 ha. Karura forest is one of the largest gazetted forests in the world fully within a city limits. (Wily & Mbaya, 2001) reported that the forest was gazetted in 1932 and is managed by the Friends of Karura Forest (FKF) in conjunction with Kenya Forest Service (KFS). It's the largest of three main gazetted forests in Nairobi. The other two gazetted forests being Ngong Forest and Ororua Forest.

Karura forest is a remnant of the *montane sclerophyllous* (small leaves) forest that covered all of the Kenya highlands from Nairobi to the Aberdare moorlands in pre-colonial times. It has always been a place of bounty for the Gikuyu people who traditionally used the forest for food, fuel and fibre, as a sacred burial place and source of herbal remedies. Scientists from the National Museums of Kenya have carried out archaeological excavation work in the Mau-Mau caves along the Karura River. Study of rare artefacts like the obsidian Stone Age knife found in the caves indicates human occupation of the forest in the distant past.

Karura became a forest reserve in April 1932 when the colonial government set it aside as a source of fuel wood for the new Uganda Railway. Due to this, three quarters of the forest was felled and replanted with exotic species (Cyprus, Eucalyptus and Araucaria). *Figure 3-1* presents the proposed water pipeline alignment along Wangari Mathai track

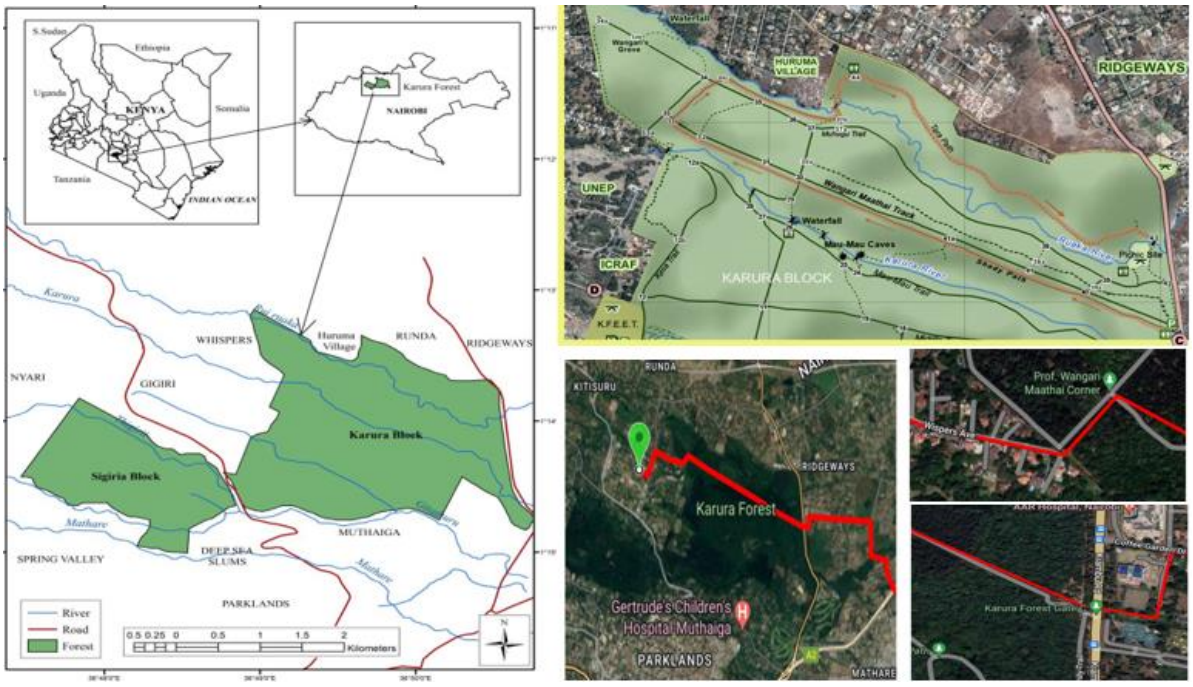


Figure 3-1: *Project Location Map Showing Proposed Water Pipeline Alignment along Wangari Mathai Track*

3.2 CLIMATE

The Project Area (Nairobi) experiences bi-modal type of rainfall. The long rains fall between Mid-March to May with a mean annual rainfall of 899mm. This is usually followed by a cold with drizzles and frost during June to August and the short rains of mean annual rainfall of 786.5mm between Mid - October to November.

The mean annual temperature for the Project Area stands at 24^0C. The warmest months are from January to March and the coolest months are between June and August. Over the past 25 years, the highest and lowest temperatures ever recorded by the meteorological department are 32.8^0C and 3.9^0C respectively. In early mornings, the air is frequently at or very close to saturation, but in the afternoon the humidity is usually about 50% and may fall as low as 10% on clear sunny days in February and March.

3.3 TOPOGRAPHY

The Karura landscape rolls gently between and through shallow valleys of Karura and Ruiruaka rivers. Drainage is generally south-easterly. Depressions throughout the forest impede drainage and cause formation of small edaphic grassy swards and swamps, some of which are under threat from Eucalyptus trees

3.4 SOILS AND GEOLOGY

Soils

Karura forest soil is usually very heavy, dark grey clay which stained black with un-decomposed humus, so-called 'black cotton' soil. Between 5 cm to 1 meter below the clay layer, a red-brown laterite occurs, a product of re-cementation that is rich in iron compounds and associated with swampy areas and a shifting water table. The forest soils are eminently suited to tree growth, except in the impeded drainage of swampy sites that provide natural edaphic grassy glades characteristic of Kenya's upland forests, (Friends of Karura Forest, 2014).

Geology

Nairobi has an underlying rock of tuff and trachytes with no significant characteristics of unsuitable fault lines. The forest sits on Tertiary volcanic rocks forming volcanic tuffs with intercalated flows of basaltic larva. Both types are occasionally exposed in Karura's deeper river valleys, and the tuffs yield the familiar grey building stone of Nairobi. "Chimneys" of larva are occasionally found exposed on ridges in the western and middle sections of the Forest (Friends of Karura Forest, 2014).

3.5 DRAINAGE AND HYDROLOGY

Five perennial tributaries of the Nairobi River pass through the forest running roughly west to east and cutting through gently undulating landscape. These are: Ruaka, Karura, Gitathuru, Thigiri and Mathare River. Karura River valley offers a precarious and stunning descent through indigenous forest to the large waterfall and the Mau-Mau caves, (Friends of Karura Forest, 2014).

3.6 BIODIVERSITY

According to an assessment of tree species distribution and diversity in the major urban green spaces of Nairobi carried out by D. Nyambane, J. Njoroge and A. Watako in May 2016, and Friends of Karura (2023) Karura Forest biodiversity reservoir contains many species of plantation besides planted trees. This implies that the forest comprises of over 100 000 indigenous seedlings from 70 different species of trees and shrubs indigenous to Kenya's upland forests . The Trees compose a large carbon sink which reduce the amount of carbon dioxide emitted by the city and gives fresh air back to the city.

Further, the assessment provided that Plant composition of urban green spaces is an important component of urban ecosystem as it influences the provision of many environmental and social services that contribute to the quality of life. In Nairobi, a few remnants of continuous highland forest exist but they are under increasing pressure from the rapidly changing surrounding landscape. The plant composition is being altered by human encroachment and other related activities. The status of the current plant composition in relation to location and disturbance level is unknown. The assessment presented tree species in Karura Forest tree species based on the Importance Value Index (IVI)[2] as summarized in **Table 3-1.**

Table 3-1: Karura Forest based on the Importance Value Index (IVI

TREE SPECIES/SITE	FAMILY	IVI
Eucalyptus paniculata	Myrtaceae	91.32
Drypetes gerrardii	Putranjivaceae	24.35
Newtonia buchananii	Mimosoideae	19.02
Markhamia lutea	Bignoniaceae	16.77
Croton megalocarpus	Euphobiaceae	16.05
Teclea trichocarpa	Rutaceae	15.94
Cupressus Spp.	Cupressaceae	14.56
Araucaria heterophylla	Aruacariaceae	11.28
Xymalos monospora	Monimiaceae	9.59
Eucalyptus paniculata	Myrtaceae	8.28
Strychno smitis	Loganiaceae	8.28

Additionally, most dominant tree species in Karura Forest include; *E. paniculata, D. gerrardii, T. trichocarpa, A. heterophylla, N. buchananii, C. spp., M. lutea, C. megalocarpus, E. ficifolia, X. monospora*. Fauna in Karura Forest include monkeys, squirrels, cobras, civets, duikers, etc. 113 birds' species were identified as provided in the study referenced under footnote 2 below.

3.7 ECO TOURISM

Karura forest is a general public space for residence to enjoy a green nature. The Forest contains important historical and cultural places of Kenya which include 50 feet waterfall and the Mau Mau caves that were used by the Mau Mau during the battle for independence.

2 *Assessment of tree species distribution and diversity in the major urban green spaces of Nairobi city, Kenya David Onguso Nyambane by John Bosco Njoroge and Arnold Onyango Watako, Department of Horticulture, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya. 11 May, 2016*

Karura Forest is now developed as a visitor's attraction for both local and international, with more than 16,000 entries per month. This includes creation of some 50km of nature trails[3] for walking, running and biking. The first trail, which is four kilometres long and connects Limuru Road with Old Kiambu Road was opened in May 2009. An electric fence has been built around the forest for security reasons. Although 70% of Karura's visitors are Kenyan citizens, there is a growing appreciation by international clients as witnessed by Karura having received a Trip Advisor Certificate of Excellence for two years running (2014–15) and being listed as No. 4 out of 101 Things To Do in Nairobi.

The Karura Forest Environmental Education Trust (KFEET) was formed in 2010 and launched by then Minister for Forestry and Wildlife. The Education Trust manages an environmental education centre located in Karura Forest and facilitates access to thousands of Kenyan school children.

3.8 RECEPTORS

The pipeline gets into Karura forest from Gigiri Estate through Wispers Avenue. It is aligned to follow a footpath leading towards Prof. Wangari Mathai Corner, joins Karura Footpath (Wangari Mathai Track) and finally exits the forest near Gate 'C' that is along Kiambu road. **Table 3-2** illustrates receptors identified during field visit.

Table 3-2: Receptor at Risk of Impacts Related to Project Activities

RECEPTOR	DETAILS
Biological	Karura Forest Ecosystem
Social Receptors	Gigiri Estate along Wispers Avenue
	Kiambu Road around Karura Forest Gate 'C'
	Visitor walking or jogging along Wangari Mathai Track

The end of Wispers avenue, entry point of the Pipeline into Karura Forest

Karura Forest gate C the exit point of the pipeline from the forest

[3] The trail will not be affected by the project although (3km) of the trail will be used to lay the pipeline, temporality, this section will be affected during works but reinstated after pipe laying is concluded.

4. APPROACH AND METHODOLOGY

4.1 BASELINE INFORMATION COLLECTION

To provide a context within which the impacts of the project can be assessed, a site visit was conducted along the proposed water pipeline alignment within the forest by team of environmentalist to confirm likely pipeline impacts to the ecosystem and to verify data sourced from literature[4]. The aim of the site visit was to undertake physical assessment of baseline situation including biophysical and social setup of the alignment with the forest. The approach of collecting data was through field observation for flora and fauna, water resources, soils, land use and landscape as well as secondary data from available literature.

4.2 STAKEHOLDER ENGAGEMENT

The stakeholders of Karura forest reserve are numerous and broad ranged and they can be classified into five groups: (i) Government institutions, (ii) Private sector, (iii) Community based organization, (iv) Nairobi County Government and (v) Faith based organizations. Key stakeholders consulted during preparation of this report included (i) Friends of Karura Forest (ii) Kenya Forest Services and (iii) Deputy County Commissioner for Westlands Sub County. Further, public barazas were organized in selected settlements within the target supply areas including; Kariobangi South, Korogocho and Njadhaini. The schedule of consultations is summarized in **Table 4-1.**

Table 4-1: Schedule of Stakeholder Consultations

STAKEHOLDER	VENUE	DATE
Friends of Karura Forest	Friends of Karura Forest Offices	26th September 2022
Kenya Forest Services (KFS)	Kenya Forest Services (KFS) offices	26th September 2022
Deputy County Commissioner Westland Sub County	Deputy County Commissioner Westland Sub County offices	22nd August 2022
Njadhaini Sub Location	Njadhaini Shopping Centre	13th September 2022
Korogocho Location	Korogocho Chiefs Offices	14th September 2022
Kariobangi South Location	Mowlem Grounds	15th September 2022

Minutes of Meetings held during the above consultations are presented as **Appendix 2** to this Report.

4

- ✓ *https://www.friendsofkarura.org/the-karura-forest-researve/ecology-climate-soils-plants-animals/*
- ✓ *Assessment of tree species distribution and diversity in the major urban green spaces of Nairobi city, Kenya David Onguso Nyambane by John Bosco Njoroge and Arnold Onyango Watako, Department of Horticulture, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya. 11 May, 2016.*

4.3 IMPACT ASSESSMENT METHODOLOGY

The principal steps of Impact identification and assessment comprise the following steps.

- **Impact Prediction** - To determine what could potentially happen to resources and receptors as a consequence of the Project and its associated activities.
- **Impact Evaluation** - To evaluate the significance of the predicted impacts by considering the magnitude of the effect and the sensitivity, value, and importance of the affected resource or receptor.
- **Mitigation and Enhancement** - To identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- **Residual Impact Evaluation** - To evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

The terminologies used to describe impact characteristics is shown in **Table 4.2.**

Table 4.2: Impact Characteristics

CHARACTERISTIC	DEFINITION	DESIGNATION
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect)	Direct, Indirect, Induced
Extent	The 'reach' of the impact (e.g., confined to a small area around the Project Footprint, Projected for several km etc.)	Local, Regional, International
Duration	The time period over which a resource/ receptor is affected	Temporary, Short term, long term Permanent
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.)	No fixed designation. Intended to be a numerical value or a qualitative description of intensity
Frequency	A measure of the constancy or periodicity of the impact	No fixed designation. Intended to be a numerical value or a qualitative description

The definitions for the type designations are shown in **Table 4.3**.

Table 4.3: Impact Characteristics

DEFINITION	DESIGNATION
Direct	Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., between occupation of a plot of land and the habitats which are affected)
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land).
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g., influx of camp followers resulting from the importation of a large Project workforce).

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains unplanned events is likelihood. The likelihood of an unplanned event occurring is designated using a qualitative scale, as described in **Table 4-4**.

Table 4-4: Definition of Likelihood

LIKELIHOOD	DEFINITION
Unlikely	The event is unlikely but may occur at some time during normal operating conditions
Possible	The event is likely to occur at some time during normal operating conditions.
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g., influx of camp followers resulting from the importation of a large Project workforce).
Likely	The event will occur at normal operating conditions (i.e., it is essentially inevitable).

Once an impact's characteristics are defined, the next step in the impact assessment phase was to assign each impact a 'magnitude'. Magnitude is a function of some combination of the following impact characteristics:

- Extent
- Duration
- Scale
- Frequency

Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. As discussed above, the magnitude designations themselves are universally consistent, but the descriptions for these designations vary on a resource/receptor-by resource/receptor basis. The universal magnitude designations are:

- Positive
- Negligible
- Small
- Medium
- Large

In the case of a positive impact, no magnitude designation (aside from 'positive') is assigned. It is considered sufficient for the purpose of the area of influence to indicate that the Project is expected to result in a positive impact, without characterizing the exact degree of positive change likely to occur. In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is utilized, but the *'likelihood'* factor is considered together with the other impact characteristics when assigning a magnitude designation.

In addition to characterizing the magnitude of impact, the other principal impact evaluation step is definition of the sensitivity, vulnerability and importance of the impacted resource/receptor. There are a range of factors to be taken into account when defining the sensitivity/vulnerability/importance of the resource/receptor, which may be physical, biological, cultural or human. Other factors may also be considered when characterizing sensitivity/vulnerability/importance, such as legal protection, government policy, stakeholder views and economic value.

As in the case of magnitude, the sensitivity/vulnerability/importance designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor basis.

The sensitivity/vulnerability/importance designations used herein for all resources/receptors are:

- Low
- Medium
- High

Significance

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor were characterized, the significance was assigned for each impact. Impact significance was designated using the matrix shown in **Table 4-5**.

Table 4-5: Impact Significance

		SENSITIVITY / VULNERABILITY / IMPORTANCE OF RESOURCE / RECEPTOR		
Magnitude of Impact		Low	Medium	High
	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations were factored into the assignment of magnitude and sensitivity, vulnerability and importance designations that enter into the matrix.

4.4 MITIGATION AND ENHANCEMENT MEASURES

Further, once the significance of an impact was characterized, the next step was to evaluate what mitigation and enhancement measures are warranted. For the purposes of this assessment, the following order or hierarchy was applied for development of mitigation:

- **Avoid at Source, Reduce at Source**: Avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- **Abate on Site**: Add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
- **Abate at Receptor**: If an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- **Repair or Remedy**: Some impacts involve unavoidable damage to a resource (e.g., agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- **Compensate in Kind, Compensate Through Other Means**: Where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation for the Project was to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude.

4.5 RESIDUAL IMPACT

In addition, once mitigation and enhancement measures were specified the next step in the Impact Assessment Process was to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the implementation of the proposed mitigation and enhancement measures.

4.6 MANAGEMENT AND MONITORING AND AUDIT

The final stage in the impact assessment process was the development of a management plan for implementing controls and mitigation and also monitoring the effectiveness. Monitoring is done to verify that:

a. Impacts or their associated project components remain in conformance with applicable standards.
b. Mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

An Environmental and Social Management Plan (ESMP) which is a compilation of all actions identified in the impact assessment, is provided in **Chapter 8**. This includes mitigation measures, compensatory measures and offsets and management and monitoring activities

5. POLICY AND LEGAL FRAMEWORK

This chapter outlines the policy, legal and institutional framework governing environmental issues in Kenya and the World Bank Policy framework for development Projects. Further, Environmental and Social Risk Management Policy for AFD-funded Operations is also discussed.

5.1 POLICY PROVISIONS

Table 5-1 presents a summary of relevant policies that were analysed in this ESIA.

Table 5-1: Policy Framework Relevant to Sewerage Infrastructure

NO	POLICY	RELEVANCE	APPLICABILITY TO THE PROJECT
1	National Environment Policy (NEP) 2013	The Policy goal is towards a better quality of life for present and future generations through sustainable management and use of the environment and natural resources. The objective of the policy among others is to ensure sustainable management of the environment and natural resources, such as unique terrestrial and aquatic ecosystems, for national economic growth and improved livelihoods.	The proposed project will contribute to achievement of this policy's mission through provision of water after the construction of the Transmission and distribution Pipelines. This Project will lead to equitable distribution of water in Nairobi City County.
2	Forest Policy 2014	The overall goal of this Policy is sustainable development, management, utilization and conservation of forest resources and equitable sharing of accrued benefits for the present and Future generations of the people of Kenya. Objectives of the Policy include among other; (i) Increase and maintain tree and forest cover of at least ten percent of the land area of Kenya and (ii) Enhance management of forest resources for conservation of soil, water biodiversity and environmental stability	The proposed water pipeline section through the forest will be implemented in a manner that conforms to provisions of the policy, this includes securing a wayleave permits from Kenya Forest Services and undertaking of EIA for any potential negative impacts that might be triggered to Karura Forest Ecosystem
3	The National Water Policy 2012 (Draft)	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.	The Water Transmission Pipeline Project will result into sustainable utilization of scarce water resources through equitable distribution
4	The National Environmental Sanitation and Hygiene Policy-July 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 behaviour and practices begin with the individual.	Gigiri-karura Transmission Pipeline Project contributes towards achievement of this policy through provision of sustainable water for domestic use to residents of Northern and Eastern sides of Nairobi.
5	National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999)	The management of water resources in Kenya is guided by four specific policy objectives, among them Preserve, conserve, and protect available water resources and allocate it in a sustainable rational and economic way.	The Water Transmission Pipeline Project will result into sustainable utilization of scarce water resources through equitable distribution

NO	POLICY	RELEVANCE	APPLICABILITY TO THE PROJECT
6	Kenya Vision 2030	The Kenya Vision 2030 is the current National Development blueprint for period 2008 to 2030. The vision has three pillars; economic, social and political. It is recognized that Kenya is a water scarce Country but stated (Kenya, 2007: 115) that the Vision for the water and sanitation sector is "to ensure water and improved sanitation services availability.	The Project will directly contribute towards achievement of objectives of vision under the environment and social pillar through provision / improvement of water infrastructure
7	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, socio-economic groups, planners and policy makers in water resource management (Kenya, 2010: 53).	Provision of Sustainable water to residents of Northern and Eastern Nairobi is a way of ensuring community resilience to climate change impacts. The Project will ensure that water resource is utilized in ways that recognize that it is a finite resource
8	Climate Change Policy Framework 2016	The Policy was developed to facilitate a coordinated, coherent and effective response to the local, National and global challenges and opportunities presented by climate change. An overarching mainstreaming approach has been adopted to ensure the integration of climate change considerations into development planning, budgeting and implementation in all sectors and at all levels of government. This Policy therefore aims to enhance adaptive capacity and build resilience to climate variability and change, while promoting a low carbon development pathway.	Gigiri – Karura Water Transmission pipeline Project is among the projects that align to provision above especially in fight against poverty and food security through provision of sustainable water to residents of Northern and Eastern sides of Nairobi
9	Economic Recovery for Wealth and Employment Creation Strategy 2006	The overall goal of the strategy is to ensure clear improvement in the social and economic wellbeing of all Kenyans; thereby giving Kenyans a better deal in their lives, and in their struggle to build a modern and prosperous nation.	The key areas covered in the strategy are: Expanding and improving infrastructure and Safeguarding environment and natural resources among others. Gigiri – Karura Water Transmission Pipeline Project directly conforms to these provisions.
10	Big 4 Agenda	The Government's Development blueprint, The Big 4 Agenda, comprises of Food Security; Affordable Housing; Manufacturing and Affordable Healthcare.	Water and Sanitation system is an enabler for this and driver of economic growth.
11	Kenya National Youth Policy 2006	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.	The project will provide direct employment to the youth as required by the Policy.
12	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	The policy will be important at the time of recruiting workers during Project implementation.

NO	POLICY	RELEVANCE	APPLICABILITY TO THE PROJECT
		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.	
13	National policy for prevention and response to gender based violence, 2014	The overall Goal of this National Policy is to accelerate efforts towards 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 in 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.	Provisions of this policy will be adhered to during project implementation phase.
14	The National Occupational Safety and Health Policy, 2012	The main objective of this policy is to establish National occupational safety and health systems and programmes geared towards the improvement of the work environment. The Policy seeks to reduce the number of work-related accidents and diseases, and equitably provide compensation and rehabilitation to those injured at work or who contract occupational diseases. It thus requires employers to ensure safety and health at workplace, establishment of safety and health committees at workplaces, conduct training on occupational safety and health and report accidents, diseases and other dangerous occurrences to relevant authorities	The contractor will be given a copy of the ESMP to develop Contractor-ESMP for compliance during construction including provision of PPE, erection of signages at critical points, sealing the pan construction area to avoid unauthorized entry and accidents.

5.2 LEGAL FRAMEWORK

Applicable Acts of Parliament as summarized in **Table 5-2** were reviewed.

Table 5-2: Legal Framework Relevant to Water Infrastructure

ACTS	RELEVANCE	APPLICABILITY TO THE PROJECT
Constitution of Kenya (CoK) 2010	Article 43 (1) provides that every person has the right – (b) to accessible and adequate housing, to reasonable standards or sanitation; and, (d) to clean and safe water in adequate quantities. These provisions oblige state organs and bind them to provide not just high quality or clean and safe water but also adequate quantities to all people that they will serve.	The proposed project will comply with all constitutional requirement of ensuring sound management of the environment by implementing the proposed environmental and social management plan. It also calls for the duty given to the Project proponent, in this case AWWDA, to co-operate with State organs and other persons to protect and conserve the environment as mentioned in Part II.
EMCA 1999 Cap 387	The Environmental Management and Coordination Act of 1999 (EMCA) Cap 387 was enacted to provide an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. EMCA does not repeal the sectoral legislation but seeks to coordinate the activities of the various institutions tasked to regulate the various sectors. These institutions are referred to as Lead Agencies in EMCA. Lead Agencies are defined in Section 2 as any Government ministry, department, parastatal, and State Corporation or local authority in which any law vests functions of control or management of any element of the environment or natural resource. EMCA and its subsidiary legislations are enforced by the National Environment Management Authority (NEMA). Section 58, all projects listed in the Second Schedule of the Act must submit a study report to NEMA.	The water supply Project is classified under Medium-risk project in the Second Schedule of EMCA 1999, and thus requires an ESIA. By conducting this ESIA, the project therefore complies with the Act.
Forest Management and Conservation Act 2016	The act provides for protection of tree species under section (40), under this section the Cabinet Secretary, on the advice of the Kenya Forestry Research Institute, by order published in the Gazette, declare any tree species or family of tree species to be protected in the whole country or in specific areas thereof, and shall cause this information to be disseminated to the public. The Act further provides that no person shall fell, cut, damage or remove, trade in or export or attempt to export any protected tree species or family of trees or regeneration thereof or abet in the commission of any such act.	This ESIA provides for compensatory tree planting on degraded sections of the forest by AWWDA in consultation with KFS. These trees will be planted as a replacement to the ones that will be cleared along the pipeline alignment within the forest. Further AWWDA will apply for way leave permit from KFS prior to commencement of works on the section within the forest.
Land Act, 2012	It is the substantive law governing land in Kenya and provides legal regime over administration of public and private lands. It also provides for the acquisition of land for public benefit. The government has the powers under	The water pipeline is designed along Wangari Mathai nature trail / track within Karura Forest which is public land under KFS. AWWDA will apply for way leave permit from KFS prior to

ACTS	RELEVANCE	APPLICABILITY TO THE PROJECT
	this Act to acquire land for projects, which are intended to benefit the general public. This Act provides for the procedure to be followed during compulsory acquisition of land by the Government and the just compensation which should be paid promptly and in full to all persons whose interest in land has been affected.	commencement of works on the section within the forest.
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 endeavour to encourage 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 own motion, or on application of the parties to a dispute, to direct the application of alternative dispute resolution (ADR), including traditional dispute resolution mechanisms.	The act will be useful in provision of guideline on resolving disputes that might arise related to land or environment.
Water Act, 2016	Article 43 of the Constitution stipulates that every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation. In conformity to this constitutional requirement, the Water Act, 2016 was enacted.	The proposed Transmission Pipelines Project is envisaged to provide reliable water to residents of Northern and Eastern sides of Nairobi in line with the provisions of this Act.
County Government Act No. 17 of 2012	The preamble to the Act gives overriding object and purpose of the Act. It states that, 'An Act of Parliament to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Part II elaborate on the functions and powers of the county government, emphasizing its constitutional authority to enter into contracts, acquire and hold and dispose of assets, and delegate functions, such as through sub-contracts and partnerships.	PART VIII of the Act provided for Citizen Participation principles which include timely access to information, data, documents, and other information relevant or related to policy formulation and implementation among others. Similarly, implementation of the proposed Transmission Pipeline Project will be done through sustained public participation as provided for by this Act
Physical and Land Use Development Plan Act 2019	Part IV of the Act provides objectives of development control which are to ensure orderly physical and land use development, to ensure the proper execution and implementation of approved physical and land use development plan and to protect and conserve the environment Further section 56 provides that Subject to the provisions of this Act, the Urban Areas and Cities Act, 2011, and the County Governments Act, 2012, the county governments shall have the power within their areas of jurisdiction to consider and approve all development applications and grant all development permissions among other roles.	As guided by this Act, AWWDA will seek requisite approvals from the Nairobi County Director of Physical Planning prior to commencement of the works discussed in this report.

ACTS	RELEVANCE	APPLICABILITY TO THE PROJECT
Occupational Health and Safety Act (OSHA 2007)	The Act provides Environment Health and Safety (EHS) Guidelines which shall be followed by both the Contractor and Supervising Consultant during implementation of the Project to avoid injuries and even loss of life to workers and neighbouring community.	OSHA is enforced by the directorate of occupational safety and health services (DOSHS). Further, the project contractor will be expected to register the site as a workplace with DOSHS and also engaged the directorate in handling work related accidents.
HIV and AIDS Prevention and Control Act 2011	The objective and purpose of this Act is to (a) promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS; (b) extend to every person suspected or known to be infected with HIV and AIDS full protection of his human rights and civil liberties.	The Act provisions will be applied during Project implementation phase where the contractor will be required to create awareness among workers and community at large as well as other measures such as provision of condoms among others.
Sexual Offences Act 2006	An Act of Parliament that makes provision about sexual offences aims at prevention and the protection of all persons from harm from unlawful sexual acts and for connected purposes. Section 15, 17 and 18 focuses mainly on sexual offenses on minor (children).	In an effort to comply to provisions of this Act, the contractor will integrate Sexual Exploitation and Abuse (SEA) in job descriptions, employments 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.
Child Rights Act (Amendment Bill) 2014	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, 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. Contractors implementing the various Project components envisaged under the Master Plan Study will be required to comply to provisions of the Act during Project implementation.	The contractor will undertake the below listed measures among others; • The contractor will develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project including SEA. • All contractor's staff must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour
Labour Relations Act 2012	An Act of Parliament to consolidate the law relating to trade unions and trade disputes, to 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.	This act will be applied by labour force on site in addressing disputes related to working conditions.

ACTS	RELEVANCE	APPLICABILITY TO THE PROJECT
National Gender and Equality Commission Act 2011	The over-arching goal for NGEC is to contribute to the reduction of gender inequalities and the discrimination against all; women, men, persons with disabilities, the youth, children, the elderly, minorities and marginalized communities.	This Act will be applied during hiring of workforce on site especially during hiring of workers, the aim will be to ensure adequate representation of women in the Project.
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.	This act together with World Bank Policy OP 4.11 on Physical Cultural Resources will be quoted in the event that the project encounters such materials. Chance find procedures have been provided in this report. The provisions of the Act are mainly enforced by the National Museums of Kenya (NMK)
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.
Traffic Act 2015	PART V of the Act provides driving and other offences 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 walkway, Causing death by driving or obstruction, Reckless driving, Signals and signs to be obeyed, Condition of vehicles, Limitation of loads.	This Act will be cited in relation to operation of plant and equipment on site. This act is enforced by the Traffic Police Department and the National Transport and Safety Authority (NTSA).
PUBLIC HEALTH ACT, CAP 242	This is an Act of Parliament which makes provision for good public sanitation and maintenance of health. Part III section 17-18 highlights on what the proponent should do in case of an outbreak of infectious diseases within the area. The infectious diseases apply to small pox, plague, cholera, typhus fever, acute poliomyelitis, rabies and many more as highlighted in this section. The Public Health Act makes provision for securing and maintaining health. For instance, the local authorities are supposed to take measures for preventing any pollution dangerous to health of any supply of water that the public uses for domestic purposes and purifying the sources that have been polluted. They are also supposed to take action against persons causing pollution to the water sources.	The contractor will be required to provide sanitary facilities and solid waste containers for use by construction workers on site during construction phase.
CLIMATE CHANGE ACT 2016	The Act establishes a cooperation called National Climate Change Council whose responsibility among others is to advise the national and county governments on legislative, policy and other measures necessary for climate change response and attaining low carbon climate change resilient development.	The proposed Project is among projects that align to provision of the National Climate Change Action Plan (NCCAP) efficient utilization and conservation of freshwater resources.

ACTS	RELEVANCE	APPLICABILITY TO THE PROJECT
	The act further provides that the Cabinet Secretary shall, in accordance with Article 10 of the Constitution and section 3 of this Act, and through public consultation, formulate a National Climate Change Action Plan (NCCAP) In formulating the National Climate Change Action Plan, the Cabinet Secretary shall be informed by social circumstances in particular, the likely impact of the action plans, strategies and policies on biodiversity and ecosystem services among other measures.	
Penal code CAP 63	Chapter XVII on "Nuisances and offences against health and convenience" contained in the penal code strictly prohibits the release of foul air into the environment which affects the health of the persons. Section 191 of the penal code states that if any person that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence.	Human and Solid (refuse) Waste disposal and other project related activities shall be carried out in such a manner as to conform to the provisions of the code.
The Standards Act Cap 496	This Act promotes the standardization of the specification of commodities and provides for the standardization of commodities and codes of practice to ensure public health and safety. It establishes the Kenya Bureau of Standards (KEBS) and defines its functions as related to: promotion of standardization in industry and commerce; and Making arrangements or provision of facilities for the testing and calibration of precision instruments, gauges and scientific apparatus, for the determination of their degree of accuracy by comparison with standards approved by the Minister on the recommendation of the Council, and for the issue of certificates in regard thereto.	This means that the contractor under the supervision of the County Engineer will ensure that all materials used on site adheres to the highest standards and do not pose any human health and safety risk.
The National Construction Authority Act, 2011	The Act provides for the establishment, powers and functions of the National Construction Authority (NCA). For accountability purposes, it requires all contractors to be registered and having valid annual practicing licenses. It also allows for public complaints against the contractor, which may trigger investigation by NCA into the conduct of such a contractor.	The proponent (AWWDA) will only hire a licensed contractor to undertake the construction works. Complaints against the contractor will first be addressed through the project Grievance Redress Mechanism (GRM) and other measures only acting as a last resort.
Malaria Prevention Act (CAP 246)	The Act provides for the prevention and control of malaria and for connected purposes. It prohibits the construction of a dam or any other construction so as to obstruct the flow of water into or out of a drain, *or* alter the level of water so as to reduce the flow of water without consent.	The Proponent will be required to provide measures (such as sensitize the community on use of treated mosquito nets, local spraying and bush clearing near households) for the prevention and control of malaria

5.3 REGULATIONS AND RULES

Applicable Regulations and Rules as summarized in **Table 5-3** were reviewed.

Table 5-3: Regulations and Polices

REGULATION	RELEVANCE	APPLICABILITY TO THE PROJECT
The Environmental (Impact Assessment and Audit) Regulations, 2003	The regulation provides a framework under which Environment Impact Assessment for the Factory is prepared, Regulation 4(1) further states that: (a)''…no Proponent shall implement a project: likely to have a negative environmental impact. (b) for which an environmental impact assessment is required under the Act or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulations…''	Provisions of the regulations were applied during preparation of this report.
Environmental Management and Coordination (Water Quality) Regulations, 2006	Regulation 9 of these regulations provides for water quality monitoring. It states that the "Authority in consultation with the relevant lead agency, shall maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as set out in the second schedule to these regulations". The regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams,' springs, wells and other water sources). Construction of the dam provides for sustainable management of such water resources.	Provisions of the regulations were applied during preparation of this report.
(Waste Management Regulations, 2006	Regulation 4 (1) states that "no person shall dispose of any waste on a public highway, street, road, recreational area or in any place except in a designated receptacle". Regulation 4 (2) further states that "a waste generator shall collect, segregate and dispose such waste in the manner provided for under these regulations".	AWWDA will use provisions of this regulation to ensure that waste is handled, stored, transported and disposed as per this regulation.
Noise and Excessive Vibration Pollution (Control) Regulations, 2009	The Contractor will be required to ensure compliance with the above regulations in order to promote a healthy and safe working environment throughout the Construction Phase. This shall include regular inspection and maintenance of equipment and prohibition of unnecessary hooting by vehicles. The regulations provides for a maximum of 60 dBA during the day and 35 dBA during the night for a construction site.	Provisions of the regulations were applied during preparation of this report.
The Environmental Management and Coordination (Air Quality Regulations 2014)	These regulations provide a framework for management of plant and equipment emissions of hydrocarbons on site. The regulations require that all plant and equipment on site should be well serviced to manufacturers specifications to avoid air pollution, the regulation also require monitoring of baseline air quality within construction site and implementation of correction action where the standards are not complied to.	Water spray will be used at all times when working in dry areas to avoid risks associated with dust menace. Particulate matter (PM_{10}), equipment's will be operated as provided by manufacturers specification to eliminate cases of Oxides (SOx), Nitrogen Oxides (NOx)) and

REGULATION	RELEVANCE	APPLICABILITY TO THE PROJECT
		Volatile Organic Compounds (VOC).
Fire Risk Reduction Rules, 2007	The rules require electrical equipment be installed in accordance with the respective hazardous area classification system, flammable materials are stored in appropriately designed receptacles, electrical equipment is inspected after six months by a competent person and the Proponent is required to keep records of such inspections, installation and maintenance of firefighting systems in workplaces, fire drills at least once a year, assembly points be marked, undertake annual fire safety audits etc.	The contractor will be required to store all flammable materials and liquids safely to avoid risk of fire.
Medical Examination Rules, 2005	It requires workers on site to undergo regular medical examination to identify the symptoms of hazardous exposures on the body, especially those who handle food or food products. This is with a sole purpose of monitoring exposure for remedial action.	The contractor will institute and implement regular medical examinations for its staff at the facility. These will include COVID 19 temperature check-up and drug abuse (at least alcohol on daily basis).
Safety and Health Committee Rules of 2004	These rules require the proponent and contractor (once they employ a more than twenty persons) to establish a committee to address the health, safety and welfare of workers. The Proponent and by extension the contractor, are required to provide space for meetings for the committee, training of the S&H Committee, appoint a S&H management representative, as well as allowing all staff to attend these meetings with no risk of loss of earnings, opportunities for promotion or advancement. They should also make legislation on occupational safety and health available to the Committee.	The contractor will develop a clearly defined safety and health policy and bring it to the notice of all employees at the workplace. They are also required to implement and review the policy when need arises. If construction workers exceed 20, the contractor will facilitate the formation of a S&H Committee and its operations.
First-Aid Rules, 1977	Rule 7 of First-Aid Rules, 1977 require that (No person shall be placed in charge of a first aid unless he has received adequate training and holds a certificate of competence	The contractor will conduct first aiders' training for the first time and a refresher training Bi-annually.

5.4 WORLD BANK OPERATIONAL SAFEGUARD POLICIES

Applicable World Bank Safeguard Policies that are triggered by the project are summarized in **Table 5-4**.

Table 5-4: World Bank Safeguard Policies

SAFEGUARDS POLICIES	PROVISION	RELEVANCE TO THE PROJECT
World Bank OP 4.01 on Environmental Assessment	Provides framework for WB environmental safeguard policies and describes project screening and categorization to determine level of environmental assessment required. For category A and B projects the policy requires public consultation and disclosure to be undertaken as part of the EA process. If indigenous people are found to be affected, in addition to consultation, it is necessary to prepare a plan to avoid or mitigate adverse impacts on such groups and ensure that they have access to project benefits to the extent that they wish to.	An Environmental and Social Impact Assessment of Proposed Project Components is required and therefore the need for this report.
World Bank OP 4.12 On Involuntary Resettlement	The policy provides that Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative Project designs. Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons Should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs. Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher	Not triggered as no land acquisition is required. The water pipeline is designed along Wangari Mathai nature trail / track within Karura Forest which is public land under KFS. AWWDA will apply for way leave permit from KFS prior to commencement of works on the section within the forest.
World Bank OP 4.11 on Physical Cultural Resources	Provides for measures to protect cultural heritage from the adverse impacts of project activities and support its preservation;	Requires assessment for any physical cultural resources or requires preparation of chance find procedures be prepared during implementations of Projects. Appended to this ESIA are chance find procedures to be adopted in the event such resources are encountered during Project construction phase.

5.5 ENVIRONMENT AND SOCIAL STANDARDS

Review of Environment and Social Standards (ESS) of the World Bank was undertaken during preparation of the ESIA as summarized in **Table 5-5**.

Table 5-5: World Bank Environment and Social Standards

Standard	PROVISION	RELEVANCE TO THE PROJECT
(ESS1) Assessment and Management of Environmental and Social Risks and Impacts	(ESS1) Assessment and management of environmental and social risks and impacts which provides for (i) Environment Assessment (ii) Development of Environmental and Social Commitment Plan (ESCP), (iii) Project monitoring and reporting (iv) Stakeholder engagement and information disclosure. The main focus of the standard is to promote environmental and social sustainability in the Program design; avoid, minimize, or mitigate adverse impacts, and promote informed decision-making relating to the Program's environmental and social impacts.	An Environmental and Social Impact Assessment of Proposed Project Components is required and therefore the need for this report.
(ESS2) Labor and Working Conditions	ESS2 recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. The standard objectives include among others; To promote safety and health at work, To promote the fair treatment, non-discrimination and equal opportunity of project workers, To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with the (ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate among others	Section 7 discusses Project related Social Impacts. Appropriate provisions have been provided to mitigate impacts related to Worker and Community Health and Safety and Workers Management
(ESS3) Resource Efficiency Pollution prevention and Management	ESS3 recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. The policy objective among other include; to promote the sustainable use of resources, including energy, water and raw materials and; To avoid or minimize adverse impacts on human Health and the environment by avoiding or minimizing pollution from project activities among others.	Chapter 7 of this ESIA has discussed in detail potential risks that the Project could pose to Biophysical resources ranging from Water, Soil and Air and Biological resources including Fauna and Flora. Appropriate ranking has been determined and mitigation measures provided.
(ESS4) Community Health and Safety	ESS4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration or intensification of impacts due to project activities. The policy objectives among others include; to anticipate and avoid adverse impacts on the health and safety of project-	Section 7 discusses Project related Social Impacts, appropriate provisions have been provided to mitigate impacts related to Worker and Community Health and Safety and Workers Management, the risk will also apply to visitors within Karura Forest.

Standard	PROVISION	RELEVANCE TO THE PROJECT
	affected communities during the project life cycle from both routine and non-routine circumstances and to promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure.	
(**ESS5)** Land Acquisition, Restrictions on land Use and Involuntary Resettlement.	ESS5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons. Project-related land acquisition or restrictions on land use may cause physical displacement (relocation, loss of residential land or loss of shelter), economic displacement (loss of land, assets or access to assets, leading to loss of income Sources or other means of livelihood), or both. The objectives of the standards include; To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives, To avoid forced eviction and To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement Cost and (b) assisting displaced persons in their efforts to improve, or at least restore, their livelihoods and living standards, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher among other objectives	Not triggered as no land acquisition is required. The water pipeline is designed along Wangari Mathai nature trail / track within Karura Forest which is public land under KFS. AWWDA will apply for way leave permit from KFS prior to commencement of works on the section within the forest.
(ESS6) Biodiversity Conservation and Sustainable Management of Living Natural Resources	ESS6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development. The policy recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support. The policy objectives include among others include; to protect and conserve biodiversity and habitats and to apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity	Chapter 7 of this ESIA has discussed in detail potential risks that the Project could pose to Biophysical resources ranging from Water, Soil and Air and Biological resources including Fauna and Flora. Appropriate ranking has been determined and mitigation measures provided.
(ESS8) Cultural Heritage	ESS8 recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present and future.	The ESIA has provides chance find procedures to be adopted in the event

Standard	PROVISION	RELEVANCE TO THE PROJECT
	The policy objectives include; to protect cultural heritage from the adverse impacts of Project activities and support its preservation; to address cultural heritage as an integral aspect of sustainable development; to promote meaningful consultation with stakeholders regarding cultural heritage; to promote the equitable sharing of benefits from the use of cultural heritage.	such resources are encountered during Project construction phase.
(ESS10) Stakeholder Engagement and Information Disclosure	This ESS recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. The policy objectives provide for; To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties; To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance	The stakeholders of Karura forest reserve are numerous and broad ranged, but they are concluded to five groups: Government Institutions, Private Sector, Community Based Organization, Nairobi City County and Faith Based Organizations. Key stakeholders consulted during preparation of this report included (i) Friends of Karura Forest (ii) Kenya Forest Services and (iii) Deputy County Commissioner for Westlands Sub County.

5.6 ENVIRONMENTAL AND SOCIAL RISK MANAGEMENT POLICY FOR AFD-FUNDED OPERATIONS

The policy provides that any development operation may involve potentially adverse risks, particularly in terms of environmental and social impacts.

Consequently, AFD's financing is conditional upon the implementation by the client of continuous and systematic environmental and social assessment procedures to:

i) Assess the environmental and social impacts of operations
ii) Propose appropriate measures to avoid the negative impacts or, when they are unavoidable, reduce or offset them in an appropriate manner
iii) Monitor the application of such measures during the implementation phase of the operation
iv) Conduct an ex-post evaluation of the effectiveness of the proposed measures.

The systematic environmental and social assessment of operations aims to ensure that they are environmentally and socially sustainable, contribute to integrating environmental and social considerations into the decision-making process of all the stakeholders and provide a strong framework to manage financial and reputational risks run by AFD.

Further, the policy provides under ADF principles that the client is responsible for conducting the environmental and social assessment of its project. It mobilizes the expertise and environmental and social resources required at the various stages of the project implementation (feasibility, detailed design preparation, construction, operation, decommissioning) and contractually commits to respect the environmental and social performance targets agreed during the appraisal of the financing and set out in the financing agreement with AFD. The client monitors and documents the application of the environmental and social management measures during the implementation of the project activities. It also implements the preventive actions required to remove the potential causes of a failure and the remedial actions required when a failure is identified. It regularly informs AFD about this through periodic progress reports.

AFD assists the client in defining its environmental and social objectives and verifies their implementation throughout the project cycle. The Environmental and social impact assessment (ESIA) for the proposed Gigiri Reservoir to Karura Water Pipeline Section through Karura Forest has been prepared to conform to this principle.

6. STAKEHOLDER CONSULTATION

6.1 STAKEHOLDER CONSULTATIONS

Project stakeholders are defined as individuals, groups or other entities who: (i) are impacted or likely to be impacted directly or indirectly, positively or adversely, by the Project (also known as 'affected parties'); and (ii) may have an interest in the Project ('interested parties'). They include individuals or groups whose interests may be affected by the Project and who have the potential to influence the Project outcomes in any way.

The objectives of stakeholder consultations were as follows:

- To identify and map all relevant stakeholders, their context, interests and concerns
- To establish a two-way dialogue to understand concerns, management options and external perspectives
- To manage stakeholders' expectations
- To facilitate the collection of quality primary and secondary information relevant to the project processes including monitoring
- To triangulate data collected and analysis done to inform decision making
- To document information disclosed and public consultation efforts
- To comply with regulations and requirements on disclosure and consultation
- To provide information about the project and its potential impacts to those interested in or affected by the project and solicit their opinion in this regard
- To identify additional impacts/issues and possible mitigation measures
- To inform the process of developing appropriate mitigation measures and facilitate consideration of alternatives and trade-offs (if any)
- To reduce chances of conflict through early identification of contentious issues
- To ensure transparency and accountability of decision-making
- To increase public confidence in the project.

6.2 STAKEHOLDER AND PUBLIC PARTICIPATION SCHEDULE

The stakeholders of Karura forest reserve are numerous and broad ranged, but they are concluded to five groups: Government Institutions, Private Sector, Community Based Organization, Nairobi City County and Faith Based Organizations. Key stakeholders consulted during preparation of this report included

i) Friends of Karura Forest
ii) Kenya Forest Services
iii) Deputy County Commissioner for Westlands Sub County.

The schedule of consultations is summarized in **Table 6-1.**

Table 6-1: Schedule of Stakeholder Consultations

STAKEHOLDER	VENUE	DATE
Friends of Karura Forest	Friends of Karura Forest Offices	26th September 2022
Kenya Forest Services (KFS)	Kenya Forest Services (KFS) offices	26th September 2022
Deputy County Commissioner Westland Sub County	Deputy County Commissioner Westland Sub County offices	22nd August 2022
Njadhaini Sub Location	Njadhaini Shopping Centre	13th September 2022
Korogocho Location	Korogocho Chiefs Offices	14th September 2022
Kariobangi South Location	Mowlem Grounds	15th September 2022

Minutes of meetings for the above consultations are presented as **Appendix 2** to this Report.

Summary of issues of concerns presented by the stakeholders is summarized in **Table 6-2.**

Table 6-2: Stakeholders Concerns

STAKEHOLDER	RESOLUTIONS
Kenya Forest Services (KFS) and Friends of Karura Forest (FKF)	• AWWDA to formally apply for approval to lay the pipeline within Karura Forest. Application to be addressed to the Chief Conservator of Forest (CCF) • The application should clearly indicate the Scope of Works planned to be undertaken within the forest. • The application should include a clear Layout Plan and indicate the proposed pipeline route • The CCF will review the application and communicate the decision of KFS officially to AWWDA. • After approval is granted by KFS, AWWDA will undertake survey of the pipeline route. • After Survey works is completed, AWWDA will further apply through the CCF for approval or authority to commence pipeline construction. • This application will be reviewed and approval granted to AWWDA by KFS for construction works. This will be through a lease permit that will be renewed on an annual basis. • AWWDA will ensure that the proposed pipeline is restricted within existing track and the existing water pipeline easement, this approach will ensure that no tree is cleared along the easement. However, at the truncation, any trees that will be affected will be valued and cost included in the permit fees
Deputy County Commissioner Westland Sub County	• The office of County Commissioner supports AWWDA initiative of expanding water distribution networks within Nairobi • The office of County Commissioner is ready to assist AWWDA to mobilise any stakeholder consultations that might be required • Local administration would ask to be involved in any stakeholder workshops that might be organized by AWWDA with regards to the Project • The DCC office advises consultations with Kenya Forest Services (KFS) and Friends of Karura Forest (FKF) given that the study is focussed on pipeline section through the forest.
Public Barazas in Roysambu, Korogocho and Kariobangi	• Residents of these areas have continually experienced water shortage due to NCWSC water rationing program, they supported the project and viewed the project as a solution to water shortage problem in their respective areas • They further inquired about connection protocols which they were informed that NCWSC will guide them through the connection procedure including guiding them on tariff issues

7. ASSESSMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS

7.1 INTRODUCTION

This chapter presents the assessment of potential Environmental (physical, biological), Community Health & Safety and Social Impacts associated with the proposed water pipeline. Based on the impact assessment, mitigation for both construction and operation phases are specified with the goal to either avoid the impact, abate the impact at the source, minimize the impact at receptor and, if necessary, to offset the impact through compensation or other means. The impacts are assessed as presented below.

- **Physical Resources or Receptors**: The impacts assessed for are soils and water resources within Karura Forest.
- **Biological Resources and Receptors:** Impacts are assessed for flora and fauna within the forest that might be directly or indirectly impacted due to construction of the pipeline within the forest.
- **Social impacts**: Assessed based on community health and safety especially the visitors who come to the forest for hiking and adventure. Further, health and safety was assessed in relation to contractor's workers who will be employed to the Project.

7.2 CONSTRUCTION PHASE POSITIVE IMPACTS

Project positive impacts during construction phase are summarized below.

- **Employment Creation**: At construction stage workers will be deployed to help in construction and land reinstatement/restoration activities. This will include both skilled and unskilled personnel especially from the local population with approximately 100 direct and indirect jobs as referenced from similar contracts within Nairobi. .
- **Income/Revenue to Government**: Income to government will be realized in terms of taxes generated during the acquisition of relevant statutory licenses. Materials to be used during construction will also be taxable (16% VAT). Through revenues generated, the government will be capable of financing its responsibility to her citizens.
- **Income to Other Businesses**: During implementation of the Project, there will be need for transporters, suppliers of raw materials and other service providers, who will benefit from the proposed development.

7.3 OPERATION PHASE POSITIVE IMPACTS

Positive project impacts during operation phase are summarized below.

- Availability of water for domestic use: The Project will lead to increased water supply in the target areas thus reducing the perennial water shortages encountered in the Northern and Eastern parts of Nairobi.
- Reduction in poverty levels of many households as a result of the availability of reliable water for domestic use, households will therefore engage more time in other income generation streams.

- Employment opportunities will be created both to those working directly under the Project with the contractor and indirectly with AWWDA and NCWSC
- Improved public hygiene and sanitation due to improved availability of water.

7.4 CONSTRUCTION PHASE NEGATIVE IMPACTS

7.4.1 Impact on Biological Resources and Receptors

Baseline Information

The assessment identified that biological resources which present significant receptor along the proposed water pipeline within the forest are exotic and indigenous trees. From literature, the trees species based on the Importance Value Index within Karura Forest is summarized in **Table 7-1**.

Table 7-1: Karura Forest Based on the Importance Value Index (IVI

TREE SPECIES/SITE	FAMILY	IVI
Eucalyptus paniculata	Myrtaceae	91.32
Drypetes gerrardii	Putranjivaceae	24.35
Newtonia buchananii	Mimosoideae	19.02
Markhamia lutea	Bignoniaceae	16.77
Croton megalocarpus	Euphobiaceae	16.05
Teclea trichocarpa	Rutaceae	15.94
Cupressus Spp.	Cupressaceae	14.56
Araucaria heterophylla	Aruacariaceae	11.28
Xymalos monospora	Monimiaceae	9.59
Eucalyptus paniculata	Myrtaceae	8.28
Strychno smitis	Loganiaceae	8.28

Impact

The pipeline is designed along existing Wangari Mathai Track alongside an existing water pipeline wayleave within Karura Forest which is free from vegetation. The design provides that the new water pipeline will be laid on edge of the road between the existing pipeline and existing road track, this implies that no new route will be opened and no tree will be cut as the proposed pipeline will be laid within existing wayleave[5]. Therefore, the impact is assessed to be minimal as presented in **Table 7.2**.

Table 7.2: Pre-Mitigation Impact Assessment

IMPACT	FLORA AND VEGETATION DURING CONSTRUCTION			
Nature of Impact	Negative	Positive	Neutral	
	Disturbance to vegetation cover along the proposed water pipeline alignment within Karura Forest (along Wangari Mathai Track)			
Type of Impact	Direct	Indirect	Induced	
	Impact is as a result of a direct interaction between the Project and isolated cases of vegetation along the track.			
Duration of Impact	Temporal	Short term	Long term	Permanent
	The effect is considered permanent as the areas where vegetation will be removed along the water pipeline alignment as the wayleave will be permanently kept free of vegetation for maintenance purposes			
Impact Extend	Local	Regional	International	
	The impact will be limited to the water pipeline alignment along the track.			

[5] The arrangement is that the machinery will move along the existing track that is approximately 12m, storage of materials will be outside the forest,

IMPACT	FLORA AND VEGETATION DURING CONSTRUCTION				
Impact scale	The impact is considered as small (local) scale.				
Frequency	Once off				
Likelihood	Inevitable				
Impact magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above, the impact magnitude is considered small				
Resource / receptor sensitivity	Low	Medium	High		
	The works will not be constructed within disturbed or modified environment.				
Impact significance	Negligible	Minor	Moderate	Major	
	Considering that the impact magnitude is small and the sensitivity is low, the overall significance is considered to be minor.				

Mitigation

The following standard mitigation measures will be adopted.

- AWWDA will secure a wayleave permit from KFS, prior to issuance of the permit, KFS will value any trees that and likely to be affected and bill AWWDA alongside requisite permit fees that in cooperate both ecological and financial value of any tree that might be cut as a result of creating wayleave through the forest.
- The pipeline alignment to be confined to the existing Wangari Mathai track. However, in circumstances where a tree is to be cut, compensatory tree planting will be undertaken within a degraded area in the forest in Liaison with KFS and Friends of Karura Forest (FKF).
- Areas to be cleared shall be agreed endorsed by KFS and FKF before demarcation and clearance.
- The use of existing cleared or disturbed areas for the Contractor's office, stockpiling of materials etc. shall be encouraged.
- Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible.
- Rehabilitation of temporary construction sites and pioneer camps (if needed) should be done as swiftly as possible and always with suitable native grasses and other plants.
- Where necessary, new trees shall be planted to compensate for affected ones, the quantities and species will be determined and presented in the Constructtion Specific Management Plan (C-ESMP), Kenya forest Service and Friends of Karura will guide preparation of this site specific C-ESMP at construction stage.

7.4.2 Impact on Water Resources

Baseline Information

Five perennial tributaries of the Nairobi River pass through the forest running roughly west to east and cutting through gently undulating landscape. These are: Riuruaka, Karura, Gitathuru, Thigiri and Mathare River. Karura River valley offers a precarious and stunning descent through indigenous forest to the large waterfall and the Mau-Mau caves, (Friends of Karura Forest, 2014).

Impact

The rivers are not within close proximity to the proposed pipeline alignment. However, Karura and Ruiruaka rivers are within 500m from the alignment. The rivers might be indirectly impacted in the ways listed below.

- There might be indirect interaction in the case of erosion of soils into storm water drains that flow into Karura and Ruiruaka Rivers.

- Project related site activities such as excavations of pipeline trenches could result to loosening of soils that could result to sedimentation and siltation of storm water drainage channels and eventually flowing into Karura and Ruiruaka Rivers.
- There will be direct interaction from the abstraction of water from rivers for construction (e.g., for dust control).
- Un-serviced plant and equipment on site could result to oil and fuel leaks that could contaminate the water resources identified rivers and stream above.

Pre- Mitigation Impact Assessment is presented in **Table 7-3.**

Table 7-3: Pre-Mitigation Impact Assessment

IMPACT	SILTATION AND POLLUTION OF SURFACE WATERS RESOURCES				
Nature of Impact	Negative	Positive	Neutral		
	Eroded soil and leaked oils and fuels entering surface water bodies and indirectly into Karura and Ruiruaka Rivers				
Type of Impact	Direct	Indirect	Induced		
	Impact is as a result of a direct interaction between Project activities and the environment				
Duration of Impact	Temporal	Short term	Long term	Permanent	
	The impact is expected to be short term. However, in the case of serious erosion, the impacts of siltation of surface water may be experienced in the long term (into the operational phase).				
Impact Extent	Local	Regional	International		
	The impact will be limited to the water pipeline alignment.				
Impact scale	The impact is considered as small (local) scale.				
Frequency	Continuous				
Likelihood	Possible				
Impact magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above, the impact magnitude is considered small.				
Resource / receptor sensitivity	Low	Medium	High		
	The sensitivity of the (receptors) rivers and stream adjacent to construction works that result to Siltation and pollution is considered to be medium to low.				
Impact significance	Negligible	Minor	Moderate	Major	
	Considering the impact magnitude is small and the sensitivity is medium to low, the overall significance is considered to be minor.				

Water Resources Impact Mitigation

The following will be carried out to mitigate negative impacts to water resources:

- Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank
- Contractor shall prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to drainage channels
- Debris and other material will be prevented from entering watercourses
- Discharges to watercourses and water bodies will only be carried out under consent of the relevant governing bodies such as WRA.
- At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which shall include among others; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.

Residual Impact

The implementation of the proposed mitigation measures reduces the significance of the residual impact to negligible from minor within the receptors**.** **Table 7-4 on Page 41** presents residual impact significance following mitigation measures.

Table 7-4: Residual Impact Significance

IMPACT	PROJECT PHASE	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL IMPACT SIGNIFICANCE (POST-MITIGATION)
Availability and Quality of Water flowing through Karura and Ruiruaka Rivers	Construction	Minor	Negligible

7.4.3 Impact on Soil Resources

Baseline Information

Karura forest soil is usually very heavy, dark grey clay which stained black with un-decomposed humus, so-called 'black cotton' soil. Between 5 cm to 1 meter below the clay layer, a red-brown laterite occurs, a product of re-cementation that is rich in iron compounds and associated with swampy areas and a shifting water table. The forest soils are eminently suited to tree growth, except in the impeded drainage of swampy sites that provide natural edaphic grassy glades characteristic of Kenya's upland forests, (Friends of Karura Forest, 2014).

Potential Impacts

Project activities will have direct physical impacts to soil within the water pipeline alignment along Wangari Mathai Track. The impact to soil include erosion resulting from activities such as excavation and levelling works, clearing of vegetation for infrastructure such as access roads, laydown areas and construction zones among others.

If not properly restored or managed, such soils may erode and wash into nearby water resources identified as Karura and Ruiruaka Rivers thereby increasing the sediment load. Temporary soil stockpiles established during construction of infrastructure will be at risk of erosion from wind and rainfall. Soil contamination as a result of possible oil and fuel leaks from un-serviced plant and equipment on site. **Table 7-5** presents Pre- mitigation Impact Assessment.

Table 7-5: Mitigation Impact Assessment

IMPACT	SOIL EROSION DURING CONSTRUCTION				
Nature of Impact	Negative	Positive	Neutral		
	Loss of soil cohesion contributing to erosion.				
Type of Impact	Direct	Indirect	Induced		
	Impact results from direct interaction as a result of excavation of pipeline trenches				
Duration of Impact	Temporal	Short term	Long term	Permanent	
	The impact is expected to be short term. However, in the case of serious erosion, the impacts may be experienced long term.				
Impact Extend	Local	Regional	International		
	The impact will be limited to the footprint of the water pipeline alignment				
Impact scale	The impact is considered as small (local) scale.				
Frequency	Continuous				
Likelihood	Possible				
Impact magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered small.				
Resource / receptor sensitivity	Low	Medium	High		
	The sensitivity of seasonal streams and rivers identified to erosion is considered to be medium to low.				
Impact significance	Negligible	Minor	Moderate	Major	

	Considering the impact magnitude is small and the sensitivity is medium to low, the overall significance is considered to be minor

Mitigation

The following mitigation measures will be implemented to minimize the potential for soil erosion:

- Sheet and rill erosion of soil shall be prevented where necessary through the use of sandbags, diversion berms, culverts, or other physical means.
- Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height and shall be located away from drainage lines. The stockpiles shall be protected from rain and wind erosion and shall not be contaminated.
- Topsoil shall be evenly spread across the cleared areas when reinstated.
- Accelerated erosion from storm events during construction shall be minimized through managing storm water runoff (e.g. velocity control measures).
- Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile.
- Spread mulch generated from indigenous cleared vegetation across exposed soils after construction
- At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which shall include among others; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.

Residual Impact

The implementation of the proposed mitigation measures reduces the significance of the residual impact to negligible from minor within the project area. **Table 7-6** presents residual impact significance following mitigation measures.

Table 7-6: Residual Impact Significance

IMPACT	PROJECT PHASE	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL IMPACT SIGNIFICANCE (POST-MITIGATION)
Loss of soil resources due to erosion	Construction	Minor	Negligible

7.4.4 Air Quality

Potential Impacts

Project activities that have potential to impact air quality would be associated with construction from emissions of air pollutants from temporary power generators, construction equipment, and vehicles. Construction activities will also create dust.

The following would be expected during construction.

- Emissions of oxides of nitrogen (NO2 in particular) mainly from construction-related vehicles (and to a lesser degree from construction generators and other hydrocarbon powered equipment); and
- Dust and particulate matter (as PM10) created by construction-related vehicle traffic on unpaved roads.

After the sewer lines are built and operational and the site is reinstated, no significant effects on air quality are anticipated.

Impact Assessment

Exhaust Emissions

The numbers of Heavy-Duty Vehicles (HDV) and Light Duty Vehicles (LDVs) are expected to be well below the thresholds for potentially significant impacts. On this basis, the magnitude of impacts associated road traffic exhaust emissions are predicted to be Negligible. Combined with the Medium and Low receptor sensitivities identified, the overall significance of impacts is Negligible.

Dust and PM10

These are the potential for impacts expected to arise from; plant and equipment traffic on unpaved roads, trench excavation works and general construction activities. The Project will generate traffic on unpaved roads close to dwellings. As this is expected to be less than five HDVs/day, and at some locations for more than four weeks, the magnitude is medium.

The Project works will include stripping of pavements, excavation and backfilling of trenches, etc., during sewer pipe laying works. Due to the scale of these activities, the Magnitude is medium. On this basis there is a need for mitigation to be implemented to reduce dust emissions/ impacts as presented in Pre- Mitigation Impact Assessment in **Table 7-7.**

Table 7-7: Pre-Mitigation Impact Assessment

IMPACT	DEGRADATION OF THE AIR-SHED DURING CONSTRUCTION				
Nature of Impact	Negative	Positive	Neutral		
	Increase in airborne pollution.				
Type of Impact	Direct	Indirect	Induced		
	Impact is a result as a direct interaction between project activities and the environment along the sewer alignments.				
Duration of Impact	Temporal	Short term	Long term	Permanent	
	The impact is expected to be temporary as emissions arise throughout the construction phase				
Impact Extend	Local	Regional	International		
	The impact will be limited to the footprint along the proposed sewer alignments.				
Impact scale	The impact is considered as small (local) scale.				
Frequency	Intermittent – impacts will typically only arise during working hours				
Likelihood	Inevitable				
Impact magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered medium.				
Resource / receptor sensitivity	Low	Medium	High		
	The sensitivity of human receptors is Medium in dwellings and settlements				
Impact significance	Negligible	Minor	Moderate	Major	
	Dust emissions have the potential to have Moderate significant impacts at nearby sensitive human receptors.				

Mitigation

Exhaust Emissions

No mitigation is required. We assume that the Project will use only vehicles that are operated and maintained according to manufacturer specifications as provided in the ESMP.

Dust and PM10

The impact assessment identified minor impacts associated with plant and equipment traffic on unpaved roads and pavements along sewer alignment corridors. The following mitigations are therefore recommended to manage these impacts.

As general measures for all locations:

- Develop a Dust Management Plan (DMP) and record all dust and air quality complaints, identify cause(s), take appropriate measures;
- Liaise with local communities to forewarn of potentially dusty activities;
- Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring as parameter
- Undertake inspections to ensure compliance with the Dust Management Plan;
- Plan potentially dusty activities so that these are located as far from receptors as feasible;
- Erect solid screens if feasible around stockpiles and concrete batching;
- Avoid run off of mud and water and maintain drains in a clean state;
- Remove dusty materials form site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible;
- Impose speed limits on haul routes and in construction compounds to reduce dust generation;
- Minimize drop heights when loading stockpiles or transferring materials; and
- Avoid waste or vegetation burning.

For traffic on unpaved roads and pavements:

- 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; and

For excavations and levelling works

- Revegetate exposed areas as soon as feasible;
- Revegetate or cover stockpiles if feasible;
- Expose the minimum area required for the works, and undertake; and exposure on a staged basis to minimize dust blow.

Residual Impact

The residual impacts associated with road traffic exhaust emissions are Negligible.

With the implementation of suitable mitigation and with adequate monitoring, residual impacts associated with dust and PM_{10} from construction activities are Negligible as presented in **Table 7-8**.

Table 7-8: Residual Impact Significance

IMPACT	PROJECT PHASE	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL IMPACT SIGNIFICANCE (POST-MITIGATION)
Road Traffic Exhaust Emissions	Construction	Negligible	Negligible
Dust and PM from construction activities	Construction	Moderate	Negligible

7.4.5 Noise and Vibration

Potential Impact

Potential noise impacts may arise as a result of the construction activities associated with the construction of the protection works.

Construction activities and equipment are not expected to result in significant levels of vibration. Therefore, equipment that might produce high levels of vibration (such as impact piling or vibratory compaction) will not be used. Therefore, vibration effects have been scoped out of further assessment.

The Project will not be associated with deep excavation or rock breaking that result to excessive vibrations resulting from equipment's such as rock drillers. Therefore, risk related to the works will be limited to occupational health and safety scope. World Bank Group General EHS Guidelines provide guidance on acceptable noise levels based on WHO standards and these are set out in **Table 7-9**.

Table 7-9: World Bank Group Noise Level Guidelines

	MAXIMUM ALLOWABLE AMBIENT NOISE LEVELS, LAEQ,1HR, DBA FREE FIELD	
	DAYTIME	NIGHT-TIME
	07:00 – 22:00	22:00 – 07:00
Residential, institutional, educational	55	45
Industrial, commercial	70	70

National Environment Management Authority (NEMA) noise levels, maximum permissible noise levels for construction sites (Measurement taken within the facility) are shown **Table 7-10**.

Table 7-10: NEMA Noise Level Guidelines

SITE	DAY	NIGHT
Health facilities, educational institutions, homes for disabled	60dBA	35dBA
Residential	60dBA	35dBA
Other areas	75dBA	65dBA

The equipment and plant used during construction will generate noise during construction activities that might affect communities living and working near to the works. However, this impact will not be significant. Pre mitigation Impact Assessment is presented in **Table 7-11.**

Table 7-11: Pre-Mitigation Impact Assessment

IMPACT	NOISE DURING CONSTRUCTION				
Nature of Impact	Negative	Positive	Neutral		
	Elevated noise levels from operation of construction equipment.				
Type of Impact	Direct	Indirect	Induced		
	Impact is a result of noise generated by construction activities.				
Duration of Impact	Temporal	Short term	Long term	Permanent	
	Impacts are expected to be short term				
Impact Extend	Local	Regional	International		
	The impact will be limited to the footprint of the Project along the sewer alignment corridor.				
Impact scale	The impact is considered as small (local) scale.				
Frequency	Impacts may occur during daytime periods over a short term.				
Likelihood	Inevitable				
Impact magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered negligible to small.				
Resource / receptor sensitivity	Low	Medium	High		
	Dwellings are considered to have a high sensitivity to noise				
Impact significance	Negligible	Minor	Moderate	Major	
	Considering the impact magnitude is small to negligible and the sensitivity is high, the overall significance is considered to be minor.				

Mitigation

Mitigation measures are set out below, which have been assumed for the base case assessment. They are assumed to result in a 5 dB (A) reduction in the overall noise from construction plant teams.

The following standard mitigation measures will be employed

- Siting noisy plant and equipment as far away as possible from human settlement, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable.
- Where practicable noisy equipment will be orientated to face away from the nearest human settlement and other receptors;
- Working hours for significant noise generating construction work (including works required to upgrade existing access roads), will be daytime only.
- Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable.
- Where practicable, stationary equipment will be located in an acoustically treated enclosure.
- For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals;
- Throttle settings will be reduced and equipment and plant turned off, when not being used;
- Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and fitting of mufflers or silencers of the type recommended by manufacturers.

Residual Impact

Standard mitigation measures listed above have been assumed for the base case noise assessment. No impacts above small are predicted and therefore no further mitigation is required. Consequently, the residual impacts are the same as those presented above. Residual Impact Significance is presented in **Table 7-12**.

Table 7-12: Residual Impact Significance

IMPACT	PROJECT PHASE	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL IMPACT SIGNIFICANCE (POST-MITIGATION)
Noise from construction activities affecting nearby dwellings	Construction	Minor	Negligible

7.4.6 Community Health Safety and Security

Baseline Information

Karura forest is a general public space for residence to enjoy a green nature which apart from a very crowded Nairobi city contains important historical and cultural places of Kenya such as 50 feet waterfall and the Mau Mau caves that were used by the Mau Mau during the battle for independence. Karura Forest is now developed as a visitor's attraction for both local and international visitors, with more than 16,000 entries per month.

Some of the developed visitor's attraction sites within Karura Forest includes creation of some 50km of nature trails for walking, running and biking. The first trail, which is four kilometres long connects Limuru Road with Old Kiambu Road was opened in May 2009. This information implies that ecotourism activities

and adventure activities within the forest are significant. Such activities attract significant number of people who could be exposed to health and safety hazards related to excavation and laying of the proposed water pipeline along the Wangari Mathai Track as discussed.

Impact Assessment

The pipeline gets into Karura forest from Gigiri Estate through Wispers avenue. It is designed to be laid along a footpath leading towards Prof. Wangari Mathai Corner, joins Karura Footpath (Wangari Mathai Track) and finally exits the forest near Gate 'C' that is along Kiambu road.

The impact will be associated with increased traffic movements of heavy machinery and light vehicles on roads within the project area during pipeline construction. This will include, pipeline delivery trucks, cement trucks, transport of construction material, excavation machinery, etc. which is expected to increase the risk of accidents to community members undertaking activities within the forest. Pre-mitigation Impact Assessment is presented in **Table 7-13**.

Table 7-13: Pre-Mitigation Impact Assessment

IMPACT	COMMUNITY SAFETY AND ENVIRONMENT HEALTH				
Nature of Impact	Negative	Positive	Neutral		
	As a result of risks posed by construction activities within the forest				
Type of Impact	Direct	Indirect	Induced		
	Impact that result from a direct interaction between the Project and community members in the forest including tourists				
Duration of Impact	Temporal	Short term	Long term	Permanent	
	The increased traffic effect and risks to injuries is temporary, as construction activities will take place in a sequential manner during the length of the construction period				
Impact Extend	Local	Regional	International		
	The impact will be limited to community members permitted to be in the forest either on adventure or jogging along the tracks				
Impact scale	The impact is considered as small (local) scale.				
Frequency	The frequency is considered to be occasional or one time at each temporary over the duration of the construction phase.				
Likelihood	Inevitable				
Impact magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered negligible to small.				
Resource / receptor sensitivity	Low	Medium	High		
	The sensitivity of the receptors (Community members in the Forest on hike, adventure or jogging) is considered medium.				
Impact significance	Negligible	Minor	Moderate	Major	
	Considering the magnitude and sensitivity are medium, the impact on the community safety during construction activities is considered to be of moderate significance.				

Mitigation

The following mitigation measures will be implemented during the construction phase to reduce any impacts on community health and safety.

- The contractor shall barricade working area karura forest users will be appropriately advised on alternative trail to use, appropriate signature will be provided.
- Noise abetment measures will be implemented as discussed in section (7.4.5) of this report.
- The contractor will ensure that there is full exclusion between worksite and communities / users, and provide adequate safety signages communication of alternative trails and routes to use.

- Contractor will develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals.
- Contractor will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including subcontractors and truck drivers as part of the induction process.
- Contractor will provide primary health care and first aid at construction site to avoid pressure on local healthcare infrastructures.
- Contractor will implement a Community Grievance Mechanism.
- At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which included among other; Health, Hygiene and Safety Plan, Labour Management Plan and Gender-based Violence Action Plan

Residual Impact

The significance of the residual impacts on community health and safety after the implementation of mitigation measures is presented in **Table 7-14.**

Table 7-14: Residual Impact Significance

IMPACT	PROJECT PHASE	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL IMPACT SIGNIFICANCE (POST-MITIGATION)
Safety risks to community members permitted to be in the forest either on adventure or jogging along the tracks	Construction	Moderate	Minor

7.4.7 Construction Workers Health and Safety

Potential Impacts

Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working conditions. The Project could potentially lead to workforce-related social and health issues throughout the life cycle of the Project if worker management and rights do not meet Kenyan law or international best practice. Also, equipment and plant on site may trigger accidents in the absence of adherence to plant and equipment management plan. The impacts are as presented below.

- Impacts on workers' health and safety, in particular from road accidents, slip, and trip and falls hazards during trench excavations and inconsistent use of PPEs.
- Impacts on workers' rights from violations of labour laws in particular with respect to enforcement of health and safety measures by the employer such as the use of appropriate PPEs during construction of the proposed works

Pre mitigation Impact Assessment is presented in **Table 7-15**.

Table 7-15: Pre-Mitigation Impact Assessment

IMPACT	WORKERS HEALTH AND SAFETY AND RIGHTS DURING CONSTRUCTION			
Nature of Impact	Negative	Positive	Neutral	
	Poor planning, non-compliance with health and safety best practice and labour rights can result in injuries or fatalities			
Type of Impact	Direct	Indirect	Induced	
	Impact that result from construction activities on site			
	Temporal	Short term	Long term	Permanent

Duration of Impact	Injuries and fatalities could have permanent impacts on workers and their families.				
Impact Extend	Local	Regional	International		
	The workforce will be primarily contracted from local market				
Impact scale	Workers will be working on different sections of the line at different times. The impact scale is therefore medium.				
Frequency	The frequency is considered to be infrequent as the workforce and drivers are expected to be trained and the employer is expected to enforce the use of PPEs and health and safety measures.				
Likelihood	Inevitable				
Impact magnitude	Positive	Negligible	Small	Medium	Large
	Based on the parameters above, and considering the embedded measures in place the magnitude is considered to be medium				
Resource / receptor sensitivity	Low	Medium	High		
	The sensitivity of the receptors is considered medium as some workers may not be aware of their rights.				
Impact significance	Negligible	Minor	Moderate	Major	
	Since the magnitude is considered medium and sensitivity is medium, the impact on workers' health and safety during construction activities is considered to be of moderate significance				

Mitigation Measures

The following mitigation measures will be implemented during the construction phase to reduce any impacts on workers' health and safety and labour rights[6].

- Contractor will develop a Human Resources Policy, which will outline workers' rights to be included in all contracts including restrictions on working hours in line with applicable International Labour Organization (ILO) standards, compensation including consideration of overtime, holidays etc. Contractor will require his subcontractors to put in place policies in line with national legislation and applicable international legislation and contractor Code of Conduct and Policies.
- Contractor will establish contractual clauses to be embedded in the contracts of all sub-contractors that require adherence to Kenyan law and international standards to be upheld related to worker rights.
- 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.
- Contractor and self-employed contractors will assess the H&S risks related with the tasks to be performed during the construction phase.
- Pre-employment medical assessments will be put in place as a workforce risk management tool to screen individuals for risk factors that may limit their ability to perform a job safely and effectively. Expected benefits of conducting pre-employment medical assessments include a safer working environment, reduction in workplace injuries, minimized downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction.
- 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.
- Contractor will implement regular health and safety checks and audits of workers, and subcontractors and implementing sanctions in case of breaches of national standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards.

[6] The ESIA provides for preparation of stand-alone SH-GBV and SEAH Plan will be prepared as part of the ESMP, this plan will in cooperated project specific measures as indicated

- Contractor will develop and implement a Workers Grievance Redress Mechanism for the Project workforce including workers and subcontractors.
- Contractor will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks.
- Contractor will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents.
- Contractor will ensure that his 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.
- Contractor will ensure that World Bank Health and Safety guidelines regarding the construction and management of worker accommodation and the provisions of medical facilities at worker accommodation are followed.
- Contractor will ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation.
- Contractor will develop and implement a Traffic Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations.
- Contractor will develop a Waste Management Plan during the construction phase with clear guidelines for the safe storage and disposal of hazardous waste and handling of hazardous materials.

Residual Impacts

With the implementation of mitigation measures the remaining impact significance is considered minor. Residual Impact Significance is presented in **Table 7-16**.

Table 7-16: Residual Impact Significance

IMPACT	PROJECT PHASE	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL IMPACT SIGNIFICANCE (POST-MITIGATION)
Worker health and safety	Construction	Moderate	Minor
Worker labour rights	Construction	Moderate	Minor

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMP)

8.1 PURPOSE AND OBJECTIVES OF ESMP

The specific objectives of the ESMP are to:

- Serve as a commitment and reference for the Contractor to implement the ESMP including conditions of approval by NEMA.
- Serve as a guiding document for the environmental and social monitoring activities during construction and operation of the Water Transmission Pipeline.
- Provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment, health and safety of workers and community.
- Provide instructions to relevant project personnel regarding procedures for protecting the environment and minimizing environmental effects, thereby supporting the operator's goal of minimal or zero incidents.
- Document environmental concerns and appropriate protection measures while ensuring that appropriate actions are completed promptly.

The Environmental, Social Management and Monitoring Plan (ESMP) prepared for Water Transmission Pipeline within Karura Forest is presented in **Table 8-1**.

Table 8-1: Environment and Social Management Monitoring Plan at Construction Stage

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
Impacts on Trees (Exotic and indigenous) along the Water Pipeline Alignment within the forest	Minimal stripping of trees along the proposed water pipeline alignment, this is so because the design provides that the new water pipeline will be laid on edge of the road between the existing pipeline and existing road track. This implies that no new route will be opened and no tree will be fell, the proposed pipeline will be laid with an existing water pipeline wayleave. The impact is therefore assessed to be minimal.	• AWWDA will secure a wayleave permit from KFS. Prior to issuance of the permit, KFS will value any trees that are likely to be affected and bill AWWDA alongside requisite permit fees. • The pipeline alignment to be confined to the existing Wangari Mathai track. However, in circumstances where a tree is to be cut, compensatory tree planting will be undertaken within a degraded area in the forest in Liaison with KFS and Friends of Karura Forest (FKF). • Areas to be cleared shall be agreed upon by KFS and FKF before demarcation and clearance. • Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible.	AWWDA	tree species and numbers cut tree species and numbers re-planted as part of compensation measures Trees nurturing report on survival and replacements done during 6 months monitoring of the re-planted trees	Preliminary Sum of Kshs 500,000 to be allowed for tree planting and nurturing by KFS and FKF
Impacts on Water Resources	The rivers are not within close proximity to the proposed pipeline alignment. However Karura and Ruiruaka rivers are within 500m from the pipeline alignment. The rivers might be indirectly impacted by silt and sediments from construction site.	• Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank • Contractor shall prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to drainage channels • Debris and other material will be prevented from entering watercourses • Discharges to watercourses and water bodies will only be carried out under consent of the relevant governing bodies such as WRA. • At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which shall include among others; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.	AWWDA	State of the Karura and Ruiruaka rivers with regards to sediment load associated with the Project Turbidity state of water flowing though Karura and Ruiruaka streams, as provided by water quality regulations of 2006, parameters to be checked will include; pH, colour, turbidity, Total Suspended Solids, Total Dissolved Solids among others,	Preliminary Sum of Kshs 500,000 to be allowed for Water Resources Management

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
Impacts on Soil Resources	Karura forest soil is usually very heavy, dark grey clay which stained black with un-decomposed humus, so-called 'black cotton' soil. Project activities will have direct physical impacts to soil within the pipeline alignment along Wangari Mathai Track. The impact to soil include erosion resulting from activities such as excavation and levelling works, clearing of vegetation for infrastructure such as access roads, laydown areas and construction zones among others	• Sheet and rill erosion of soil shall be prevented where necessary through the use of sandbags, diversion berms, culverts, or other physical means. • Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated. • Topsoil shall be evenly spread across the cleared areas after reinstatement. • Accelerated erosion from storm events during construction shall be minimized through managing storm water runoff (e.g., velocity control measures). • Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile. • Spread mulch generated from indigenous cleared vegetation across exposed soils after construction. • At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which shall include among others; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.	AWWDA	State of the Karura and Ruiruaka rivers with regards to sediment load associated with the Project	Preliminary Sum of Kshs 250,000 to be allowed for Soil Resources Management
Community Health Safety and Security Impacts to Hikers, Joggers, tourists in the forest	Karura forest is a general public space for residence to enjoy a green nature. During construction, there will be an increase in traffic movements of heavy machinery and light vehicles on roads within the project area. This will include, pipeline delivery trucks, cement trucks, transport of construction material, excavation machinery, etc. The increases traffic is expected to increase the risk	• Contractor will develop and monitor the implementation of a Community Health and Safety Management Plan (CHSMP) • Contractor will develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals. • Contractor will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including drivers as part of the induction process. • Contractor will provide primary health care and first aid	AWWDA	• The number of incidences recorded on site and within communities around the forest. • Reported and addressed grievances on site and from communities.	Preliminary Sum of Kshs 250,000 to allowed for addressing safety of community members within the forest

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
	accidents to community members undertaking activities within the forest	at construction office sites to avoid pressure on local healthcare infrastructures. ● Contractor will implement a Community Grievance Mechanism. ● Contractor will develop and implement a Traffic Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations.			
Impacts on Air Quality	● Emissions of oxides of nitrogen (NO_2 in particular) mainly from construction-related vehicles (and to a lesser degree from construction generators and other hydrocarbon powered equipment); and Dust and particulate matter (as PM_{10}) created by construction-related vehicle traffic on unpaved roads.	**As general measures for all locations:** ● Develop a Dust Management Plan (DMP); ● Record all dust and air quality complaints, identify cause(s), take appropriate measures; ● Liaise with local communities to forewarn of potentially dusty activities; ● Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring as parameter ● Undertake inspections to ensure compliance with the Dust Management Plan; ● Plan potentially dusty activities so that these are located as far from receptors as feasible; ● Erect solid screens if feasible around stockpiles and concrete batching; ● Avoid run off of mud and water and maintain drains in a clean state; ● Remove dusty materials form site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible; ● Impose speed limits on haul routes and in construction compounds to reduce dust generation; ● Minimize drop heights when loading stockpiles or transferring materials; and	Contractor	● Compliance level Dust Management Plan ● Services and inspection reports of plant and equipment ● Air quality monitoring report findings ● Number of complaints from community related to dust menace	Preliminary Sum of Kshs 500,000 to be allowed for air pollution control

<table>
<tr><th>RISK</th><th>ANTICIPATED IMPACT</th><th>MITIGATION</th><th>RESPONSIBILITY</th><th>MONITORING PARAMETER</th><th>BUDGET (Kshs.)</th></tr>
<tr><td></td><td></td><td>● Avoid waste or vegetation burning.
● For traffic on unpaved roads:
● 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.
For excavations and levelling
● Revegetate exposed areas as soon as feasible;
● Revegetate or cover stockpiles if feasible;
● Expose the minimum area required for the works, and undertake; and exposure on a staged basis to minimize dust blow.</td><td></td><td></td><td></td></tr>
<tr><td>Noise and Vibrations Impacts</td><td>Construction activities and equipment are not expected to result in significant levels of vibration. Equipment that might high levels of vibration (such as impact piling or vibratory compaction) will not be used</td><td>● Siting noisy plant and equipment as far away as possible from human settlement, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable;
● Where practicable noisy equipment will be orientated to face away from the nearest Human settlement and other receptors;
● Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only;
● Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable;
● Where practicable, stationary equipment will be located in an acoustically treated enclosure;
● For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals;
● Throttle settings will be reduced and equipment and plant turned off, when not being used;
● Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and fitting of mufflers or</td><td>Contractor</td><td>● Serviced plant and equipment to manufacturers specification
● Monitoring reports of noise and vibration as provided noise regulation 2010

<table><tr><th>SITE</th><th>DAY</th><th>NIGHT</th></tr><tr><td>Health facilities, educational institutions, homes for disabled</td><td>60dBA</td><td>35dBA</td></tr><tr><td>Residential</td><td>60dBA</td><td>35dBA</td></tr><tr><td>Other areas</td><td>75dBA</td><td>65dBA</td></tr></table></td><td>Best Management practices with no direct cost</td></tr>
</table>

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		silencers of the type recommended by manufacturers.			
Workers Health, Safety and Security Impacts	The Project could potentially lead to workforce-related social and health issues throughout the life cycle of the Project if worker management and rights do not meet Kenyan law or international best practice. Also, equipment and plant on site may trigger accidents in the absence of adherence to plant and equipment management plan.	• 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. • Contractor will implement regular health and safety checks and audits of workers, and subcontractors and implementing sanctions in case of breaches of national standards and the Project's specific standards. • Contractor will develop and implement a Workers Grievance Redress Mechanism for the Project workforce including workers and subcontractors. • Contractor will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. • Contractor will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. • 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.	AWWDA	• Level of compliance to statutory requirements with regards to Health and safety • The number of incidences recorded on site by contractors' workers • Reported and addressed grievances on site by workers • Number of workers trained on health and safety • Number and state of PPEs provided to workers • Level of involvement of Health and Safety Committee on daily site activities • H&S reports that inclue near miss, incident, first-aid injuries, lost time injuries, fatalities) and an analysis of their rates (LTIFR	Preliminary Sum of Kshs 250,000 to allowed for addressing safety of workers on the Project
				Sub Total ESMP	**1,750,000.00**

9 FINDINGS AND PROVISIONS

9.1 FINDINGS

The ESIA findings associated with proposed construction of the Gigiri – Karura – Outer Ring Road Water Transmission Pipeline Section through Karura Forest is presented below.

- Athi Water Works Development Agency (AWWDA) prepared an Environment and Social Impact Assessment for Gigiri Water Reservoir to Karura Water Pipeline and associated works including installation of bulk meters, control valves, water storage facilities, reservoirs, repair and replacement of pipelines and laying of new water pipelines. The ESIA was approved and an Environment License No NEMA/EIA/PSL/7512 was issued on 7th of March 2019.
- Karura forest reserve is located in the northern part of Nairobi city, Capital city of Kenya. By the area of 1,041.3 hectares, it is one of the largest urban gazette forests in the world (3). The forest comprises of two blocks which are Karura (765.9 hectares) and Sigiria (275.4 hectares). The Reserve was originally gazette in 1932 and then in 1964 it became a Central Government Forest Reserve. The management of the forest is due to Kenya Forest Service under the Forest Act of 2005 now repealed by Forest Management and Conservation Act of 2016.
- A section (3.1km) of Gigiri – Karura – Outer Ring Road Water Transmission Pipeline traverses the forest along Prof. Wangari Mathai Nature Trail. Considering the sensitivity of Karura Forest as a gazetted ecosystem, the ESIA prepared and licensed (NEMA/EIA/PSL/7512) for the Project was not explicit on Project potential impacts and applicable mitigation measures.
- *M/S Artelia / MIBP* in May 2023 prepared a Comprehensive Project Report (CPR) that focussed on potential environment and Social Impacts likely to be triggered by the pipeline section through the forest. The report also provided appropriate mitigation measures that will be implemented by AWWDA during pipeline construction and operation through the forest. However, NEMA reviewed and report and recommended the report to be upgraded into a Study. Consequently, Terms of Reference was prepared and approved as presented under (Appendix 1)
- The assessment identified that biological resources which present significant receptor along the proposed water pipeline within the forest are exotic and indigenous trees. From literature, the trees species based on the Importance Value Index within Karura Forest include: *Eucalyptus paniculata, Drypetes gerrardii, Newtonia buchananii, Markhamia lutea, Croton megalocarpus, Teclea trichocarpa, Cupressus Spp, Araucaria heterophylla, Xymalos monospora, Eucalyptus paniculata and Strychno smitis.*
- The pipeline is designed along existing Wangari Mathai Track alongside and existing water pipeline wayleave within Karura Forest which is free from vegetation. The design provides that the new water pipeline will be laid on edge of the road between the existing pipeline and existing road track, this implies that no new route will be opened and that the proposed pipeline will be laid on existing wayleave.
- There are five perennial tributaries of the Nairobi River that passes through Karura forest running roughly west to east and cutting through gently undulating landscape. These are: Ruiruaka, Karura, Gitathuru, Thigiri and Mathare Rivers. Karura River valley offers a precarious and stunning descent through indigenous forest to the large waterfall and the Mau-Mau caves, (Friends of Karura Forest, 2014). The rivers are not within close proximity to the proposed pipeline alignment however Karura and Ruiruaka rivers are within 500m from the alignment. There might be indirect interaction in the case of erosion of soils into storm water drains that flow into Karura and Ruiruaka Rivers.
- AWWDA will secure a wayleave permit from Kenya Forest Services (KFS). Prior to issuance of the permit, KFS will value any trees that are likely to be affected and bill AWWDA alongside requisite permit fees.

Nairobi Water and Sewerage Company (NCWSC) will be responsible for annual payments to KFS for lease of the pipeline through Karura Forest.

9.2 PROVISIONS

The ESIA Make Provisions Listed below

- The Environment and Social Management Plan (ESMP) prepared under this ESIA assessment provides a budget of **Kenya Shillings One Million, Seven Hundred Fifty Thousand (Kshs 1,750,000.00)** for mitigation of environment and social impacts identified in this Report. The Bid Documents to be prepared for the project should incorporates the Environment, Social provisions discussed under Chapter 7 (Environment and Social Impact Assessment and Mitigation Measures).
- Project Contract Document to include provisions for the contractor to prepare and implement Construction Environment and Social Management Plan (C-EMSP). Annexes to the C-EMSP will include but not limited to: Soil and Sedimentation Control Plan, Spoil Management Control Plan, Dust Management Plan, Health, Hygiene and Safety Plan, Labour Management Plan, Child Protection Strategy, Gender-based Violence Action Plan, Waste Management Plan, Contractors Code of Conduct, Gender Inclusivity Strategy , HIV/Aid Prevention Strategy. The contractors will be required to engage services of a qualified Environment, Health and Safety Officers and Social Safeguards Officer at the time of Project implementation.
- At Project implementation stage, the contractor with approval of the supervising engineer will prepare periodic Environmental and Social Implementation Report. The reports will provide status of implementation of risks & impacts management measures to date from the project start to the end of the reporting period. From an Occupational Health and Safety approach, the contractors will ensure they undergo the following; OSH risk assessment, Registration of workplaces, Safety and Health (OSH) Audit, Fitness to work assessment of employees, Training of all workers or workers' representatives in basic Occupational Safety and Health, Accident and incident reporting, Compensation of injured workers who die or get injured and disabled and Examination of Safety Plants and Equipment.
- At Project completion stage, within the Defects Liability Period, Athi Water Works Development Agency (AWWDA) will initiate an Initial Environment and Social Audit for the Project as required by EIA/EA Audit Regulations of the year 2003 and subsequent annual self-audits. The Audit will develop an Environment and Social Audit Action Plan (ESAAP) that will be used to track Project Environment and Social Compliance during Operations Stage

APPENDICES

APPENDIX 1

TERMS OF REFERENCE APPROVAL NEMA/TOR/5/2/592

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Telcom Wireless: 020-2183718, 020-2101370
Mobile Line: 0724 253 398, 0723 363 010, 0735 013 046
Incident Line: 0786 101 100, 0741 101 100

P.O. Box 67839 - (00200)
Popo Road, Nairobi, Kenya
Email: dgnema@nema.go.ke
Website: www.nema.go.ke

REF: NEMA/TOR/5/2/592

27th June, 2023

Managing Director,
Athi Water Works Development Agency,
Athi Water Plaza,
Muthaiga North Road, Off Kiambu Road,
P.O Box 45283-00100,
NAIROBI

RE: TERMS OF REFERENCE (TOR) FOR ENVIROMENTAL IMPACT ASSESSMENT FOR THE PROPOSED WATER TRANSMISSION PIPELINE FROM GIGIRI RESERVOIR TO KARURA RESERVOIR THROUGH KARURA FOREST.

We acknowledge the receipt of your TOR for the above subject.

Pursuant to the Environmental Management and Coordination Act, 1999, the Environmental (Impact Assessment and Audit) Regulations 2003 and Legal notice 31 & 32 of 2019, your terms of reference for the Environmental and Social Impact Assessment (EIA **FOR THE PROPOSED WATER TRANSMISSION PIPELINE FROM GIGIRI RESERVOIR TO KARURA RESERVOIR THROUGH KARURA FOREST** has been approved on condition that you shall develop and implement a comprehensive stakeholder engagement plan.

You shall submit ten (10) copies of the study report, upon payment of the applicable EIA processing and monitoring fees being 0.1% of the total project cost, a soft copy of the summarised ESMP in **WORD** format for preparation of public notice and one electronic copy of the report prepared by the team of experts to the Authority.

JOSEPH MAKAU
For: DIRECTOR GENERAL

Our Environment, Our Life, Our Responsibility

APPENDIX 2

ENVIRONMENTAL IMPACT ASSESSMENT LICENSE NUMBER NEMA/EIA/PSL/7512

nema

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

License No: **NEMA/EIA/PSL/7512**
Application Reference No: **NEMA/EIA/PSR/9954**

This is to certify that the Environmental Impact Assessment Project Report received from
Athi Water Services Board.
P. O. Box 45283 - 00100, Nairobi.
submitted to the National Environment Management Authority in accordance with the Environmental Impact Assessment & Audit Regulations, 2003 regarding the:
Proposed Nairobi Water Distribution Project.
whose objective is to carry on
Construction of the Gigiri-Karura water pipeline distribution comprising installation of bulk metres, controll valves, water storage facilities, reservoirs, repair and replacement of pipes, laying of pipes and associated works.
located at
Nairobi County.
has been reviewed and a license is hereby issued for the implementation of the project, subject to attached conditions.

Issue date : **07 March, 2019**

Signature
(seal)
Director-General
The National Environment
Management Authority.

P.T.O.

ISO 9001: 2008 Certified

1.0 General Conditions

1.1 This project is for the construction of the Gigiri-Karura water pipeline distribution comprising installation of bulk metres, control valves, water storage facilities, reservoirs, repair and replacement of pipes, laying of pipes and associated works in Nairobi County.

1.2 The license shall be valid for **24 months** from the date of issue (time within which the project should commence).

1.3 The Director General shall be notified of any transfer, variation or surrender of the license.

1.4 Without prejudice to the other conditions of this license, the proponent shall implement and maintain an environmental management system, organizational structure and allocate resources that are sufficient to achieve compliance with the requirements and conditions of this license.

1.5 The Authority shall take appropriate action against the proponent in the event of breach of any of the conditions stated herein or any contravention to the Environmental Management and Coordination Act, Cap 387 and regulations therein.

1.6 This license shall not be taken as statutory defence against charges of pollution in respect of any manner of pollution not specified herein.

1.7 The proponent shall ensure that records on conditions of licenses/approval and project monitoring and evaluation shall be kept on the project site for inspection by NEMA's Environmental Inspectors.

1.8 The proponent shall submit an Environmental Audit report in the first year of occupation/operations/commissioning to confirm the efficacy and adequacy of the Environmental Management Plan.

1.9 The proponent shall provide the final project accounts (final project costs) on completion of construction phase. This should be done prior to project commissioning/operation/occupation.

1.10 The proponent shall comply with NEMA's improvement orders throughout the project cycle.

2.0 Construction Conditions

2.1 The proponent shall obtain the requisite approvals from the County Government of Nairobi, Kenya Forest Service, Water Resources Authority, Kenya National Highways Authority, and all other relevant Authorities prior to commencement of works.

2.2 The proponent shall put up a project signboard as per the Ministry of Transport and Infrastructure standards showing the NEMA EIA license number among other details.

2.3 The proponent shall ensure that all excavated material and debris is collected, re-used and where need be, disposed off as per the Environmental Management and Coordination (Waste Management) Regulations of 2006.

2.4 The proponent shall seek necessary authorization from the Water Resources Authority to lay the pipeline, prior to commencement of works.

2.5 The proponent shall ensure strict adherence to the provisions of Environmental Management and Coordination (Noise and Excessive Vibrations Pollution Control) Regulations of 2009.

2.6 The proponent shall ensure strict adherence to the Occupational Safety and Health Act (OSHA), 2007.

2.7 The proponent shall ensure relocation, compensation and restoration of livelihoods for any project affected persons (PAPs) and develop a consultative plan for emerging issues and grievance redress mechanisms (GRM) as shall be prescribed in the Resettlement Action Plan (RAP).

2.8 The proponent shall ensure that workers are provided with adequate personal protection equipment (PPE), sanitary facilities as well as adequate training.

2.9 The proponent shall ensure strict adherence to the provisions of the National Construction Act of 2011.

2.10 The proponent shall ensure strict adherence to the provisions of the Environmental Management and Coordination (Air Quality) Regulations of 2014.

2.11 The proponent shall ensure that no excavated debris or other forms of wastes are disposed off or deposited in the rivers.

2.12 The proponent shall ensure that construction activities are undertaken during the day (and not at night) - between 08.00 hrs and 18.00 hrs; and on Saturdays between 0800 hrs to 1300 hrs. No work shall be undertaken on Sundays; and that transportation of construction materials to and from site is undertaken during weekdays and Saturdays only during the hours specified herein.

2.13 The proponent shall ensure that the development adheres to zoning specifications issued for development of such a project within the jurisdiction of the County Government of Nairobi, with emphasis on approved land use for the area.

2.14 The proponent shall ensure strict adherence to the Environmental Management Plan (EMP) developed throughout the project cycle.

3.0 Operational Conditions

3.1 The proponent shall adhere to conditions issued by Water Resources Authority for in-water works and water use permits.

3.2 The proponent shall ensure that sanitary facilities are constructed at suitable places so as to avoid contamination of water bodies and the subsequent water-borne diseases/vectors.

3.3 The proponent shall ensure that the chemicals used for water treatment (such as Alum) are appropriately handled and disposed off as provided for in their respective Material Safety Data Sheets.

3.4 The proponent shall ensure that all waste water is disposed as per the standards set out in the Environmental Management and Coordination (Water Quality) Regulations of 2006.

3.5 The proponent shall ensure that all drainage facilities are fitted with adequate functional oil water separators and silt traps.

3.6 The proponent shall ensure that rain water harvesting facilities are provided to supplement surface and ground water.

3.7 The proponent shall ensure that all equipment used are well maintained in accordance with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations of 2009.

3.8 The proponent shall ensure that all solid waste is handled in accordance with the Environmental Management and Coordination (Waste Management) Regulations of 2006.

3.9 The proponent shall ensure that all workers are well protected and trained as per the Occupational Safety and Health Act (OSHA) of 2007.

3.10 The proponent shall comply with the relevant principal laws, by-laws and guidelines issued for development of such a project within the jurisdiction of the County Government of Nairobi, Kenya Forest Service, Kenya National Highways Authority, Ministry of Health, Kenya Urban Roads Authority, Ministry of Land, Housing and Urban Development, Water Resources Authority, National Construction Authority and other relevant Authorities.

3.11 The proponent shall ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as soil erosion control, functional storm drainage, catchment protection, river pollution prevention, and equitable water supply mechanisms are designed, constructed and employed simultaneously with the proposed project.

4.0 Notification Conditions

4.1 The proponent shall seek written approval from the Authority for any operational changes under this license.

4.2 The proponent shall ensure that the Authority is notified of any malfunction of any system within 12 hours on the NEMA hotline No. **0786101100** and mitigation measures put in place.

4.3 The proponent shall keep records of all pollution incidences and notify the Authority within 24 hours.

4.4 The proponent shall notify the Authority in writing of its intent to decommission the facility **three (3) months** in advance.

5.0 Decommissioning Conditions

5.1 The proponent shall ensure that a decommissioning plan is submitted to the Authority for approval at least three (3) months prior to decommissioning.

5.2 The proponent shall ensure that all pollutants and polluted material is contained and adequate mitigation measures provided during the phase.

The above conditions will ensure environmentally sustainable development and must be complied with.

APPENDIX 3

STAKEHOLDER CONSULTATION

Meeting 1:

Meeting with Deputy County Commissioner (DCC) Westland Sub-County

ARTELIA MIBP CONSULTING ENGINEERS

NAIROBI WATER AND SANITATION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED GIGIRI RESERVOIR TO OUTERING WATER PIPELINE SECTION THROUGH KARURA FOREST

CONSULTATIVE MEETING DEPUTY COUNTY COMMISSIONER (WESTLANDS SUB COUNTY) ON 22ND AUGUST 2022

Meeting Session SUMMARY OF ISSUES DISCUSSED	Dates of Meeting	Participants	Number of Participants
Consultative Meeting Deputy County Commissioner (Westland's Sub County) On 22nd August 2022	22ND AUGUST 2022	MIBP/Artelia and AWWDA Representative as per the List Attached	7

STAKEHOLDER	RESOLUTIONS
Deputy County Commissioner Westland Sub County	• The office of County Commissioner supports AWWDA initiative of expanding water distribution networks within Nairobi • The office of County Commissioner is ready to assist AWWDA to mobilize any stakeholder consultations that might be required • Local administration would ask to be involved in any stakeholder workshops that might be organized by AWWDA with regards to the Project • The DCC office advises consultations with Kenya Forest Services (KFS) and Friends of Karura Forest (FKS) this is because the study is focused on pipeline section through the forest.

Attendance List

Name	Organisation	Telephone	Signature
Collin Juma (MIBP)	Safeguards	0711806553	
OBRA MMANTSI (MIBP)	Safeguards	0729766004	
Ben Thuku	AWWDA	0720301557	Ben
Mr Mwai Gichere	DCC Westland	0722585813	

Meeting 2:

Courtesy Call at Kenya Forest Services / Friends of Karura Forest

ARTELIA MIBP CONSULTING ENGINEERS

NAIROBI WATER AND SANITATION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED GIGIRI RESERVOIR TO OUTERING WATER PIPELINE SECTION THROUGH KARURA FOREST

COURTESY CALL AT KENYA FOREST SERVICES (KFS) / FRIENDS OF KARURA FOREST (FKF) ON 26TH SEPTEMBER 2022 AT FOREST HOUSE

STAKEHOLDER	RESOLUTIONS
Kenya Forest Services (KFS) and Friends of Karura Forest (FKS)	• AWWDA to a formal application to the Chief Conservator of Forest (CCF) • The application should clearly indicate the scope of works planned to be undertaken through the forest • The application should include a clear layout plan and indicating the proposed pipeline route • The CCF will review the application and communicate officially to AWWD • After approval is granted by KFS, AWWDA will undertake survey of the pipeline route. • After Survey AWWDA will further apply through the CCF for approval or authority to construct works • This application will be review and approval granted to AWWDA by KFS to construct works, this will through a lease permit that will be renewed on an annual basis • AWWDA will ensure that the proposed pipeline is restricted within existing track and the existing water pipeline easement, this approach will ensure that no tree is cleared along the easement. However, at the truncation, any trees that will be affected will be valued and cost included in the permit fees

Meeting 3:

Public Baraza Meeting in Njadhaini

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED GIGIRI RESERVOIR TOKARURA WATER PIPELINE SECTION THROUGH KARURA FOREST COMPREHENSIVE PROJECT REPORT (CPR)

Minutes of Public Participation Meeting Held at the Njadhaini Shopping Centre Maruru on 13th September 2022 at 9:00am

MEMBERS PRESENT

NO	NAME	DESIGNATION
1	Senior Chief Mbai	Area Chief Roysambu Location.
2	As per Attached Attendance list	Community members
3	Safeguards team	MIBP/Artelia

AGENDA OF THE MEETING

- Share Project information with the community
- To discuss the issues the Project
- AOB

PROCEEDINGS OF MEETINGS

The meeting started at 9:00am hours with introductions of the parties' present and opening remarks from the chief Mr. Senior Chief Mbai who welcomed all members present to the meeting and requested for a word of prayer from Pastor Nekesa. He briefly talked about illicit alcohol in the area and encouraged anyone with valid information on the where about of the illegal brew to contact the authorities and also warned youth against engaging in crime drug abuse.

Minute 1 /09/2022 Pipeline Alignment

MIBP/ Artelia representative gave a brief to the residents describing pipeline route as indicated below

Gigiri Reservoir Site ⟹ UN Avenue ⟹ Wispers Avenue ⟹ Karura Forest ⟹ Crossing Klambu Road to Karura Reservoir Site ⟹

N Access Road to Karura t Reservoir Site and AWWDA Head Office ⟹ kno the Coffee Garden Drive ⟹ al cl Pipeline Estate Road ⟹ ya Thika Super Highway, connecting to the existing network at the terminal point at the Outer Ring Road Interchange

Further, A 3.1 km section of Route Option 1 traverses through the Karura Forest which is the focus of this ESIA, along the alignment of an existing pipeline. The rest of the pipeline is proposed within existing road reserves. Pipeline route option is entirely within existing road reserves, further he explained that AWWDA will seek for wayleave permit from Kenya Forest Services (KFS)

Minute 2 /09/2022 Permission to use the water.
Mr. Karani wanted to know if they will be allowed to tap water from the main line as it by passes their neighborhood or they will get a connection.

Discussion and Response
Safeguards team informed Mr.Karani that the pipeline has been prioritized to boost water supply in Northern and Eastern Nairobi, therefore, residents will be get a connection through normal application process done at NCWSC Eastern or Northern Region

Minute 3 /09/2022 Job opportunities.
Bosire. He wanted to know if youth of the area will be considered for some jobs during construction

Discussion and Response
Safeguards team responded that some responsible, organized, hardworking youths with semi skilled experience might be considered for employment if the contractor finds it necessary. Some organized youth groups can also register with the area chiefs so that their request can be forwarded to the contractor.

Minute 4 /09/2022 Timings for Notices to the PAPs on when to commence works
Peter Kariuki. Wanted to know whether adequate notice will be issued by the authority in charge in order to allow them ample time to relocate.

Discussion and Response
Yes adequate time will be given to them just before the contractor mobilizes to the ground and also RAP report has proposed for the them to be allowed ample time to salvage materials from their structures in addition to reconstructions assistance offered.

Minute 5/09/2022 Interference of existing water pipes
Mr. Wambungu who is a residence of Njadhaini area was concerned about the existing pipelines and wanted to know if they will be interfered with during the construction of the new lines.

Discussion and Response
Safeguards team responded that Nairobi water company will work hand in hand to ensure that all the existing lines are identified in order to avoid unnecessary damages to the lines, in the event that any existing line is broken during construction of the new line it will be reconnected soonest possible to limit water supply interruptions.

Minute 6 /09/2022 Compensation procedure.
Mr. Oliva Otieno wanted to know how the compensation process will be conducted in the event that a person's property is demolished due to the construction of the pipeline.

Discussion and Response.
RAP team informed Mr. Otieno that no compensation will be triggered, this is because the water lines are designed within existing road reserves.

Minute 7 /07/15 Reconstruction of the structures.
Mrs. Kamau a resident of Mirema area in Roysambu wanted to know if they will be allowed to reconstruct their structures where they initially were after the line has been laid down.

Response
Safeguards team responded that reconstruction of the structures will be illegal since there is a law governing against construction of illegal structures on road reserves and water way leaves.

There being no any other business the Area chief thanked individuals present for their attendance despite the short notice. The meeting closed at 11:00am with a word of prayer.

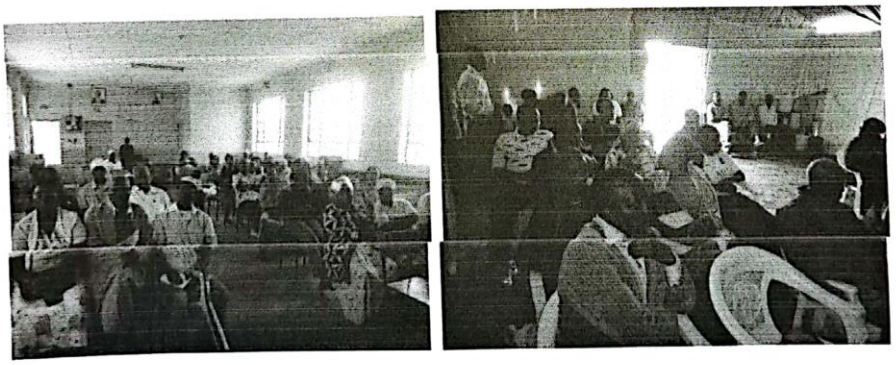
Minutes Signed

SECRETARY

ROYSAMBU LOCATION
CHIEF
DATE.....

Chief Roysambu Location

Public Participation Photos



Residents listening to Meeting Deliberations

ROYSAMBU LOCATION
CHIEF
DATE..13/9/.22...

Njadhaini Sub Location Meeting

1	PETER Muthumi	ID 25997543	TEL. 0704557412
2	EVALINE ATIAMO	0706195079	
3	Joseph WAGENI	ID. 7995886	TEL 0712433227
4	John Mburu Njoki	ID 12500855	TEL 0723436855
5	JOHN KIMANI MAINA	0724785024	ID. NO 11217004
6	DAVID MIRI	ID 3688747	TEL. 0724444615
7	CLEMENT OdhiAMBO	29340691 / 0711155040	2934[illegible]91
8	Ann Nduku	0704368571	23887955 46
9	JAMES machanu	0712624481	ID 4556834
10	John Mululu	28093365	7037494279
11	DOMINIC KIMATHI	9908918	0711897167
12	Kibwana Sharon Adhiambo	0729937638	ID 26480149
13	JOSIAH KIHARA	0715842694	23378156
14	TERESA ISAA	0716466354	3106977
15	PETER KAMAU	0714836988	29792756
16	[illegible]	0711[illegible]	293[illegible]
17	Lea Wambui	0717290673	
18	NILSON GATUNE	0703713620	25370351
19	CYRUS Wachira	0711666406	
20	Lydian K M	0717713951	
21	Philis Wamuyu	0700765734	
22	ESTHER WAMBOI	0723078457	
23	JOSEPHAT KASAVULI	0701812838	
24	NDOLO BONIFACE	0705199064	
25	JAMES MUTUA	0704 223221	
26	Mourine Achieng	0706 88 6215	
27	Josphene Nduku	0724 22 8319	
28	Margret Nigendo	0712624481	
29	Lucy Wanjiu Gitau	0716 233306	
30	JULIUS MUSYOKA	071342281	

ROYSAMBU LOCATION
CHIEF
DATE 13/1/22

31 Christine motugutu otoki 0725356050
32 Teresa oboityo Tinega 0729 791169
34 Consolata Vilenyo Nyabuto 070092156
35 Stephen Ponall luchebeleri 0704963697
36 DOREEN KARIMI KINYUA 0725634049
37 BEATRICE NJAMSH OSINYO 31072631946 0
38 MARTHA WAMBOI MWANGI 3181093 - 0715558859
39 MARTIN MACHARIA ID-29473206 0705845112
40 NICHOLAS MUIVA MIKE ID 20173041 0728937817
41 Jackson Mutua Mumo 24055035-0716628576
42 GODFREY MWANGI ISABOGO ID2277106 0727347200
43 CAROLINE AUMA OYOLO (23721895) 0727943026
44 Elizabeth wangui MUTISO 2527319 0706108700
45 Anthony Kubucha Wangari 26067271 0720600989
46 Dominic WAMALWA 23455227 0715343512
47 JOSEPH NGUGI MWANGI 13432071 0720710228
48 STANLEY GAKUU KANYUHA 12794718 0725817492
49 JOYCE WACUKA MBUGUA - 20999896 - 0715741143
50 GILBERT WAINAINA 21113174 0717061166
51 ISAAC MUTUMA JOHN 24502944 0728362494
52 ANDREW NYAGAH 23828820 0713567041
53 ELISHA ADUNA 31819877 0704954050
54 CATHERINE WANJIKU 0715507112
55 BONFACE NJAENTA 24790646 0724270068
56 PAUL OCHIENG - 22062842 0729177275
57 KENNEDY OPIYO - 29270049 0710154040
58 MARY WAMUHU GACHERU ID 4916717 0727063680
59 HENRY Githinji KARIUKI ID 4852092 07116206240

Meeting 4:

Public Baraza Meeting in Korogocho

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED GIGIRI RESERVOIR TOKARURA WATER PIPELINE SECTION THROUGH KARURA FOREST COMPREHENSIVE PROJECT REPORT (CPR)

Minutes of Public Participation Meeting Held at the chiefs' Office on 14th September 2022 at 9:00am

MEMBERS PRESENT

NO	NAME	DESIGNATION
1	Mr.Nyambuto	Area Chief Korokocho location.
2	Mr Samuel Njoroge	Chairman R.C youth
3	As per Attached Attendance list	Community members
4	Safeguards team	Mangat IB Patel & Partners

AGENDA OF THE MEETING

- Share Project information with the community
- To discuss project issues and way forward
- AOB

PROCEEDINGS OF MEETINGS

The meeting started at 9:00am hours with introductions of the parties' present and opening remarks from the chief Mr. Nyambuto who welcomed all members present to the meeting and requested for a word of prayer from Nerea Chan. The chairman urged the youth to corporate with the safeguards team, assist them where necessary to enable them to carry out their exercise smoothly.

MIBP/ Artelia representative gave a brief to the residents describing pipeline route as indicated below

Gigiri Reservoir Site ⟹ UN Avenue ⟹ Wispers Avenue ⟹ Karura Forest ⟹ Crossing Kiambu Road to ⟹ Karura Reservoir Site

N ⟹ Access Road to Karura t Reservoir Site and AWWDA Head Office ⟹ kno the Coffee Garden Drive ⟹ al cl Pipeline Estate Road ⟹ wa Thika Super Highway, connecting to the existing network at the terminal point at the Outer Ring Road Interchange

Further, A 3.1 km section of Route Option 1 traverses through the Karura Forest which is the focus of this ESIA, along the alignment of an existing pipeline. The rest of the pipeline is proposed

within existing road reserves. Pipeline route option is entirely within existing road reserves, further he explained that AWWDA will seek for wayleave permit from Kenya Forest Services (KFS)

Minute 1 /09/2022. How the pipe line will cross the tarmac road being constructed.
Teresia Akinyi. She wanted to know how the pipeline the tarmac roads that are currently being constructed in the area under the slum upgrading program.

Discussion and Response
Safeguards team responded that the pipeline will cross tarmac at point where it's unavoidable and any damages caused by the construction will be restored back to its original form. The contractor can also be requested to drill under the road to minimize damages to the road surface where necessary.

Minute 2 /09/2022 Request to use manpower during construction.
Mr. Benedict Okumu. He requested that if possible the contractor to use human labour to dig up the trench instead of using caterpillars and bulldozers because their houses are so clustered together. This he said will minimize damages to houses near the pipeline.

Discussion and Response
Safeguards team responded that the contractor will carry out a reconnaissance survey before mobilizing to the site so that to establish the best methods to use to dig up the trench in order minimal damages to nearby assets.

Minute 3 /09/2022 Permission to use the water.
Mr. Cleophas Odhiambo wanted to know if they will be allowed to tap water from the main line as it by passes their neighborhood.

Discussion and Response
Safeguards team informed Mr. Odhiambo that the pipeline has been prioritized to boost water in Nairobi Northern and Eastern region and that Korogocho is among the areas that will benefit, residents will make formal application to NCWSC to get a connection

There being no any other business the Area chief thanked individuals present for their attendance despite the short notice. The meeting closed at 11:00 am with a word of prayer.

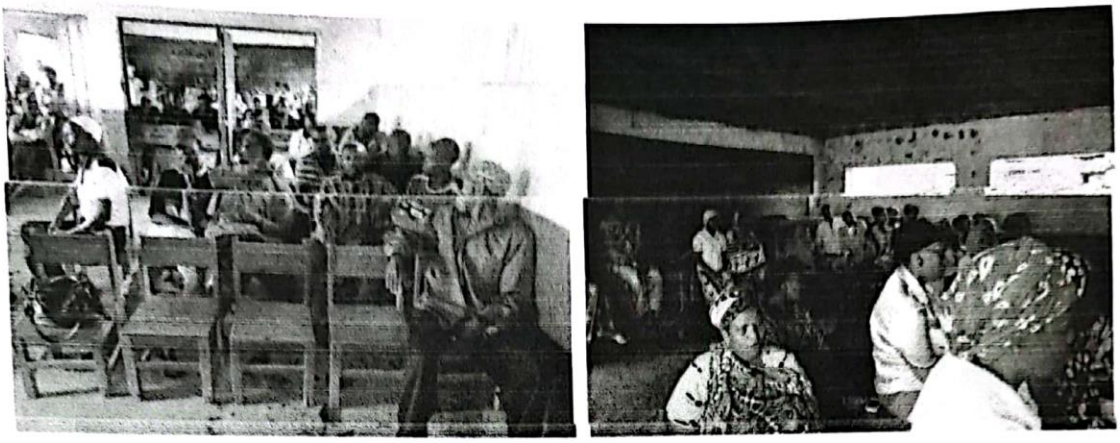
Minutes Signed

SECRETARY

KOROGOCHO LOCATION
DATE 14.9.22

Chief Korogocho Location

PUBLIC PARTICIPATION PHOTOS



PAPs listening to Meeting Deliberations

orogocho Location Meeting

CHIEF
KOROGOCHO LOCATION
DATE. 14/9/22....

NAME	Village	Tel	Sign
1) Peter Mbusa	Highridge	0722316297	[signature]
2) Khadija Juma	Highridge	0723 467353	[signature]
3) BENEDICT OKUMU	GITATHURU	0708156053	[signature]
4) Naresh Chan	Ngomongo	0725408463	[signature]
5) Ali Okelo	KHR	0726687452	[signature]
6) NANCY WANGARI	KOROGOCHO B	0722380593	[signature]
7) MARTIN NYAWINDA	GITATHURU	0725-212493	[signature]
8) GIDEON KAHURE	UDD	0726432528	[signature]
9) PETER KINYANJUI	Chairman R.C	0723825159	[signature]
10 Samuel Ntonye	Youth	0728 333459	[signature]
11 Francis Kimuyati	Ngunyumu Housing Co LTD	0723732628	[signature]
12. Peter Kariuki	Ngunyumu HOUSING	0720939398	[signature]
13. Joseph Githuka	KA	0721 499651	[signature]
14 JAMES DIETO	NGOMONGO	0722394634	[signature]

Meeting 5:

Public Baraza Meeting in Kariobangi

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED GIGIRI RESERVOIR TOKARURA WATER PIPELINE SECTION THROUGH KARURA FOREST COMPREHENSIVE PROJECT REPORT (CPR)

Minutes of Public Participation Meeting Held in Makongeni (Umoja 3) on 15th September 2022 at 9am

MEMBERS PRESENT

NO	NAME	DESIGNATION
1	Mr Ayecha	Area Chief
2	Safeguards Team	MIBP / Artelia
3	As per Attached Attendance list	Public

AGENDA OF THE MEETING

- Share Project information
- To discuss the issues related to the Project
- AOB

PROCEEDINGS OF MEETINGS

The meeting started at 9am hours with introductions of the parties' present and opening remarks from the chief who welcomed all members present to the meeting and requested for a word of prayer from Zipporah.

MIBP/ Artelia representative gave a brief to the residents describing pipeline route as indicated below

Gigiri Reservoir Site ➡ UN Avenue ➡ Wispers Avenue ➡ Karura Forest ➡ Crossing Kiambu Road to Karura Reservoir Site ➡

N Access Road to Karura t Reservoir Site and AWWDA Head Office ➡ kno the Coffee Garden Drive ➡ al cl Pipeline Estate Road ➡ va Thika Super Highway, connecting to the existing network at the terminal point at the Outer Ring Road Interchange

Further, A 3.1 km section of Route Option 1 traverses through the Karura Forest which is the focus of this ESIA, along the alignment of an existing pipeline. The rest of the pipeline is proposed within existing road reserves. Pipeline route option is entirely within existing road reserves, further he explained that AWWDA will seek for wayleave permit from Kenya Forest Services (KFS)

Minute 1 /09/2022 Interference of existing water pipes
Mr. Mwangi who is a residence of Makongeni area was concerned about the existing pipelines and wanted to know if they will be interfered with during the construction of the new line.

Discussion and Response
Safeguards team responded that Nairobi Water Company and Athi Water Services Board will work hand in hand to ensure that all the existing lines are identified in order to avoid unnecessary damages to the lines, in the event that any existing line is broken during construction of the new line it will be reconnected soonest possible to limit water supply interruptions.

Minute 2 /09/2022 Job opportunities and subcontracts
Mr. Ayub informed the Safeguards team that he has a company equipped with sufficient machinery and wanted to know how he can secure a sub-contract so that this company can be part of the construction team. He also wanted to know if the youth of the area will be considered for some jobs during construction

Discussion and Response
Safeguard team responded that the procurement process will be free to the public, the contract advertised publically and all interested companies will be invited to submit their proposals for vetting, the most qualified company will be awarded the contract.

Concerning the issue of job opportunities for the youths the Safeguards team informed Ayub that some of the responsible youths in the area might be considered for jobs if the contractor finds it necessary. He was also informed that interested youth should mobilize themselves and register with the area chief so that their request for jobs can be forwarded formally to the contractor through the chief's office.

Minute 3 /09/2022 Possibility of a takeoff from the main line to supply the area
Mr. Wycliffe wanted to know if NCWSC will provide a take off point from the main line to boast water supply in Kariobangi. He proposed if possible the take off point be at Mutan area.

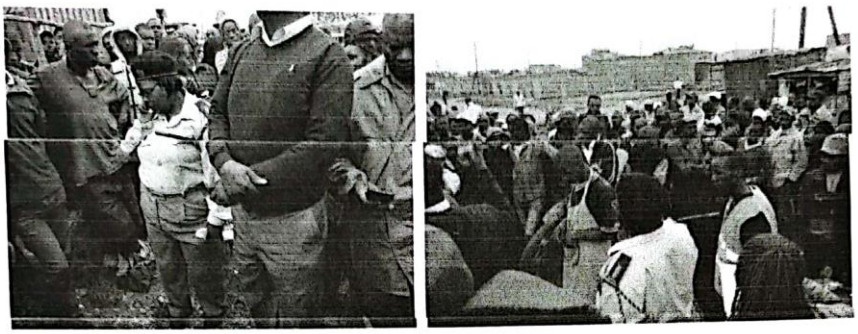
Discussion and Response
Safeguards team informed Mr. Odhiambo that the pipeline has been prioritized to boost water in Nairobi Northern and Eastern region and that Korogocho is among the areas that will benefit, residents will make formal application to NCWSC to get a connection

Minutes Signed
SECRETARY

Chief Kariobangi South Location

CHIEF
KARIOBANGI LOCATION
DATE..... SIGN.....

PUBLIC PARTICIPATION PHOTOS

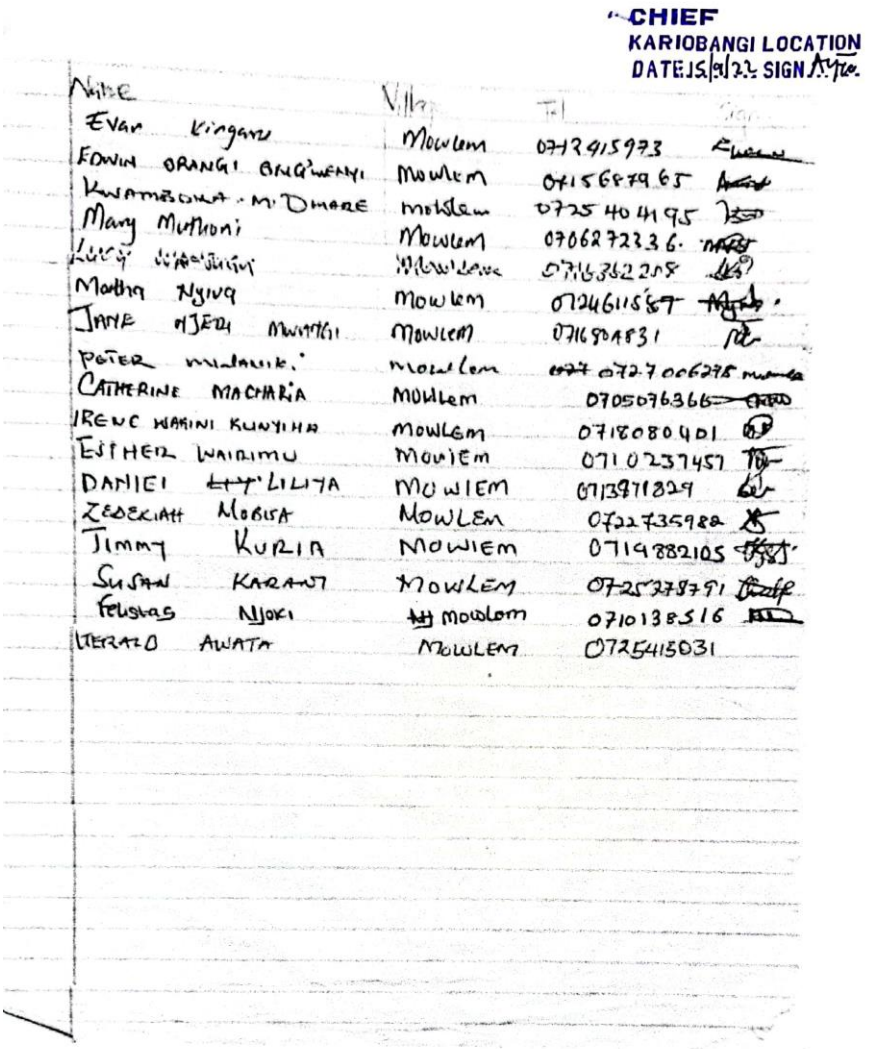


Kariobangi South Assistant Chief Addressing People during Public Meeting

CHIEF
KARIOBANGI LOCATION
DATE: 15/9/23 SIGN.

Kariobangi South Location Meeting

Name	Village	Tel	Sign.
CHRISTOPHER NDEZO KIIO	MOWLEM	0724178524	
LEEMSHON MUURE ILMIAH	MOLEM	0724382946	
SAMUEL KAMANJE NDUNGU	Moulem	0728052047	
LUCY WANJIRU MWANGI	Moulem	0717 311 262	
STEPHEN M. MWANGI	V Molem	0723652853	
STEPHEN KAMAU	Molem	0722 422 282	
Edwin Muriithi	Mowlem	0723554143	
Thomas maina	Mowlem	0708577637	
~~Thomas maina~~	~~Mowlem~~	~~0708577637~~	
PETER MURITHI	Mowlem	0723093961	
Teresian Wangui	Mowlem	0715672541	
JOHN MBUGUA	MOWLEM	0724472331	
Nancy Wairimu	Mowlem	0726317359	
Daniel Kinyua	mowlem	0726594606	
Susan Njeri	Mowlem	0712527263	
STELLA GATWIRI	MOWLEM	0712 942973	
LEAH NYANYANG'A	MOWLEM	0123918794	
FAITH NYAMBURA GAKIU	MOWLEM	0722177968	Faith
JOYCE KARUNDU NDUNGIRI	MOWLEM	0714584621	JOYCE
MILLICENT ATIENO	MOWLEM	0735497628	
MARTHA Imumia	MOULEM	0706838481	
Michael Mahiani	Mowlem	0706622115	
Douglas Kibe	Mowlem	0721126943	
Irene Wairimu	Mowlem	0723230957	
SOFIA YOSIA	MOWLEM	0725899047	
JOSEPH MAKONA	MOWLEM	0723864411	
HELEN AUMA	Mowlem	0728883083	
Francis Omondi		0728883083	
	MOWLEM	0714057267	



CHIEF
KARIOBANGI LOCATION
DATE 15/9/22 SIGN

Name	Village	Tel
Evan Kinganu	Mowlem	0732915973
Edwin Orangi Ong'wenyi	Mowlem	0715687965
Kwamboka M. Omare	Mowlem	0725404195
Mary Muthoni	Mowlem	0706272336
Lucy [illegible]	Mowlem	0716362205
Martha Nyiva	Mowlem	0724611587
Jane Mjeri Mwithi	Mowlem	0716904831
Peter Mwalulik.	Mowlem	0727006278
Catherine Machaka	Mowlem	0705076366
Irene Wamini Kunyiha	Mowlem	0718080401
Esther Wairimu	Mowlem	0710237457
Daniel Liliya	Mowlem	0713971829
Zedekiah Mobisa	Mowlem	0722735988
Jimmy Kuria	Mowlem	0719882105
Susan Karanji	Mowlem	0725378791
Felistas Njoki	Mowlem	0710138516
Lerato Awata	Mowlem	0725415031

APPENDIX 4

LEAD EXPERT'S YEAR 2023 PRACTICING LICENCE

FORM 7 (r.15(2))

nema

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/18651

Application Reference No: NEMA/EIA/EL/24565

M/S **Godwin Lidahuli Sakwa**
(individual or firm) of address
P.O. Box 18075 - 00500 NAIROBI

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert General**

registration number **2492**

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

Issued Date: 1/23/2023 Expiry Date: 12/31/2023

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001:2015 Certified