Ministry of Water, Sanitation and Irrigation

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED WATER PROJECT INTERVENTIONS IN NAIVASHA TOWN

FINAL ESIA REPORT

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DECLARATION

This EIA report was done in accordance with the requirements of the Environmental (Impact Assessment and Audit) Regulations, 2003, pursuant to the Environmental Management and Coordination Act (EMCA) 1999 and acceptable international standards.

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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
DMAs	District Metering Areas
DN	Diameter Nominal
DOSH	Directorate of Occupational Safety and Health
E&S	Environment and Social
EA	Environmental Audits
EIAs	Environmental Impact Assessments
EMCA	Environmental Management and Coordination Act
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GoK	Government of Kenya
HIV	Human Immunodeficiency Virus
KWS	Kenya Wildlife Service
MDGs	Millennium Development Goals
NECC	National Environmental Complaints Committee
NEMA	National Environment Management Authority
NET	National Environmental Tribunal
NGEC	National Gender and Equality Commission
OP	Operational Policies
OSHA	Occupational Safety and Health Act
PAPs	Project Affected Persons
PPE	Personal Protective Equipment
PPP	Public Private Partnership
RAP	Resettlement Action Plan
SDGs	Sustainable Development Goals
SEP	Stakeholders Engagement Plan
SHE	Safety, Health and Environment
TOR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
VECs	Valued Environmental Components
WB	World Bank
WRA	Water Resource Authority

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EXECUTIVE SUMMARY

E1: Introduction

The Ministry of Water, Sanitation and Irrigation (MoWS&I) is implementing Water and Sanitation Development Project (WSDP) with a credit from the International Development Association (IDA) that aims at improving water supply and sanitation services in selected regions in Kenya through the Water Service Providers (WSPs). The Project Development Objective (PDO) is to improve water supply and sanitation services in select Coastal and North Eastern regions in Kenya and improve the financial performance of Water Service Providers (WSPs) affected by the COVID-19 pandemic. Following conclusion on allocation of grants to WSPs under the CLSG-1 program, the Water Sector Trust Fund (WSTF) through the MoWSI prepared documentation for the second phase of the CLSG program now referred to as CLSG-II program. The focus of CLSG-II is to support financial recovery of WSPs to pre-COVID levels or better. During this phase, only WSPs with potential to achieve financial recovery within a period of less than 12 months are eligible to receive the support.

NAIVAWASCO has been struggling with high Non - Revenue Water over the years. The Company has employed several strategies, technologies and models adopted from exemplary utilities across the globe in order to improve the company efficiencies and attain the allowable range of 25% and below set out by the regulator in Kenya. These efforts have propelled the utility to bring the NRW to manageable ranges across many zones except for Lakeview and CBD Zones in Naivasha whose levels have been in the highs of 50%+. The utility with support from WSTF wishes to utilize some of the proceeds of the Conditional Liquidity Support Grant to implement CBD and Lakeview Non-Revenue water project geared at reducing NRW to 31% at CBD and 25% at Lakeview Zones, improve production operations at DTI, DCK and Police line production sites as well as improve debt collection strategies for the company. These interventions are proposed to be carried out at a Cost of Ksh.93.9 million for the period between Feb and October 2025.

E2: Proposed Project

The overall object of this project in each zone is as follows: *CBD Zone*: Replacement of 8.3km dilapidated water line in CBD zone with HDPE water lines in order to reduce rampant bursts and leakages and ultimately reduce NRW from 62% to 31% after project implementation. *Lakeview Zone*: Laying of 6.2km HDPE pipes in Lakeview zone as measure of reducing NRW from 54% to 25% after the project implementation.

The general objective of this project is to improve the water supply services within Naivasha town for the benefit of residents.

E3: Scope of works

The scope of work for the proposed potable water networks overhaul in Naivasha includes the design and implementation of overhauls for three critical projects: Replacement of CBD zone 8.3km Asbestos Cement (AC) lines (of DN40mm, 50mm, 63mm, 75mm & 90mm) and laying of DN40 to DN110 HDPE pipes. Procurement of 1,100 pieces DN25mm R200 Customer meters and laying of 6.2km DN32 to DN63mm HDPE lines at Lakeview Zone.

E4: Objective of ESIA study

The general objective of the ESIA investigations is to carry out a systematic examination of the present environmental situation within the project area to determine whether the proposed project will impact adversely on the physical and biological elements of the environment within the project area. This is in line with Section 58 (1) of EMCA 1999 that requires proponents to carry out ESIA on projects that appear in the Second Schedule of the Act.

E5: Study methodology

The methodologies used in the study include identification, collection, and analysis of environmental baseline data; identification of impacts; analyses and evaluation of impacts; formulation of mitigation measures for significant negative impacts; development and analysis of project alternatives, and development of environmental/social management and monitoring plans.

E6: Study findings

The study identified several critical issues that could impact the implementation of water network project, including encroachment on road reserves and water pipeline wayleaves, inherited old networks, and public accessibility conflicts. Additional challenges include illegal tapping, road crossings, service disruptions, disruption of businesses, drainage blockages, and risks to residents from construction traffic. Environmental concerns such as solid waste generation, soil erosion, atmospheric pollution, and noise impacts were also noted, along with potential disruptions to water supply.

E7: Public Consultation

Public participation in this project was achieved through consultation with the Lake view and Naivasha town CBD community and with lead agencies including WRA, KENHA, KURA, CECM Water, CECM Roads; and Municipal Manager. This was done through direct interviews and questionnaire administration, and public barazas. It emerged from the stakeholders' consultation that the project is welcome in the area as they do not anticipate any major negative impacts from its construction and operation.

E8: Impact Assessment Criteria

The criteria applied in this study are based on industry standards for impact assessment, adopted for use in the assessment of the proposed project impacts. The purpose of impact assessment is to assign relative significance to predicted impacts associated with the project, and to determine the way impacts are to be avoided, mitigated or managed. The rating of impacts assumes that standard construction and operating procedures present in the project description will be implemented. The impact assessment criteria include the spatial context of project impacts; temporal context; and reversibility, magnitude and significance of potential impacts of project construction and operation. The potentially significant environmental and social impacts have been identified based on the nature of the receiving environment, analysis of the proposed activities and analysis of the issues raised by stakeholders during public participation process.

E9: Environmental and Social Impacts and mitigation Measures

Environmental and social impacts associated with construction and operation phases of the proposed project include the following:

Environmental and social impacts	Mitigation Measures
Disruption of socio-economic activities within the project area Impacts on socio-economic front associated with the proposed project have been looked at from the point of view of individual properties that will be affected by project infrastructure. Most of the properties in question include business like tree nurseries, kiosks and shop verandas.	(i) Business owners who have their business within road reserves will be advised in advance to remove the kiosks before excavation activities begin. They will be allowed to reconstruct their kiosks after the pipes have been laid and trenches backfilled. The impacts will therefore be short term. (ii) The affected business shall be entitled to compensation as per provisions of World Bank OP 4.12. The project has undertaken the PAP census and 44PAPs identified who are doing businesses along the road sections to be impacted. Nevertheless, the WSP indicated that works will be undertaken during the night and weekends to reduce on this impact.
Impact on public infrastructure There are instances where the proposed project will cross Mama Ngina road, Kenyatta avenue, and Naivasha – Mai Mahiu road; approximately 10 road crossings and a railway crossing.	(i) Micro-tunnelling method will be applied on road crossings (ii) Existing AC pipes will be used as sleeves on all the crossings to avoid open trenches. (iii) All excavated soil shall be used for backfilling of trenched areas and site restoration. (iv) Damaged road surfaces shall be adequately restored to pre-excavation conditions. (v) Excess spoil materials shall be disposed of in approved tips in compliance with existing laws, rules and regulations (vi) The traffic disruption will be managed by working during off peak and also, traffic police will be involved to manage the traffic. In addition, same day excavation, pipelaying and backfilling to minimize disruptions. (vii) Use of signage
Blockage of drainage channels Drainage blockages due to temporary disruption of surface runoff because of the construction process will be experienced.	(i) Working under dry weather conditions and unclogging all blocked storm water drainage channels shall be implemented. (ii) Use dewatering pumps
Accidents and Injuries to workers and residents Work at the proposed site may involve hazards such as accidental falls into open trenches, slippery walkways, and heavy equipment which have the potential of causing accidents and injuries.	(i) The Contractor shall conform to all the stipulations of the Occupational Health and Safety Act, 2007. The Act requires the designation of a Health and Safety representative when more than 20 employees are deployed. (ii) The contractor shall provide ample warning signs, guard rails, warning tape, etc., around open excavations, stacks of material, debris, etc. and shall be held liable for all claims as a result of neglect of such precautions and provisions.

Environmental and social impacts	Mitigation Measures
	(iii) Use of requisite Personal Protective Equipment (PPE) always during construction works
Solid waste generation Construction will result in the generation of various solid wastes, principally surplus aggregates, plastics and wood which will potentially lead to environmental pollution.	(i) Bins/ receptacles shall be placed at strategic locations within the site as collection centres to facilitate separation and sorting of the various types of wastes. (ii) Express condition shall be put in the contract that before the contractor is issued with a completion certificate; he will clear the site of all debris and restore it to a state acceptable to the supervising architect and environmental consultant. (iii) Construction site management plans will be required for all works. This plan will include a waste management plan for all activities during the construction period.
Atmospheric Pollution The expected air pollutants from the proposed project will include dust, particulate matter and gaseous emissions from construction materials. Dust will be generated from the excavations, earth moving and materials delivery. Particulate matter will be generated by dry construction materials including sand, cement, gravel, murram, etc.	(i) Impose speed limits (10 km/h in all areas within the site boundaries). (ii) Damping down of access roads, stockpiles and cleared areas must take place to minimize dust pollution. (iii) Dust and air pollution due to dust when excavated material is stock piled, should be limited by means of wetting (particularly dry season), covering with foil or working in small sections so that the trenches are backfilled with excavated soil within shortest possible period (maximum 2 days).
Noise Impact Use of heavy construction machinery including excavators, and generators will lead to relative noise levels.	(i) Schedule road traffic movements to normal working hours (08H00 –17H00). (ii) Where need be, all exposed workers will be provided with functional earmuffs, whose use is mandatory, and closely enforced, monitored and supervised.
Violation of children rights by contractor and child labour on site	(i) Develop and implement and SEA action plan with an accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018).
Spread of HIV/AIDS, STIs and other communicable diseases	(i) Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: ✓ effective and on-going community engagement and consultation, particularly with women and girls; ✓ review of specific project components that are known to heighten GBV risk at the community level, e.g. employment schemes for women; delivery of supplies; etc.

Environmental and social impacts	Mitigation Measures
	✓ Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to employment; supply services; etc (ii) Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.
Workers/ Labour Influx Impacts	(i) Develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project. (ii) All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behavior (iii) Children under the age of 18 years shall not be hired on site as provided by Child Rights Act (Amendment Bill) 2014.

E10. ESMP summary and implementation arrangements

The ESMP provided in chapter 8 provides the mitigations measures of the anticipated environment and social impacts, monitoring indicators, responsible party and the cost of mitigation measures. Key impacts and risks anticipated include: waste generation, clearance of vegetation, loss of biodiversity, air pollution, occupational health and safety risks, GBV, etc. The cost for the implementation of the ESMP shall be included in the overall design, construction supervision cost of the project. Most of the environmental cost which involves engineering design is embedded in the engineering costs. However, Ksh. 3,439,000 will be spent in the implementation of the mitigation measures and environmental management administration. These costs shall also cover environmental monitoring.

The ESMP shall be provided along with bidding documents. Compliance with the ESMP shall be clearly provided for in the contract documents. The Contractor shall prepare a C-ESMP to operationalize the ESIA findings and recommendations. Method statements will also be prepared and will be task-specific after undertaking specific risk assessments. In addition, the contractor will have a qualified fulltime EHS person to be based on site who will be responsible for the implementation of the ESMP. The contractor will be required to submit monthly progress reports on ESMP implementation during construction phase. Also, the contractor should submit incident reports, and any other as per the WB standards.

The Naivasha Water and Sewerage Company (NAIVAWASCO) will be the implementing Agency of the project. The company has the capacity to supervise the implementation of the E&S activities. It has full time social and environmental safeguards staff that will be dedicated to the project. At the national level, WSTF will form a project implementation unit comprising of the E&S experts to oversee the project activities.

E11: Conclusions and recommendations

The following are recommended with respect to the proposed Project.

(i) That strict adherence to the Environmental Management Plans should be observed.

(ii) That any unforeseen impacts shall be immediately notified to the environmental assessor to ensure that they are immediately addressed and mitigated.
(iii) Project Construction works to commence after approval and issuance of the license.
(iv) The project contractor shall need to hold meetings with business owners and local communities before commencement of construction to firm up agreements of engagement.

1 INTRODUCTION

1.1 Background

The Ministry of Water, Sanitation and Irrigation (MoWS&I) is implementing Water and Sanitation Development Project (WSDP) with a credit from the International Development Association (IDA) that aims at improving water supply and sanitation services in selected regions in Kenya through the Water Service Providers (WSPs). The Project Development Objective (PDO) is to improve water supply and sanitation services in select Coastal and North Eastern regions in Kenya and improve the financial performance of Water Service Providers (WSPs) affected by the COVID-19 pandemic.

Following conclusion on allocation of grants to WSPs under the CLSG-1 program, WaterFund through the MoWS&I prepared documentation for the second phase of the CLSG program now referred to as CLSG-II program. The focus of CLSG-II is to support financial recovery of WSPs to pre-COVID levels or better. During this phase, only WSPs with potential to achieve financial recovery within a period of less than 12 months are eligible to receive the support.

A total of 31 WSPs with 77 interventions costing KES 2.198 billion have been pre-qualified to implement the CLSG II programme which is expected to start in February, 2024 for implementation period of 12 months. 18 WSPs will have significant interventions and are clustered into four groups based on their location within the county.

This ESIA report has been prepared in compliance with the Terms of Reference (TOR) for the following interventions by Naivasha Water and Sanitation Company:

i. Replacing 1 No. DCK high lift pump. To repair DTI panel, to replace DTI borehole 2 37kw motor. Flushing and servicing of police line borehole.
ii. Replacement of CBD zone 8.3km AC lines and laying of DN40 to DN110 HDPE pipes
iii. Procurement of 1,100 pieces DN25mm R200 Customer meters and laying of 7.9km DN32 to DN63mm HDPE lines at Lakeview Zone.

1.2 Project objectives

The overall object of this project in each zone is as follows: CBD Zone: Replacement of 8.3km dilapidated water line in CBD zone with HDPE water lines in order to reduce rampant bursts and leakages and ultimately reduce NRW from 62% to 31% after project implementation. Lakeview Zone: Laying of 6.2km HDPE pipes in Lakeview zone as measure of reducing NRW from 54% to 25% after the project implementation.

The general objective of this project is to improve the water supply services within Naivasha town for the benefit of residents.

1.3Relevant SDGs

Sustainable Development Goal (SDG)	Goal Description	Relevance to the Project
SDG 6: Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all.	▪ **Improved Water Supply and Sanitation Services:** The primary objective of the WSDP is to enhance water supply and sanitation services. By replacing old and faulty pipelines, the project aims to improve water quality and reduce health risks associated with inadequate infrastructure. This directly contributes to SDG 6 by ensuring access to safe and reliable water and sanitation services. ▪ **Reduction of Physical Water Losses:** The overhaul of pipelines, including the replacement of asbestos pipes, will reduce water losses due to leaks and bursts. This improvement in infrastructure not only conserves water but also enhances the efficiency of water supply systems. ▪ **Health Risk Mitigation:** Replacing asbestos pipes addresses health risks associated with asbestos, aligning with SDG 6's target to improve water quality and reduce water contamination.
SDG 3: Good Health and Well-Being	Ensure healthy lives and promote well-being for all at all ages.	▪ **Reduction of Health Risks:** By replacing asbestos and outdated pipelines, the project minimizes exposure to harmful substances and reduces waterborne diseases, contributing to better public health. Improved water quality directly impacts community health, which is a key target of SDG 3. ▪ **Enhanced Water Quality:** The project's focus on improving water quality through pipeline upgrades ensures safer drinking water, thereby promoting overall well-being and reducing health hazards.
SDG 9: Industry, Innovation, and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.	▪ **Infrastructure Development:** The overhaul and upgrade of water supply pipelines represent a significant improvement in infrastructure. Upgrading to DN250 specifications and replacing old pipes with modern materials fosters resilient infrastructure. ▪ **Support for Financial Recovery:** The project's role in supporting the financial recovery of WSPs aligns with SDG 9's aim to enhance infrastructure resilience and sustainability.

Sustainable Development Goal (SDG)	Goal Description	Relevance to the Project
SDG 13: Climate Action	Take urgent action to combat climate change and its impacts.	▪ **Reduction of Water Losses:** Efficient water management practices, such as reducing physical water losses, contribute to better water conservation and climate resilience. By minimizing leaks and bursts, the project supports sustainable water use and management, which is essential for climate adaptation and mitigation efforts.
SDG 1: No Poverty	End poverty in all its forms everywhere.	▪ **Economic Impact:** Improved water infrastructure can lead to increased economic opportunities and improved living standards for communities. By enhancing water supply and sanitation services, the project contributes to poverty reduction by ensuring access to essential services, which can improve overall quality of life.
SDG 11: Sustainable Cities and Communities	Make cities and human settlements inclusive, safe, resilient, and sustainable.	▪ **Urban Infrastructure:** The pipeline project supports the development of sustainable urban infrastructure by upgrading and replacing old pipelines. This contributes to making urban areas more resilient and sustainable, addressing the needs of growing populations and improving living conditions.

1.4Objective of ESIA study

The principal objective of the study is to identify the potential positive and negative environmental & social impacts expected during the construction, operation and decommissioning phases of the proposed project with the aim of proposing the possible mitigation measures. The exercise was undertaken to ensure that current and future activities does not negatively impact the environment & social fabric of the project area including human health and safety, physical (land, water, plants, and animals) components and intricate relation between them. In case any of such impacts are inevitable, a mitigation plan for the same is proposed in the study. Thus, the subject environmental and social impact assessment study formulates environmental and social considerations in the planning, designing, implementation and decommissioning phases, so as to ensure sustainable development. The present study has been undertaken in line with Kenyan legislations as well as World Bank Guidelines. In this context, Environmental Social Impact Assessment (ESIA) Study of the proposed project is performed.

In brief, the specific objectives in carrying out the ESIA are as under:

i. To discuss elements of the proposed project and policy & regulatory frameworks relevant to project

ii. Establish the social, economic and cultural make-up of the project area.

iii. Document the views of the community and other stakeholders in the project area.

iv. To identify elements of environment likely to be affected by the project and/or likely to cause adverse impacts to the project including natural and man-made environment.

v. Identify the potential social risks and how to mitigate them in the project area.

vi. To identify any potential losses or damage to flora, fauna and natural habitats.

vii. To identify the negative impacts and propose the provision of infrastructure or mitigation measures to minimize pollution, environmental disturbance and nuisance during construction and operation of the project.

viii. To specify environmental monitoring and audit requirements, if necessary, to ensure the implementation and the effectiveness of the environmental protection and pollution control measures adopted.

ix. Prepare an environmental impact assessment study report compliant with the Environmental management and Coordination Act (1999) and detailing findings and recommendations.

1.5Scope of work

The Scope of Work for the ESIA comprised of the following tasks and activities

Task 1 Detailed Project Description:

The Consultant provided a detailed information on the following:

- Geographic, ecological, general layout including maps at appropriate scale where necessary.
- Land required and its availability
- Intervention design and construction processes
- Natural resources (water and construction materials) required for the construction process
- Labour requirements in all phases of the interventions
- Waste generated
- Applicable permitting process
- Applicable design and operational standards
- Project timeline

Task 2: Description of the Baseline Environment:

The Consultant collected, analysed and presented qualitative and quantitative baseline information on the existing physical and natural environment, social and economic as well as demographic conditions within the project site and its area of influence. This allowed for the positive socio-economic, environmental and health effects of the proposed interventions to be realized to the maximum extent possible, while minimizing the negative impacts related to the project.

The baselines emphasized those aspects of the natural, cultural and socio – economic environment that affected by the interventions, including but not necessarily limited to the following:

- Physical environment
    - Air quality
    - Noise
    - Water Quality and hydrology
    - Soil
    - Geology and hydrogeology
- Bio –Physical Environment
    - Terrestrial Flora
    - Terrestrial Fauna
    - Aquatic flora and fauna where applicable
- Socio- economic and cultural environmental (including gender)- The socio-economic assessments was based on NEMA's and World Bank's OP and guidelines with special attention on demography; land-use; status of existing water resource management programmes (conservation and reuse); community structure; employment; gender; local communities; livelihoods, Sources and distribution of income, goods and services, recreation, cultural properties (e.g., archaeological and historically significant sites), Education, health, waste disposal, community participation, customs/norms, attitudes; traditional knowledge, perception and aspiration and social amenities and infrastructure. In addition, it includes Risks of gender-based discrimination, threats to human security through the escalation of personal, communal or inter-state conflict, crime or violence, discrimination toward individuals or groups, economic displacement (i.e. loss of assets or access to assets that leads to loss of income sources or means of livelihood). Consider the aspects that depends on environmental changes (public health, vulnerability to disasters, vulnerability to increasing climate variability and the expected effects of climate change, access to natural resources and associated conflicts), those that can produce environmental impacts, and, more broadly, the socio-economic conditions that might be affected by the project. This needs to show how the proposed project may increase or reduce the population's vulnerability to the effects of climate change.

Task 3: Stakeholder Engagement

The consultant reviewed the stakeholders identified both county, and non-county actors (direct and indirect affected persons) and continued with the engagement process in line with national & World Bank's OP requirements. In this regard the consultant carried out the following;

- Conducted stakeholder analysis that outlines the affected and interested parties. This was to enhance identification, analysis and categorization of project stakeholders, possible interests in the project and risks associated with any of these interests.
- Reviewed, updated and addressed issues identified & raised during the preliminary engagement process. This was to ensure project affected persons, relevant authorities and interested parties with concerns pertaining the project received feedback; suggest mitigation measures to such risks establish the level of knowledge and support for the project from the identified key stakeholders.

- Developed a communication strategy to engage with all levels of stakeholders, including planned consultations` activities, information materials and measures for encouraging participation of Vulnerable individuals, women, elderly, youth and PWDs.
- Kept records of all meetings organized to enable stakeholders to present their concerns and opinions regarding the proposed project, and these was signed off by the participants. Records must show the number of public consultations and list of attendees during those consultations.
- Ensured that stakeholder concerns are incorporated into the ESIA report recommendations and propose means for these to be incorporated into the project design/project activities as/where appropriate.

Task 4: Description of the Relevant National and International Legislative and Institutional Regulatory Framework:

The Consultant provided a description of the pertinent policies, regulations, standards and regulatory bodies governing water sector, environmental management, water, biodiversity, climate change, occupational Health and safety, public & community health & safety, labour, waste management, energy, gender and land.

The ESIA was undertaken within the reference framework of the following standards and regulations, the list not limiting:

- Applicable National policies, laws and regulations.
- Applicable county by-laws.
- The triggered World Bank Operational Policies
- World Bank Group/IFC EHS guidelines

Task 5: Analysis and Assessment of Potential impacts and recommendations for mitigation and potential development needs

The consultant carried out the following;

- Identification, assessment and determination of the significance of potential positive and negative impacts of the project on the physical & natural environment, social, socio-economic and cultural environment of the project area. Particular attention was paid to the impacts due to pollution (air, noise & water quality), impacts on biodiversity (terrestrial & aquatic) and project affected persons.
- Carried out a climate risk vulnerability assessment to identify, assess and describe potential risks posed, effects on baselines and impacts to the project activities due to climate change (adaptation and resilience).
- Assessed the magnitude and significance of the residual environmental and social impacts after the mitigation hierarchy has been applied.
- Made recommendations on the enhancement of positive impacts from the project/project activities.
- Provided analysis of alternatives (in case of adverse effects) and provide for mitigation measures.

Task 6: Cumulative Impact Assessment

The consultant assessed the cumulative impacts of the project on Valued Environmental & Social components (VESCs). The report outline ways in which the cumulative impact assessment and management could subsequently be progressed further over a period of 10-20 years. Impact assessment addresses cumulative impacts, including but not limited to:

- Impacts created by the activities of other adjacent, upstream and downstream developments, projects and landholders.
- Cumulative Impacts Synergies and conflicts with other projects in the area will be evaluated:
- Competition for water resources.
- Competition for use of existing services and infrastructure.
- Access to natural resources and business opportunities

Task 7: Waste Management (Solid and liquid/ effluents/wastewater)

The consultant was required to.

- Describe all the expected waste streams from the proposed project activities during the construction, operational, rehabilitation and decommissioning phases of the project.
- Describe the estimated quantity, and physical and chemical characteristics of each significant waste, any attributes that may affect its dispersal in the environment, and its associated risk of causing environmental harm.
- Define and describe objectives and practical measures for protecting or enhancing environmental values from impacts from wastes.
- Assess and describe the proposed management measures against the preferred waste management hierarchy, namely: avoid and reduce waste generation; cleaner production; reduce; recycle; reuse; reprocess and reclaim; waste to energy; treatment; disposal. This includes the generation and storage of waste.
- Provide water quality limits that are appropriate to maintain background water quality and protect other water uses.

Task 8: Assessment of alternatives:

The Consultant assessed alternatives to the proposed project, which included the "No Project" alternative, project design, location and layout. The Pros and cons of each alternative was considered in terms of environmental and social impacts. In case the analysis of alternatives reveals an alternative with less impact, the consultant either recommend a redesign to the project attribute to favour one with less impact or explain why the proposed attribute was selected instead of one with less impact.

Task 9: Development of Environmental & Social management & monitoring plan:

The Consultant prepared an Environmental and social management plan that recommends a set of mitigation, monitoring and institutional measures to eliminate, minimize or reduce to acceptable levels of adverse environmental and impacts and/or maximize socio-economic

benefits. Simple restoration measures/ plan was developed for any change of land use necessitated by the project. The Consultant provided cost outlays for the proposed measures as well as their institutional and financial support. The monitoring plan is required to give a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, and definition of thresholds that will signal the need for corrective actions as well as deliver monitoring and reporting procedures. The Consultant provided a time frame and implementation mechanism, staffing requirements and cost outlays.

1.6Methodology

In order to meet the study objectives, the first step was for the consultant to undertake desk study and preliminary site visit. Based on the site visit various considerations relevant to project that could influence the Environmental and Social Impact Assessment were identified. The stepwise activities as well as methodologies followed for this study is described below:

1.6.1 Desk Study

Various relevant documents were reviewed for a clear understanding of the terms of reference, environmental status of the project area, data on demographic trends, land use practices in the affected areas, development strategies and plans (local and national) as well as the policy, legal and institutional documents.

The team reviewed relevant literature including but not limited to the following reports:

- Design Report; to understand the project background, the preliminary designs and the implementation plan
- Secondary data through literature reviews to collect baseline information in the project area
- Relevant Legal, Policy and Regulatory documents with special emphasis to requirements under the EMCA, 1999, and the Environmental Impact Assessment and Audit Regulations, 2003
- World Bank's Environmental Health and Safety (EHS) Guidelines.

1.6.2 Understanding the project

The first step in environmental assessment of the proposed project was to understand the proposed site based on maps and, also analysing the direct and indirect environmental impacts, which are key in determining the scope and depth of the study.

1.6.3 Site Survey and Baseline Data Collection

Physical project site inspections and observations constituted the main baseline survey activities. The team visited site inspecting the site characteristics to assess the existing baseline condition with respect to physical, biological and socio-economic environment.

1.6.4 Physical environment

The baseline data collection methodology applied for physical environment involved a combination of primary and secondary data collection methods ranging from direct

observations & visual analysis to interaction with locals during field survey on various parameters such as land use & topography, water channels, natural drainage, flood flows, climate, air, and noise quality etc.

1.6.5 Physical Cultural Resources

Archaeological and Cultural Heritage Impact Assessment has been undertaken to identify and ensure the protection of archaeological and cultural heritage assets associated with the project sites to ensure that effective management and mitigation controls are in place. The assessment included a desktop review of any available documents and records associated with archaeological and cultural heritage resources within the project sites as well as field survey of project site.

1.6.6 Biodiversity Assessment

Both qualitative (desk-stop literature review) and quantitative (field sampling) methods were employed to assess biodiversity of the study area.

The general biodiversity information gathered includes the following.

- Detailed lists of flora and fauna species occurring in the project area.
- Fauna and flora Species of Conservation Concern (SCC) were identified based on the IUCN Red List of species i.e. Critically Endangered, Endangered, Vulnerable or Near Threatened.
- Other biodiversity value characterization criteria such as nationally threatened, nationally protected, restricted-range and endemic species, congregatory, migratory species as well as invasive species were also applied.
- Characterization of vegetation structure and habitat types i.e. modified, natural, critical

1.6.7 Data Evaluation and Analysis

Environmental assessment was carried out to identify potential impacts of the project on the environment, biodiversity and the community. The assessment was carried out in three main steps, as follows:

- Prediction of potential impacts
- Execution of specialized ecological studies on biodiversity and evaluation and assessment of the impacts in terms of their significance
- Identification/ proposing mitigation measures for minimizing the effects of the significant impacts.

After exclusion of the negligible impacts, the remaining aspects were assessed based on the following criteria:

- Magnitude of the impact.
- Duration: period that impact lasts.
- Mitigation measures: its availability whether integrated in the project design or implemented as management measures; and

- Residual impacts.

Where negative environmental impacts are expected, the majority of them will be experienced during the construction phase. To help manage the potential negative impacts, mitigation measures are suggested, and the residual impact evaluated.

1.6.8 Public Consultations.

Public consultations were undertaken during the environment and social impact assessment study to document the social impacts to the project area and general community perceptions on the project. In general, the following steps were followed in carrying out the entire consultation and public participation process: -

- Identification of institutions and individuals interested in the process and compiling a database of the interested and affected parties
- Administration of questionnaires to different target groups and local community members within the proposed project site.

One-on-one interviews with government agencies and other institutions in the project area were undertaken to assist in analysis of impacts to the community and institutions in the project area. These interviews were conducted to augment and confirm data and information obtained using the other tools and methodologies i.e. Community meetings and public consultations.

2 PROJECT DESCRIPTION

2.1Location

The Project is in Naivasha Sub County in Nakuru County which is about 75 km North West of Nairobi and about 65 km south east of Nakuru town. The total area of Naivasha Sub-County is 1,958.4 Km^2, while the population is 400,764 as at 2023 projected from the 2019 KNBS National census data. Naivasha Sub-County where the project is situated has eight wards namely Maiela ward, Mai Mahiu Ward, Lakeview Ward, Olkaria Ward, Biashara ward, Viwandani Ward, Hells Gate Ward and Naivasha East Ward. NAIVAWASCO CBD zone is located in Viwandani ward whereas Lakeview Zone is located in Lakeview ward and the project areas are; 0.5km^2 and 0.61km^2 respectively.

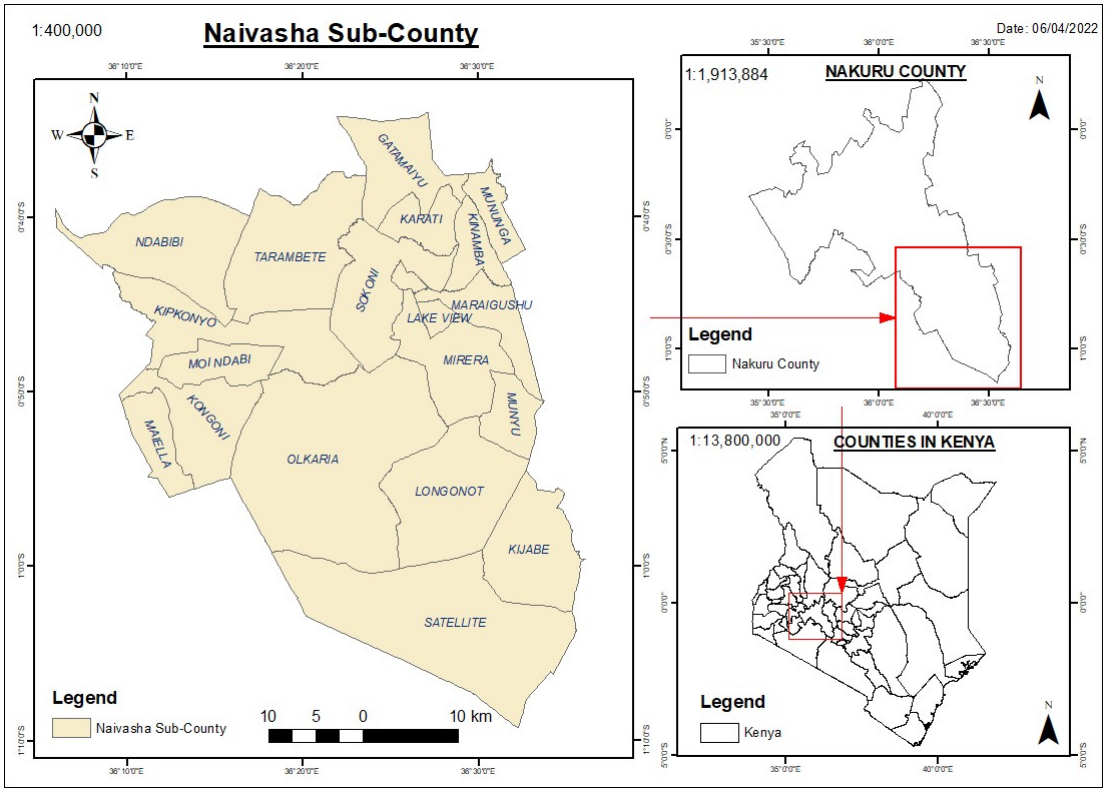


Figure 2.1: NAIVAWASCO Supply area map.

NAIVAWASCO is mandated to serve Naivasha Sub County and the Company has put all it can within its means to carry out this mandate. Presently Naivasha town, Longonot, Karagita, Kayole, Kamere, Kwa Muhia, Karima, Satelite, Mai Mahiu, Ngondi, Nyonjoro and Karate are receiving water from the Company. The company has put strides in managing NRW and the trend been has shown positive trend over the year. This notwithstanding, CBD Zone, being the Largest zone in number of connections and water demand has the highest NRW, followed by Lakeview Zone. The proposed goal of the NRW projects in CBD is to reduce the NRW from 62% to 31% and Lakeview zone from 54% to 25%.

2.2 Project components

2.2.1 Naivasha CBD zone

The CBD NRW project does not have any provisions for source development, transmission line works and storage works but it is proposed to pick from the existing distribution line for CBD zone that starts from Police line Tank. The CLSG 2 project in Naivasha has a separate component to carry out renovations at Police line borehole DTI and DCK. The renovations are geared at improving efficiencies at the production sites to improve water operations by the utility. The water distribution network for CBD zone is proposed and designed to be all HDPE pipes. The system is 8.3km long and diameters are distributed as shown in Table 2.1 below.

Table 2.1: CBD Proposed Network work categorization by diameter and length.

Sn	Pipe Diameter - OD in mm	Pressure Rating (Bars)	Length in m
1	160mm	16	1,140
2	110mm	16	960
3	90mm	16	735
4	75mm	16	500
5	63mm	16	2,300
6	50mm	16	1,220
7	40mm	16	1,450
	Total		**8,305**

Customer distribution lines within the zone has been provided for diameters between 75mm to 40mm in the table above.

The average velocity for all customer lines in CBD Zone (OD 40mm – 75mm) is proposed to be 0.4m/s. This has deliberately been kept this low as a measure to minimize water loses in the event of a line burst during operations. Valves shall be located such that supply lines can easily be isolated for repairs independently as economical as possible. Where a "tee" is installed, at least two (2) valves will be utilized. Where a "cross" is installed, at least three (3) valves will be utilized. Air valves of D040 PN 16, have been provided at high points on major lines. Lockable masonry Chambers of internal dimensions 1200 x 800 x 1200 mm shall be constructed for housing of main valves and meters. Other smaller chambers of 1000x800x1000mm will be used for Air valves.

2.2.2 Lakeview Zone

Lakeview NRW project does not have any provisions for source development, transmission line works and storage works but it is proposed to pick from the existing two storage tanks (500m^3 masonry ground tank and 100m^3 steel elevated tank) at NAIVAWASCO head office to Suberico and Guest-in all in Lakeview Zone. The two tanks are fed from the boreholes at Karate (6km from the office) and the two boreholes at the office.

The water distribution network for Lakeview zone is proposed and designed to be all HDPE pipes. The system is 6.2 km long divided into two independent lines: the Suberico block which is 4.4km and fed from the ground tank and the Guest-in block which is 1.8km and fed from the steel elevated tank. The diameter distributions are as shown in table 2.2 below.

Table 2.2: Lakeview Proposed Network work categorization by diameter and length.

Sn	Pipe Diameter - OD in mm	PN Rating (Bars)	Suberico Length in m	Guest-in Length in m
1	90mm	16	700	0
2	75mm	16	850	0
3	63mm	16	350	200
4	50mm	16	500	0
5	40mm	16	400	450
6	32mm	16	1,600	1,200
	Total		**4,400**	**1,850**
	Grand Total Lakeview			**6,250**

Customer distribution lines within the zone has been provided for diameters between 63mm to 32mm in the table 2.2 above. The average velocity for all customer lines in Suberico block of Lakeview (OD 32mm – 63mm) is proposed to be 0.54m/s. The average velocity for all customer lines in Guest-in block of Lakeview (OD 32mm – 63mm) is proposed to be 0.15m/s.

Valves shall be located such that supply lines can easily be isolated for repairs independently as economical as possible. Where a "tee" is installed, at least two (2) valves will be utilized. Where a "cross" is installed, at least three (3) valves will be utilized. Air valves of D040 PN 16, have been provided at high points on major lines. Lockable masonry Chambers of internal dimensions 1200 x 800 x 1200 mm shall be constructed for housing of main valves and meters. Other smaller chambers of 1000x800x1000mm will be used for Air valves.

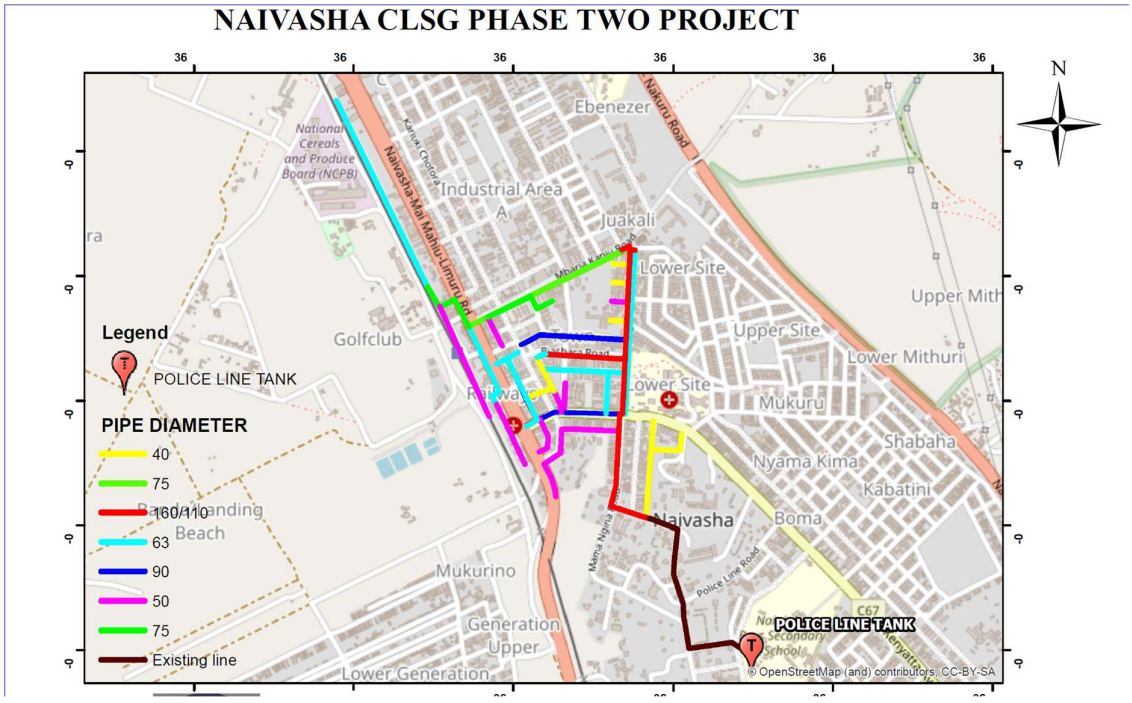


Figure 2.2. Map showing the distribution pipelines

2.3 Population Data and water demand projections

The works under the proposed project aim to partly replace the water supply network to Lake View and CBD zones. Population data has been obtained from National census data, 2019.

2.3.1 Population Projections

The Practice Manual for Water Supply Services in Kenya, 2005, recommends 20 years' project life for water supply systems. The network is designed to meet the ultimate demand (20 years). Current and projected population (see table 2.3) has been computed for initial, future and ultimate year as 2024, 2034 and 2044 respectively. Based on Nakuru County's Population Growth rate, an average of 3.05% population growth rate has been adopted. Population projection then follows a geometrical growth progression based on the formula below.

$$Pn = P_O(1+r)^n$$

Where; P*n* – Projected population after n years

P_0 – Population during the reference year

r – Population growth factor (in percent)

n – Projection period

Table 2.3: Population Projection

Location	Sub Location	From Census 2019	Land Area SKM	Project Area: Land Area, SKM	Project Area Pop: Projection 2019	Present 2024	Future 2034	Ultimate 2044
Lakeview	Lakeview	39286	15	2.4	6,414	7,454	10,066	13,594
Naivasha Town	Sokoni	21562	30	3.8	2,731	3,174	4,286	5,788
CBD & Lakeview Zones		60,848			9,145	10,628	14,352	19,382

As earlier discussed, CBD Zone lies in Viwandani ward whereas Lakeview Zone lies in Lakeview ward. To enable population projections in these zones, this data has been broken down further into Locations and Sub – Locations and the Land areas computed accordingly. NAIVAWASCO has adopted a growth rate of 3.05% which is the population growth rate for Nakuru County provided in the 2019 census data. CBD Zone is located in Sokoni sub location and the zone covers 3.8km^3 whereas Lakeview Zone is located in Lakeview Sub Location with a land cover of 2.4km$^{2.}$ The total population for CBD and Lakeview Zones in 2019 was 6,414 and 2,731 respectively; this has been projected for Lakeview zone to be: 7,454 in present year (2024), 10,066 in the future year (2034) and 13,594 in the ultimate year (2044). The CBD zone population is projected to be 2,731 in the present year, 3,174 in the future year and 5,788 in the ultimate year. The total population for the two zones has been projected to be 10,628 in the present year (2024), 14,352 in the future year (2034) and 19,382 in the ultimate year.

2.3.2 Water Demand Projections:

The following assumptions are used in estimating the design water demand.

- The settlement, due to kind of housing and standard of living is a typical medium-class urban settlement.
- Non- domestic water demand especially livestock demand areas will be met from sources other than the proposed system.
- Assumption Population Growth Rate (Nakuru County) = 3.05%

- IC (Individual Connection) = 80 l/c/d and CWP (Community Water Points) consumption = 20 l/c/d. This is based on NAIVAWASCO's experience in supply of water in similar conditions. (Inclusive of 25% NRW)
- The supply distribution will be 70% IC and 30% CWP for the present year, 85% IC and 15% CWP for the future year and 100% IC and 0% CWP for the ultimate year.

Table 2.4: Water demand projection table.

Location	Sub Location	From Census 2019	Land Area km²	Project Area: Land Area, km²	Project Area Pop: Projection 2019	Present 2024	Future 2034	Ultimate 2044
Lakeview	Lakeview	39286	15	2.4	6414	7454	10066	13594
	Sokoni	21562	30	3.8	2731	3174	4286	5788
Totals		60,848			9,145	10,628	14,352	19,382
		Demand						
IC						70%	85%	100%
CWP						30%	15%	0%
Water demand								
IC						595.17	975.94	1,550.56
CWP						63.77	43.06	-
Total						658.94	1,018.99	1,550.56
Demand		**Water**				**658.94**	**1,018.99**	**1,550.56**

From table 2.4 (population projections), the demand for Lakeview and CBD zones have been projected in considerations of the assumptions provided above and the following can be concluded: The water demand for the project area will be 659m³/day in the present year of the project (2024) and this will grow to 1,019m³/day in the future year and 1,551m³/day ultimately.

2.3.3 Supply – demand analysis

As provided in table 2.4 above: the four water production sites supplying water to the project area have a capacity of producing 19,220m³/day. This is sufficient to meet the ultimate demand of the project area of 1,551m³/day and thus this project has not factored any development of water sources save for the renovations at DCK, Police line and DTI.

2.4 Design of the water supply

The following design criteria were adopted for water network:

- A design period of 10 years for pumping systems
- Design will be based Darcy-Weisbach equation.
- A design period of 20 years for pipe systems
- Water consumption rate of 80 liters per person for I.C. and 20 liters per person per day for C.W.P (inclusive of 25% NRW)
- Washouts at lowest points should be provided with gate valves.
- Air valves at sharp points should be provided with gate valves to ease servicing
- Design flow is assumed 24hrs
- Preferred range of velocities is (0.5 – 1.5) m/s.
- HDPE pipe has been adopted for all pipework in the project
- A master meter will be provided at the off take.
- Epanet was used to model the network design.

Darcy's formula;

Using Darcy's formulae Q = ($\pi d^2/4$) V the pipe diameter was calculated assuming an initial velocity of 1m/s. The actual velocity was then determined and subsequently the pipe losses were calculated using the Darcy-Weisbach equation for head losses;

$$\Delta H_w = \lambda . \frac{l}{D} . \frac{v^2}{2.g}$$ Darcy Weisbach formula

Where; lambda = 0.02

Note: for this project the EPANET program is used to perform the hydraulic calculations. The advantage is that a number of different scenarios can be calculated quite easily, to evaluate the influence of using different internal diameters, elevation of tanks, etc.

Manning's Formula

$$Q = VA \qquad V = \frac{k}{n}\left(\frac{A}{P}\right)^{2/3} S^{1/2}$$

Notes:

k is a unit conversion factor: k=0.011-0.015 For HDPE pipes

A=Flow area of the pipe, culvert, or channel.
P=Wetted perimeter which is the portion of the circumference that is in contact with water.
Q=Discharge (flow rate).
S=Downward (longitudinal) slope of the culvert.
V=Average velocity in the pipe, culvert, or channel

Assumptions :

- Maximum flow will be half full
- Each household discharges
- Actual flow is the flow derived from the population/demand

No. of persons per household = 5

Average Consumption (liters per capita per day = 100

Consumption per household (m^3/day) = 0.375

Calculated flow is flow derived from manning's formula-used to check the correctness of the design Manning's coefficient for HDPE = 0.005

2.4.1 Pipe Material

The pipes commonly used for water supply in Kenya includes: Grey cast Iron (CI), Ductile iron (DI), Galvanized Mild Steel GMS), steel, un plasticized Polyvinyl Chlorine (uPVC), High Density Polyethylene (HDPE). The pipes commonly used for fresh water networks in Kenya is High Density Polyethylene (HDPE).

The choice of pipe adopted for this project is HDPE pipes for the pipelines, HDPE pipes from DN 32mm to 160mm for the water lines.

The HDPE pipes were chosen for the following reasons:

i) Less pressure loss than with other materials. Nearly no risk fouling / blocking because of little sediment growth
ii) Low costs because of relative long lifespan and Resistant to wastewater with abrasive solid materials Friendly to the environment
iii) No electrical dangers
iv) Simple and easy to construct by butt welding and mechanical coupling.
v) Fast, easy and moneysaving assembling
vi) Restrained joints, watertight

2.4.2 Depth of Pipe Cover

The pipe has been designed with a uniform gradient as much as possible to reduce the number of air valves and wash outs. All pipes shall be laid to a minimum depth of 1,000mm unless specifically allowed otherwise in special circumstances by the Technical Manager. The minimum pipe cover is 0.9m to soffit. Minimum cover of 1.2m where there is vehicle traffic based on industry practice

2.4.3 Pipeline Sizing

Pipes in this project have been sized to meet the ultimate demand as computed above. All flow will be gravity from the two tanks at NAIVAWASCO offices for Lakeview zone and the Police line Tank for CBD Zone project

2.4.4 Wayleave Limits of Installation

Pipelines in road reserves will be located, whenever possible 0.5m from the edge of the road reserve. Pipes will be laid parallel to existing roads and crossings will be done at 90 degrees as much as possible. All tarmac road crossings will be conducted through Micro – tunneled bores with UPVC sleeves. This project will be done in Naivasha town center and up to 90% of the roads that pipes will be laid along and crossed are tarmacked. The Company has been engaging with the County Public works and planning department to ensure acquisition of approvals to lay water lines along the road reserves will go on smoothly. Equally NAIVAWASCO has a good relationship with KENHA, KERRA and KURA build over time in similar projects and this will go a long way in securing wayleaves for this project.

2.4.5 Water Quality Standards

WHO developed standards of biological, physical and chemical quality applicable to water supply. Kenya water quality standards - KS 150 -1996 conforms to WHO guidelines limits. Water quality should conform to the criteria recommended in Section 3.1 Bacteriological and section 3.2 Chemical water quality of MoWI Manual, 2005 which have been adopted by NAIVAWASCO in its water project include this CBD and Lakeview NRW project.

2.4.6 Air Valves

Air valves are proposed to be installed at all high points and strategicpositions along the pipeline to prevent air entrapment and allow filling of the pipe.

2.5 Construction Process

The construction process will be executed in phases to ensure minimal disruption to the communities and institutions served by NAIVAWASCO. The following steps outline the key activities involved:

Phase 1: Site Clearance, Excavation and Foundation Works and back filling

The development shall involve site clearance and excavation works for installation of pipes and construction works. The development will stick to public land and the existing system as much as possible though some pipeline routes are done within the road reserves where there is encroachment. Excavation and other related project works will be labour based with use of hand tools unless otherwise required, heavy earthmoving machinery such as tractors and bulldozers will be used at a minimum. This will be done to minimise destruction of properties. The pipes will be backfilled well after laying.

Phase 2: Masonry, Concrete Work and Related Activities

The installation of manholes will require masonry work and related activities. General masonry and related activities will include stone shaping, concrete mixing, plastering, and curing of fresh concrete surfaces. These activities will be labour based but will be supplemented by machinery such as concrete mixers where necessary though the proponent anticipates it to be entirely labour based.

Phase 3: Plumbing

The plumbing activities will be carried out by the project contractor under the supervision of an appointed Project Engineer. Plumbing activities will include metal and plastic cutting, the use of adhesives, metal grinding and wall drilling among others. Majority of the pipe works will use HDPE pipes thus butt fusion machines will be used.

Phase 4: Landscaping

To improve the aesthetic value or visual quality of the area the proponent, provide seedlings for rehabilitation of project affected areas.

Phase 5: The Operational Phase

Operation phase of the project will include supplying water to the area residents by gravity. Upon completion of the project, the project will be managed by NAIVAWASCO. The water company will distribute the water to their customers and bill them at the end of the month.

Phase 6: General Repairs Maintenance of Water Supply

Maintenance of the water supply infrastructure requires to be conducted periodically to ensure sustainability of the project. The water supply line requires frequent check on blocks, burst, illegal connections, and evaluation of the general working condition of the project components from abstraction point to end users.

The proponent technical team shall conduct monitoring of the water supply line to ensure they are maintained in the required standard. The community members have been advised to be vigilant to reduce chances of vandalism.

Phase 7: Water Quality Monitoring

It is advisable to conduct continuous monitoring of the water quality and quantity in order to capture any disturbance in the system. Monitoring should be conducted through development of gauging and standard measurement systems which shall be compared to develop baseline information and existing guidelines or standards.

Phase 8: Decommissioning Phase

Upon decommissioning, the project components will be demolished and pipe uninstalled. This will produce a lot of solid waste, which are advisable to be reused for other construction works or if not reusable should be disposed of appropriately by a licensed waste handling company. All equipment including installations, pipework among others should be dismantled and removed from the site on decommissioning of the project. Priority will be given to reuse equipment in other projects. This will be achieved through resale of the equipment to other developers or contractors or donation of this equipment to schools, churches and charitable institutions. Once all the waste resulting from demolition and dismantling works is removed from the site, the site should be restored through replenishment of the topsoil and re-vegetation using indigenous plants and grass.

2.6 Natural resources (water and construction materials)

2.6.1 Water Requirement

The installation and operation activities of the proposed water networks will require water. Water is a crucial resource for both the construction processes and the eventual water supply network operation. Water will be sourced from existing local water networks managed by NAIVAWASCO.

2.6.2 Construction Materials Requirements

Several machines will be required for successful operation of the proposed project. Although hand tools will be increasingly used during construction of the pipeline, some sections e.g. the main pipeline will require minimal use of machinery. The number of equipment and machineries to be used will be confirmed at the start of construction works. Where destruction or interruption of business is realized use of machines will be avoided. The Table 2.5 below gives a summary of equipment, and machines required for successful implementation of the project.

Table 2.5: Project equipment and facilities requirements

S. No	Equipment/ Facility	Purpose
1	Hand tools including jembes, Spades and mattocks	For use in the excavation of trenches
3	Excavators	Excavation works.
4	Loaders	For mobilization of excavator to site

S. No	Equipment/ Facility	Purpose
5	Tippers	For transportation of materials from the material sources to the project site
6	Mixers	For mixing mortar
7	Rollers	For compacting surfaces
8	Pick-up truck	For transportation of personnel to site
10	Drilling machines	For rock drilling
11	Butt fusion machine	For jointing of HDPE pipes
12	Portable toilet	For use by construction workers.

2.6.3 Labour requirements

Several personnel will be required at the project site to carry out various activities and functions associated with implementation of the proposed project. They include among others professional staff, operators, drillers, drivers and labourers. The number of personnel to be involved in the Works will however be determined at the commencement of project construction. The Table 2.6 below gives a summary of personnel requirements for the proposed project. It is recommended that priority is given to the residents of Naivasha when recruiting the personnel.

Table 1.6: Labour requirements for project operations

No	Trade	Responsibility
1	Inspectors of works	Overseeing the site operations and work instructions
2	Health and Safety Officer	Supervision of implementation of health and safety requirements during project implementation
3	Environmentalist	Supervision of implementation of environmental requirements during project implementation
4	Sociologist	Dealing with community liaison and grievances arising in the course of project implementation
5	Welders	In charge of welding works within construction sites
6	Laborers	In charge of unskilled labour within construction sites
7	Drivers	In charge of driving vehicles and equipment used in construction sites
8	Plumbers	In charge of plumbing works within construction sites
9	Masons	In charge of masonry works
10	Mixer driver	In charge of driving mixers within the construction sites
11	Excavator operator	In charge of operation of excavators within construction sites
12	Surveyors	In charge of survey and positioning of works
13	Truck drivers	In charge of driving Trucks within the construction sites
14	Security Officer	In charge of site security

2.7 Waste generated

2.7.1 Excavated Material

During the excavation phase of the water pipeline project, the handling and management of excavated material are critical. The types of excavated material expected to be generated include soil, rock, and other earth materials that are removed to create chambers and trenches

for pipeline installation. This material must be carefully managed to avoid environmental contamination and to ensure it does not affect surrounding areas. Proper techniques for stockpiling and disposal are essential, including using designated storage sites and implementing erosion control measures. Additionally, strategies should be in place for reusing or recycling excavated material where possible, which can help reduce the environmental footprint of the project.

2.7.2 Old Pipeline Materials

The old pipeline materials, which are being replaced or upgraded, pose unique challenges during the decommissioning process. The expected waste in this category includes Asbestos Cement pipes (AC). The removal and disposal of these old pipes will be generated in significant quantities and must be carried out with caution to prevent environmental hazards and ensure that all safety protocols are followed. Proper procedures for the handling, transportation, and disposal of these materials are required to mitigate potential risks. The asbestos cement pipes will remain undisturbed and buried underground once the new lines are commissioned. At the road crossings, the AC pipes will be used as sleeves to avoid opening up trenches.

2.7.3 Residual Water and Sediment

Residual water and sediment from the construction process can impact both the environment and the efficiency of the project. Expected residual water will be generated in trenches or excavations and could potentially lead to issues such as soil erosion or contamination. Effective management of residual water includes measures such as dewatering techniques and proper drainage systems to prevent water accumulation. Sediment control is equally important to ensure that sediment does not enter water bodies or cause further environmental issues. Implementing sediment traps, silt fences, and other best practices can help manage sediment and minimize its impact.

2.7.4 Construction Waste

Construction waste generated during the project will include materials such as broken pipes, packaging, and excess building supplies. Proper management of construction waste involves segregation, recycling, and disposal according to relevant regulations and best practices. Establishing a waste management plan that outlines how different types of waste will be handled, including the use of recycling facilities and waste diversion strategies, can help reduce the amount of waste sent to landfills. Ensuring that all construction waste is dealt with efficiently and responsibly contributes to the overall sustainability of the project.

2.7.5 General Waste

General waste produced during the pipeline construction process encompasses everyday waste materials such as food wrappers, bottles, and other non-hazardous items. This type of waste will be generated continuously and should be managed through regular collection and proper disposal practices to prevent accumulation and potential environmental harm. Implementing waste reduction strategies, such as using reusable containers and reducing packaging, can also help minimize the amount of general waste generated. Ensuring that general waste is separated from other types of waste can facilitate more efficient recycling and disposal processes.

2.7.6 Corroded metal Pipes

Corroded metal pipes are a significant concern when dealing with old infrastructure. These pipes, often compromised by rust and corrosion, will be generated in substantial quantities and require careful handling during removal to prevent the release of potentially hazardous materials. The disposal of corroded metal pipes must be managed in accordance with environmental regulations, which may involve special treatment or recycling processes to mitigate any negative impact. Assessing the condition of these pipes and employing appropriate safety measures during their removal and disposal is crucial to maintaining environmental and public health standards.

2.7.7 Pipeline Coating and Insulation Materials

Pipeline coating and insulation materials are integral to maintaining the functionality and longevity of the pipelines. During the construction or decommissioning phases, managing these materials involves addressing any potential environmental concerns associated with their removal and disposal. The expected waste from pipeline coatings and insulation materials will include materials that may contain chemicals or other substances requiring careful handling to avoid contamination. Proper disposal methods should be employed, including adhering to regulations for hazardous materials if applicable. Additionally, considering the use of environmentally friendly materials for new pipelines can help reduce the impact of these substances on the environment.

2.8 Applicable permitting process

A legal register listing all legislation, legal instruments relevant to the site has been prepared, indicating applicability to the site. In addition, permits and licenses that are required to be obtained by the project during construction and operation has been provided.

No.	Licenses/Permits	Legislation
1.	ESIA License for project	EMCA 1999
2.	Workplace Registration License from DOSHS	OSHA 2007
3.	NEMA License to transport waste	EMCA 1999
4.	NEMA Noise Vibration Permit	EMCA 1999
5.	Micro-tunnelling permit	Kenya roads regulations, 2023

2.9 Project cost

The total project cost for the installation of the bulk meters and associated accessories is Kenya shillings Fifty-four Million Six hundred and Thirty-Six Thousand Seven hundred and Twenty-Nine (Ksh. 54,636,729). The EIA processing fee payable to NEMA is 0.1% of the project cost which translates to KSh. 54,637.

(See appendix E: BoQ)

3 LEGISLATIVE, POLICY AND INSTITUTIONAL FRAMEWORK

Regulation 18 (1) (b) of the Environmental (Impact Assessment and Audit Regulations) 2003 require an environmental assessment study report to, among others; include a concise description of national environmental legislative and regulatory framework. This chapter presents a review of the current policy, legal and regulatory framework applicable to environmental management of the proposed water networks, both at local and international levels.

3.1. Applicable National policies

Table 3.1 presents a summary of relevant policies that were analysed in this ESIA.

Table 2.1: Policy Framework Relevant to the project

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 Naivasha.
2	The National Water Policy, 2021	The water policy proposes to mitigate the challenges and threats facing the water sector by ensuring that coordination and accelerated partnerships are mainstreamed in the management and provision of water resources. It also sets the goal of enhancing protection of watersheds and other catchment areas in the country.	The Water Pipeline Project will result into sustainable utilization of scarce water resources through equitable distribution.
3	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.	The proposed water pipeline contributes towards achievement of this policy through provision of sustainable water for domestic use to residents of Niavasha.
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	Provision of Sustainable water to residents of Naivasha is a way of ensuring community resilience to climate change impacts. The Project will ensure that water resource is utilized in

No	Policy	Relevance	Applicability to the Project
		water users including gender groups, socio-economic groups, planners and policy makers in water resource management (Kenya, 2010: 53).	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.	The proposed water pipelines 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 Naivasha.
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. The proposed Project directly conforms to these provisions.
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 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	The policy will be important at the time of recruiting workers during Project implementation.
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.

No	Policy	Relevance	Applicability to the Project
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 excavation area to avoid unauthorized entry and accidents.
	Sustainable Waste Management Policy, 2021	The policy aims to promote sustainable waste management through the application of waste hierarchy and circular economy principles. It seeks to improve the efficiency of waste management processes, including mapping, planning, and transportation.	The project will incorporate sustainable waste management practices by implementing waste hierarchy and circular economy principles. This includes reducing waste generation through efficient planning and design, reusing materials where possible, and recycling construction by-products.

3.2. Legal Framework

Applicable Acts of Parliament as summarized in Table 3.2 were reviewed.

Table 3.2: 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 to co-operate with State organs and other persons to protect and conserve the environment as mentioned in Part II.
EMCA 1999	The Environmental Management and Coordination Act of 1999 (EMCA) 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	The water 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.

Acts	Relevance	Applicability to the Project
	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.	
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 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.	The water pipeline is designed to be laid along existing easements and road reserves. The Act will be useful in providing the legal framework for managing public land, facilitating the acquisition of private land for public benefit when necessary, and ensuring that affected landowners are fairly compensated during the implementation of the project.
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 water networks Project is envisaged to provide reliable water to residents of Niavasha 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	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 Pipeline Project will be

Acts	Relevance	Applicability to the Project
	and hold and dispose of assets, and delegate functions, such as through sub-contracts and partnerships.	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, the project proponent will seek requisite approvals from the Nakuru County Director of Physical Planning prior to commencement of the works discussed in this report.
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 engage 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.

Acts	Relevance	Applicability to the Project
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 ensure 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.
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 if 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 construction phase 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	The contractor will be required to provide sanitary facilities and solid

Acts	Relevance	Applicability to the Project
	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 act against persons causing pollution to the water sources.	waste containers for use by construction workers on site during construction phase.
Climate Change Act (Cap 387A)	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 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.	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.
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 Engineer will ensure that all materials used on site adheres to the highest standards and do not pose any human health and safety risk.

Acts	Relevance	Applicability to the Project
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 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.
Sustainable Waste Management Act, No. 31 of 2022.	The Act identifies the following objectives: sustainable waste management promotion; improving the health of all Kenyans by ensuring a clean and healthy environment; reduction of air, land, fresh water and marine pollution; ensuring the delivery of waste service; creating an enabling environment for employment in the green economy in waste management, recycling and recovery; circular economy practices promotion; mainstreaming resource efficiency principles in sustainable consumption; improving responsible public behaviour on waste and environment. The Act is based on the following principles: precautionary principle; polluter pays principle; payment for ecosystem services; zero waste principle.	The contractor will incorporate waste management strategies to handle construction debris and other waste products effectively.
Roads Act, 2007	The Act is relevant to the water pipeline project as it mandates obtaining necessary permits and approvals for road crossings, adhering to construction standards and safety measures to protect road infrastructure, and conducting impact assessments to minimize disruptions to traffic and road conditions.	The project will ensure compliance by coordinating with road authorities, following guidelines for trenching and reinstatement, and implementing mitigation measures to manage any potential impacts on road networks.
Urban Areas and Cities Act	The Act is relevant to the water pipeline project in Naivasha town as it provides a framework for effective urban management and infrastructure development. The Act emphasizes the importance of improving urban infrastructure, engaging residents in governance, and supporting sustainable development.	The projects aims to improve water supply by addressing critical water needs hence contributing to the city's overall growth and infrastructure development.

3.3. Regulations and Rules

Applicable Regulations and Rules as summarized in Table 3.3 were reviewed.

Table 3.3: 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	Provisions of the regulations were applied during preparation of this report.

Regulation	Relevance	Applicability to the Project
	Regulations…''	
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 provide 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".	The contractor 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 provide 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 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,	The contractor will be required to store all flammable materials and liquids safely to avoid risk of fire.

Regulation	Relevance	Applicability to the Project
	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.	
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.
Water Management Regulations 2021	Matters covered by these Regulations include: prescription of water use activities; issue of approvals, permits and authorizations for water use and waterworks; guidelines on surface water, including declaration of a watercourse, wetlands, land reclamation, water use for irrigation and Works Associated for protection and control of fish; groundwater development, including borehole and issue of specific permits and authorizations; water quality monitoring and liquid waste disposal, including control of water pollution, water quality monitoring; inspection and controls concerning waterworks; water use charges, including penalties for misuse or for over-abstraction; roles and powers of water resource users associations and basin water resources	The project will adhere to these Regulations by obtaining all necessary approvals, permits, and authorizations for water use and construction activities. It will comply with guidelines for surface and groundwater management, implement water quality monitoring and pollution control measures, and ensure regular inspections. The project will respect protected and designated areas, collaborate with local water resource associations, and employ licensed water sector professionals.

Regulation	Relevance	Applicability to the Project
	committees; identification of protected and designated groundwater conservation areas; composition of reserve; categories of water sector professionals and contractors and issue of related permits and licences	
Extended Producer Responsibility Regulations 2022	Aims to extend the responsibility of producers over their products and packaging throughout their entire life cycle. The regulations also provide a framework for the establishment and operation of mandatory extended producer responsibility schemes and promote a collaborative approach to the management of products and associated wastes.	The contractor will ensure that materials used, including pipes and construction supplies, are managed in a way that minimizes environmental and health impacts. The project will focus on selecting recyclable and recoverable materials, managing hazardous substances carefully, and implementing cost-effective waste management strategies.

3.4. World Bank Operational Safeguard Policies

Applicable World Bank Safeguard Policies that are triggered by the project are summarized in Table 3.4.

Table 3.4: 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	Triggered as 44 PAPs will be compensated for the loss of livelihood
World Bank OP	Provides for measures to protect cultural heritage from the	Requires assessment for any

Safeguards Policies	Provision	Relevance to the Project
4.11on Physical Cultural Resources	adverse impacts of project activities and support its preservation;	physical cultural resources or requires preparation of chance find procedures be prepared during implementations of Projects. Appended to this ESIA arechance find procedures to be adopted in the event such resources are encountered during Project construction phase.

3.5. World Bank Group Environmental Health and Safety Guidelines on Water and Sanitation

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry- specific examples of Good International Industry Practice. When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site -specific targets, with an appropriate timetable for achieving them.

Relevance to the Project

The EHS Guidelines for Water project include information relevant to the operation and maintenance of:

i. Potable water treatment and distribution systems

ii. Collection of sewage in centralized systems or decentralized systems and treatment of collected sewage at centralized facilities.

The above discussed Guidelines/ Instruments, present Environmental Health issues concerned with Water Distribution and the necessary requirement to assure adequate capacity to supply the water demand. The most significant environmental issues associated with operation of water distribution systems include: Water system leaks, loss of pressure and water discharges. The design for the project has ensured these environment risks are mitigated.

4 BASELINE INFORMATION

This chapter discusses the physical environment and socio-economic set up within Naivasha town.

4.1Physical Environment

4.1.1 Geography and Topography

Naivasha town lies at an average altitude of 1,890 masl, in the Rift Valley region. Soil composition in the area is complex as it is influenced by intensive variation in relief rainfall climate, past volcanic activities and the underlying rocks.

The topography is characterised by undulating terrain and Naivasha town slopes gently towards lake Naivasha.

4.1.2 Geology

The geology of the area can be classified as Kerichwa Valley Tuffs along the river valleys and the Middle and Upper Kerichwa Valley Tuffs found on the higher ground.

The soils comprise basically two types of soils, namely;

- Soils developed on ashes and other pyroclastic rocks of recent volcanoes. These soils are found in the upper catchment of the mountains. These soils are well drained, very deep, dark reddish brown to brown, very friable, clay loam to clay, with a thick humic topsoil; in places shallow to moderately deep and rocky.
- Soils developed on volcanic footridges comprising dissected lower slopes of major older volcanics and mountains on undulating to hilly terrain. These soils are well drained, extremely deep, dark reddish brown to dark brown, friable with acidic humic topsoil.

4.1.3 Soil

The soil is influenced by intensive variation in relief, climate, past volcanic activities and the underlying rocks. The main soil types in some areas are *calcic gleysols*, *andohaplic pheozems*, *gleyic cambisols*, *ando-calcic regosols*, *lithosols*, and *calcic xerosols*, from the *lacustrine* plain through the volcanic plain to the volcanic hills respectively. Generally, the soils in the study area have high phosphorus, calcium, magnesium and potassium concentrations but are low in respect of nitrogen and carbon.

4.1.4 Climate

The area lies within the range of the Intertropical Convergence Zone. The rainfall distribution has a bi-modal character. The long rains are experienced from April to June and the short rains from October to November. Mount Kenya and the Aberdare Ranges capture moisture from the easterly monsoon winds, casting a significant rain shadow over the Lake Naivasha Basin. The spatial distribution of the rain varies from approx. 600 mm at Naivasha Town to approximately 1,700 mm at the slopes of the Aberdare Ranges.

4.1.5 Water (Surface and Groundwater Resources)

Lake Naivasha lies in the Eastern Rift Valley at an altitude of 1,890 masl and covers approximately 100 km^2. The permanent river within the area is Malewa river.

4.1.6 Land use

Approximately 18% of the land in Kenya has high to medium agricultural potential and supports approximately 80% of the country's population. Agriculture is dominant in the Nakuru county. The project area is mixed use for residential and commercial.

4.2 Biological Environment

4.2.1 Flora

The varied combination of altitude and soil result in the occurrence of seasonal vegetation types like montane forests and evergreen bush land are found in higher areas of Naivasha. Savannah (mixture of trees such as acacia and shrubs standing in tall dense perennial grass) type of vegetation and grassland is predominant in the outskirts of Naivasha town. The project site being a built-up area does not have any natural vegetation to be affected.



Trees along the road reserve but will not be affected by the project

4.2.2 Fauna

Within Naivasha area, the Lake Naivasha is known as Important Bird Area (IBA) and holds over two hundred bird species, including the endangered and rare species such as Great Crested Grebe (critical), Maccoa Duck (endangered), African Darter, Great Egret, Saddle-billed Stork, White-backed Duck, Baillon's Crake and African Skimmer (all vulnerable). Coot and Yellow-billed Duck, which formerly could be enumerated in ten thousand, reappear in single thousands in the years when submerged aquatic plants are found. Jacana or Lily Trotter, formerly present in thousands can now only be counted in few hundred at most, concentrated on tightly-packed Hyacinth fringes in northern areas.

Lake Naivasha is also important for riparian mammals, primarily the population of approximately 600 - 700 *Hippopotamus amphibious*, which represents the largest meta-population of this specie in the Kenya Rift. Its numbers have remained stable for the past two decades. Marsh mongoose and otter are rarely-seen but important predators of Crayfish. Plains mammals, notably zebras and Thomson's gazelles inhabit the riparian zone of larger properties, such as the Marula - Morendat - Manera ranches at the river entries and can move relatively

freely around the north-west. Crescent Island is a private game reserve. The town is approximately less than 5km from lake Naivasha.

4.3 Socio-Economic and Cultural Environment

4.3.1 Population characteristics and Growth Patterns

Nakuru county population was estimated to be at 2,162,202as per 2019 population census. The population density of the Nakuru County is 289.7/km^2 and male to female ratio being 50% to 50%.

4.3.2 Economic activities

The main economic activities in Naivasha town is Tourism, commercial agriculture which contribute to 48% of income. Tourism in Lake Naivasha, energy generation in Olkaria, large and small-scale commercial Businesses and manufacturing are the major economic activities in Naivasha town.

4.3.3 Ethnicity

The project area is largely cosmopolitan mainly occupied by the Kikuyu, Luos, Kamba, Kalenjin, Maasai among others.

4.3.4 Gender and women

Gender can be defined as the role, rights and obligations that culture and society attach to individuals according to whether they are male or female. This understanding translates into privileges enjoyed by either sex. In normal cases the society attaches values, norms and roles to males and female that causes gender disparities that are seen in all areas of daily life. Identified gender disparities include marginalization of women in education, income and property rights and lack of credit.

Key challenges to gender balance in a society may be summarized as, minimal participation of women in development decision-making, preferential (bias) treatment of boys when it comes to education, low enrolment rate of the girls leading to disparity in literacy between boys and girls, disparity in wealth ownership, prevalence of negative cultural practices such as FGM and early marriages.

To improve gender balance in the society there is need to develop and promote gender-oriented programmes.

During our survey, most women were found in market selling clothes, kitchen wares, food items among others. It is envisaged that the project will affect women selling items in the existing market.

5 PAPS DEMOGRAPHIC PROFILE AND REGISTER

5.1Overview

This section outlines the impacts of the proposed water distribution pipeline network project on businesses in Naivasha Central Business District (CBD) and the Lake View areas. It provides a framework for mitigating economic disruptions and ensuring fair compensation for Project-Affected Persons (PAPs). The project will affect businesses with varying levels of risk (high, medium, and low) based on the degree of disturbance.

The objectives are to mitigate disruptions, provide equitable compensation, and restore livelihoods (Mitigate economic impacts, ensure compensation for business disturbances, and support livelihood restoration). The project covers Naivasha CBD and Lake View outskirts and runs for 14km along the wayleave.

The following areas were screened and classified as medium and low risk.

- Medium-risk areas: Central Business District (Southern and Northern CBD, densely populated).
- Low-risk areas: Lake View (Tenants and Landlords' residential areas, sparsely populated).

5.2 Methodology

This initiative involved a multidisciplinary team comprising members from the Naivasha Water and Sewerage Company (NAIVAWASCO), and Consultants. NAIVAWASCO's technical experts led the team in conducting an initial survey of Project-Affected Persons (PAPs) along the road reserve wayleave to assess the nature of the impacts and identify risky areas.

Over three days, experts from NAIVAWASCO and consultant carried out further baseline data collection for the PAPs in the Central Business District (CBD) and the Lake View areas. The census was conducted using structured survey questions and interviews, resulting in the successful survey of 44 PAPs identified along the project area.

5.3 Consultations during PAPs survey

The consultant held a meeting on December 3, 2024 in the NAIVAWASCO boardroom with officials from NAIVAWASCO to discuss key issues and incorporated the findings into the report.

Additional public consultations were held on December 4–5, 2024, with project-affected businesses owners. The feedback gathered during these sessions was integrated into the report.

Summary of concerns raised by PAPs and stakeholders

Issue	Measures, possible solutions
Transparency and accountability for the compensation process and grievance handling procedures?	• The compensation will only be administered to economically and physically displaced persons. In case of grievances, every PAP will be provided an opportunity to report, make, place/lodge, or express a grievance against the project and its staff or contractors as part of the RAP implementation and grievances to be addressed within 14 days.

Issue	Measures, possible solutions
	• The PAPs shall be notified/ informed through posters, emails, or public forums when to relocate where necessary. • There will be dedicated liaison officers in the field for PAP inquiries and updates.
Will their data be used for taxation of their business?	• The data is used for only compensation purposes under this RAP. Data privacy and confidentiality will be observed as per data protection law and will not be shared with third parties.
What will happen with old asbestos pipes in the underground?	• To minimize disturbance and disruption of water, it will remain buried during construction phase and operation phase.
The security of the business property at Night when works are being undertaken?	• The security shall be enhanced by the contractor to ensure authorised access to the work area.
When will the construction work commence?	• Implementation expected to begin in February 2025.
Will the local youths be involved in the project implementation?	• The contractor will be unveiled to the people before the commencement of works and the youth have been assured of employment, especially the unskilled labour. Skilled Employment will depend on the availability of human resources in the area.

5.4 Socioeconomic and Demographic Profile of PAPs

5.4.1 Demographics

As indicated in Figure 5.1, forty-four percent (44%) of the PAPs are married, while the remaining individuals are single, separated, or widowed. Any disruption to their businesses could significantly affect the livelihoods of married individuals, their spouses, and their children.

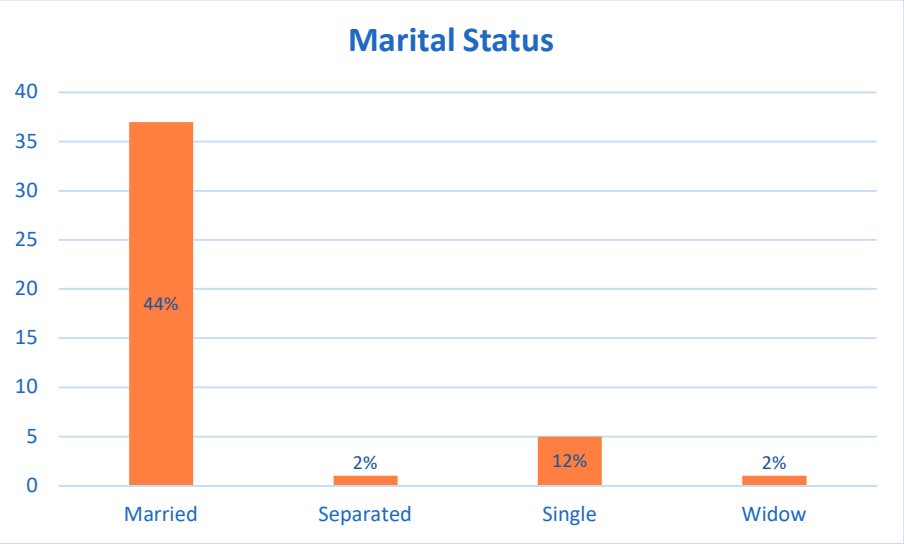


Figure 5.1: Marital status of the PAPs

Seven percent (4) of the PAPs, as shown in figure 5.2, have either completed university or primary education. The majority have completed their secondary school education. Additionally, 61% of the informal businesses are female-headed and are likely to be impacted

during the project. Some of these individuals could play a valuable role in the project based on their skill levels.

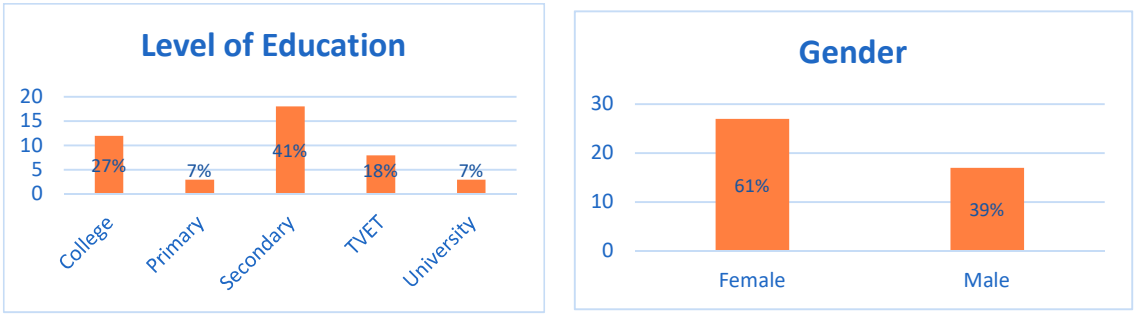


Figure 5.2: Level of education and gender

5.4.2 Income and Employment

As shown in figure 5.3, most of the affected PAPs are Informal small-scale trade that make up the majority of 97% while the rest 3% are Informal mixed (crop and tree nurseries) farming. The average monthly income is KES 42607. The majority of 22% of the PAPs earn between KES 10,000 and 20,000 while the least 2% earns below KES 10,000.

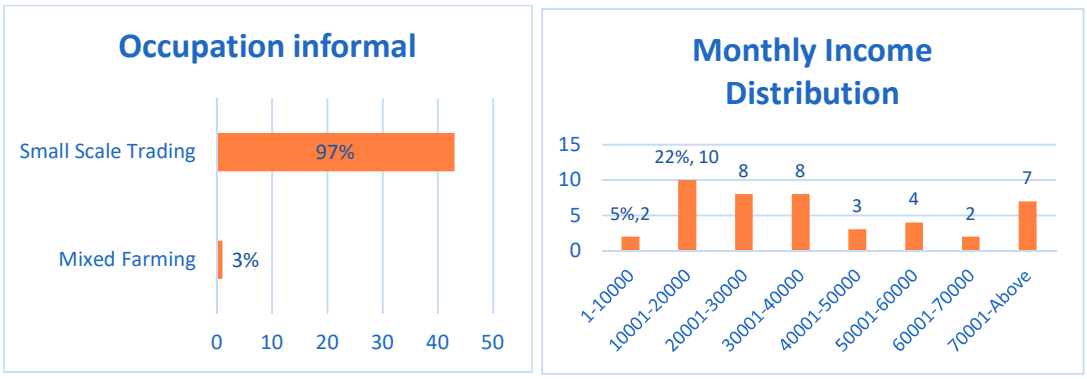
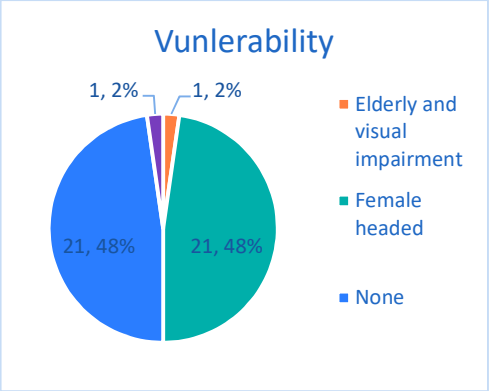


Figure 5.3: Occupation and income

5.5 Impact Assessment

As indicated in figure 5.4, the census identified 44 affected persons who will be affected temporarily. Of these, 23% are expected to suffer moderate revenue losses due to disruptions of business during trenching activity and will require temporary relocation or recovery assistance. Meanwhile, 74% are anticipated to face low income disruptions but can continue operating with minor adjustments.

Notably, 52% of these businesses are operated by women, and 48% are micro-enterprises with limited financial resilience. Micro-enterprises are small businesses typically employing fewer than ten people and often have minimal financial buffers, making them particularly vulnerable to economic disruptions. The type of businesses include: kiosks, charcoal selling, vegetable vendors, hawkers and a tree nursery.



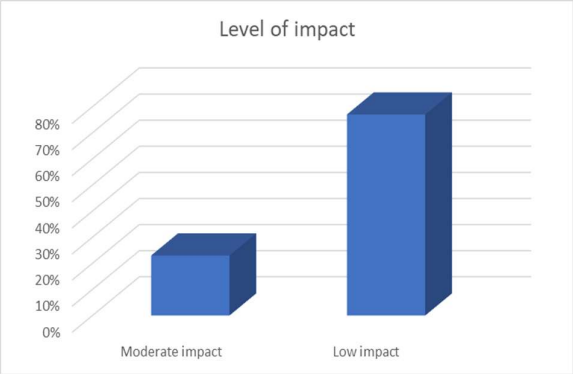


Figure 5.4: Vulnerability and level of impact

5.5.1 Risk Impact Categories

- **Moderate-low risk impact businesses:** business disruption leading to significant revenue loss due to prolonged construction activities affecting Informal vendors and traders, and Vulnerable groups (elderly, disabled, female-headed households) in the CBD. Partial disturbance, such as reduced customer access to business premises in the CBD and Lakeview areas. That notwithstanding, the WSP has proposed mitigation measures to avoid this impact or reduce by working at night and/or trenching and backfilling at the same time to avoid loss of revenue.
- **Low-risk impact businesses:** Minimal disturbances like noise, dust, or temporary inconvenience in the CBD and Lakeview Wayleave areas.

5.5.2 Access and Utilities

Ninety-eight percent (98%) of businesses in the Central Business District (CBD), encompassing both the Southern and Northern sections, and 5% of businesses in the Lake View area are likely to experience temporary disruptions in customer access or utility services, such as water, parking, internet, and electricity.

As a result, the CBD, being densely populated, is classified as a moderate-low risk to low-risk area. In contrast, Lake View, characterized by its sparsely populated residential zones (including tenants and landlords), is designated as a low-risk area.

5.6 Mitigation Measures

5.6.1 General Mitigation Measures

- Schedule construction during non-peak business hours or at night, with the provision of surveillance security to protect workers and property.
- Ensure the timely reinstatement of affected premises; same day excavation, pipelaying and backfilling.
- Provide alternative access routes and paths for customers and suppliers.
- Affected persons should be properly consulted and given opportunities to participate in the planning and implementation process, in accordance with the principles outlined in

the World Bank Operational Policy (OP 4.12). Key consultations with utility service providers (internet and electricity) and relevant road departments are essential for effective coordination of service restoration and to minimize involuntary disruptions to PAPs.

- Asbestos is carcinogenic; minimize the disturbance of asbestos pipes.
- Secure construction site trenches with clear safety signage and appoint an environmental and health safety officer.

5.6.2 Risk-Specific Mitigation Measures

Risk Level	Mitigation Measure
Medium Risk	Compensation for reduced income and provision of signage for customer access. Advance notification to businesses.
Low Risk	Dust control measures, public awareness campaigns, and minor financial support.

5.7 Entitlement Framework

5.7.1 Eligibility

PAPs eligible for compensation:

- Businesses experiencing temporary or economic displacement.
- Owners or operators of businesses identified during the census and asset inventory as 4th December 2024 are eligible for compensation. According to OP 4.12, cut-off date is the date the PAP census begins. The cut-off date is important because it guards against influx of people to the project area. Influx can increase the cost of compensation and need to be avoided. Persons who encroach on the area after the cut-off date are not entitled to any resettlement package. Improvements made to homes or additional structures added by existing residents after the cut-off date are also not eligible for compensation.

5.7.2 Compensation Matrix

The entitlement matrix establishes the specific rights and entitlements to replace affected assets or provision of compensation and assistance. These rights are granted to PAPs who will lose proven Economic or physical assets as determined during the census survey.

Category	Compensation Type	Entitlement
Medium-Risk Businesses	Partial income compensation (**Daily business and workers income)**	Average daily income + 15% disruption period. Add 15% Disturbance Allowance Add Transitional Assistance Add Support to Vulnerable PAP
Low-Risk Businesses	One-time disturbance allowance	Fixed sum (KES)

Category	Compensation Type	Entitlement
Utilities (Water/Electricity, internet fibre connection)	Cost of reconnection	Cost of reinstatement
Vulnerable Groups	Additional support	Livelihood restoration grants

5.8 Budget and Funding

The total budget for economic and or temporal displacement compensation is Kshs. 221,814.31 inclusive of other costs such as disturbance allowance, livelihood restoration, and grievance redress and administration. All costs associated with this PAP register will be met by the NAIVAWASCO.

Item	Cost Estimate (KES)
Compensation for the loss of revenue	178,882.50
Administrative Costs (9%)	16,099.43
PAP compensation process, monitoring and evaluation (15%)	26,832.38
Total Estimated Budget	**221,814.31**

A detailed PAPs register with details of the PAPs and cost is in appendix E.

5.9 Implementation Schedule

Activity	Timeline
Signing of Wayleave Agreement and Compensation Disbursement	Week 1 – Week 2
Livelihood Restoration	Week 3 – Week 4
Monitoring and Evaluation	1 Month

5.10 Monitoring and Evaluation Framework

- **Indicators:**
  - Number of businesses compensated.
  - Percentage of businesses restored to pre-project income levels.
  - Number of grievances resolved within the timeframe.
- **Reporting:** Monthly updates and quarterly evaluations.

5.11 Conclusion and Recommendations

This section ensures a structured and equitable approach to mitigating economic impacts on businesses in Naivasha CBD and Lake View areas. It is recommended that:

1. Compensation is disbursed promptly to avoid prolonged disruptions.
2. PAPs are continuously engaged during implementation.
3. Post-project evaluations are conducted to ensure long-term livelihood restoration.
4. The mitigations measures are updated in the ESIA reports.

6 PUBLIC CONSULTATION, PARTICIPATION AND STAKEHOLDER ENGAGEMENT

6.1Introduction

This chapter describes the process, and activities related to public consultation and stakeholder engagement that were undertaken to ensure that the relevant stakeholders and the public / community are informed about the project and are involved in the identification of key issues and impacts of the proposed project. Stakeholders are defined as persons or groups who are directly or indirectly affected by a project as well as those who may have interests in a project and / or the ability to influence its outcome, either positively or negatively.

Stakeholder engagement and public consultation are an integral aspect of successful decision making in the ESIA process and implementation of projects, plans and programmes. It is central to all other aspects of environmental and social performance. It is the basis for building strong, constructive and responsive relationships that are essential for the successful management of a project's environmental and social impacts (IFC, 2012). The key focus of meaningful consultations is equity and inclusivity i.e. ensuring that all groups (including those that are disadvantaged or vulnerable) are embraced within the consultation process on equal terms, and that all groups are given the capacity to express their views with the knowledge that these views will be properly considered.

The process of engagement presupposes that the relevant stakeholders and other interested publics have access to timely and accurate information on the environment and the proposed development and are therefore able to offer informed views on the project. Stakeholder engagement presents a useful avenue for gathering, understanding and establishing likely impacts of projects, determining community and individual preferences and selecting alternatives. For the proposed potable water networks project, stakeholder engagement focused on diverse issues including disclosure of project information, communication on project scope, financiers and financing framework, construction and operation impacts, mitigation measures, project benefits and recommendations.

The objectives of stakeholder engagement were.

(a) Share project information.

(b) Obtain feedback from the stakeholders.

(c) Bring the stakeholders up to date on the progress of the project as well as next steps to be undertaken.

(d) Garner support for the project hence acquiring the social license /acceptability.

(e) Reduce possibility of conflict through early identification of contentious issues.

(f) Understand culturally sensitive information about the stakeholders.

6.2 Consultation method and approach used in ESIA

Stakeholder mapping and analysis was undertaken in order to determine the particular stakeholders in the project area of influence (individuals, groups, communities, institutions/ organizations, agencies etc.) that will be affected directly or indirectly, either positively or

negatively by the proposed project; or those who can contribute to, or hinder its success, and those with interests, have mandate over various issues related to the project. Overall, the critical guiding participation principles used are outlined in Table 6.1 below.

Table 3: Principles of Participation and how they were ensured in the ESIA process

Principle	How observed
Adaptive, communicative, meaningful and pro-active consultation	• Project information was shared in Swahili and English languages. In some cases where necessary translation was provided by a local person / someone appointed by the community or the chief. Some questions were however asked in Kiswahili, local language or English. • Information provided was extensive, detailed and providing as much information as possible but mainly revolving around dissemination of fundamental project background, objectives, scope, description of the proposed alignment, administrative footprint, potential positive and negative lenders, compensation entitlements, safety. • Effort was put towards simplification of technical processes and concepts.
Accessibility	• The locations for consultation were convenient to the stakeholders – in their offices or places where they live in the community. • Meeting venues were accessible to all those who wanted to attend; meetings were held within settlements, mainly in venues used for community meetings e.g. chiefs baraza, social halls, open air, tents. • There were no restrictions for attendance.
Inclusivity	• All the stakeholders – men, women, youth, leaders, vulnerable peoples, households etc. were notified of the meetings and involved in the meetings. • Notices for meetings were posted well in advance, announcements were made in community gatherings. • Community mobilizers were used to reach more people.
Right to questions and responses	• In line with Article 33 of the Constitution, which states that public participation should respect the freedom of expression of the participants, the stakeholders were allowed to ask questions, share their views, make recommendations, seek clarifications, make comments about all aspects of the project. • All the questions, requests for clarifications, or additional information were responded to. • Time was dedicated to a question-response session in all the engagements.

Stakeholder engagement/participation was achieved through a variety of information and consultation methods. These were contextualized to the type of stakeholder and/or complexity of the information to be shared or collected. The consultation methods used were (see table 6.2 & 6.3): community meetings, administration of a household questionnaire, key informant interviews, observation and secondary data.

Table 6.2: Consultation Methods

Stakeholder Type	Details of Stakeholders	Consultation Method
Community members in the project area individuals / groups institutions that may or not be direct beneficiaries but who consider or perceive their interests in the project and the process of its implementation in some way.	All community members: men, women, youth, vulnerable, PWDs, community leaders, business people, religious leaders, traditional council of elders, village managers. • National Government County leaders e.g. Chiefs, Assistant Chiefs. • County Government Officers including Municipal Managers	• Environmental Impact Assessment questionnaire. • Community meetings. Barraza - notices of meetings were delivered to respective chiefs, Assistant Chiefs, village elders, Nyumba kumi elders, places of worship, markets, institutions. Announcements were made in public gatherings including places of worship, chiefs baraza, funerals, water collection points. • Face to face meetings. • One- on- One/ face to face meetings • Key Informant Interviews
Government Agencies	• Kenya Wildlife Service (KWS) • NEMA • KURA/KERRA • CECM Water • CECM Roads • Water Resources Authority	• Key informant interviews • Face to face discussions • Questionnaire

Table 4: Key Stakeholders Consulted

Stakeholder	Relevance to the project components
National Government (Chiefs)	• Key implementer of government and public projects. • Safety of project staff and infrastructure. • Coordination and mobilization of the community and other stakeholders relevant to the project.
National Environment Management Authority (NEMA)	Review ESIA reports and issue EIA Licence
County Government	• Community Mobilization. • Implementer of County Projects. Therefore, liaison will be required for functions that fall under Nakuru County.
Kenya Wildlife Service	Some of the areas where the proposed project traverses have wildlife and wildlife corridors. Therefore, KWS is key agency to engage.
Water Resources Authority	Where the proposed project will traverse water catchment areas the agency was engaged.
Kenya Urban Roads Authority (KURA)	Some of the proposed water networks will have road crossings where the agencies were engaged.

6.3 Stakeholder Consultation and Engagement

6.3.1 Public community meetings (Barazas)

The Notices were distributed in the community, posted in public spaces including markets, places of worship, chiefs' offices, bus stops, social halls and shared with community members at random. The chief also made announcements of the planned meetings during their scheduled baraza meetings.

Objectives of community consultation meetings

i. To share and sensitize the community about the proposed project
ii. To obtain feedback from the community about the project.
iii. Promote community understanding of the issues and scope of the project with respect to the key project components.
iv. Learn how to work with the community to ensure that their concerns and aspirations are understood and considered in the ESIA report, and to assure them that their aspirations would be directly reflected in the report.
v. Empower the community to make them partners in every aspect / stage of decision making of the project
vi. Identify and establish a communication channel between the community, the consultants, project proponents and government.

Details of Minutes of Meetings and attendance list is placed at **Appendix- A & B** respectively.

6.3.2 Stakeholder Engagement Feedback

In all the engagements – both high level and community level, several issues were raised. The issues ranged between questions, comments and recommendations. The issues were synthesized/ summarized below, and responses provided (for questions) as shown in the Table 6.4 below.

Table 5: Question/Issue Response Matrix

Participant Name	Issue Raised	Responses
Njuguna Njoroge	In lakeview estate, we do not have an issue with water and the leakages were already fixed since new pipes were installed recently. Will you be removing the new pipes or will you be installing new pipes in different areas?	Samson Mwangi (NAIVAWASCO Technical Team) responded that there is a new line that they are focusing on, the new pipes that were installed will not be removed. He went ahead and showed the map and explained further the proposed lines.
	Suggestion: Before the project commences, they should give notice early enough so they can find different ways of meeting their day to day life in terms of roads and the issue of water rationing. Suggestion: The project should take the shortest time possible since the issue of insecurity might rise. In that, when drilling is done, the open trenches might be	The ESIA consultant explained that they will give a 7 days notice prior.

Participant Name	Issue Raised	Responses
	dangerous to the kids within the estate.	
	Which safety measures will be taken during and after the project is being done?	The ESIA consultant provided comprehensive safety mitigation measures that will be taken during and after the project to ensure community well-being and improve water reliability and quality: Measures will be taken to minimize environmental impact, such as proper disposal of construction waste, protection of water sources from contamination, and dust control practices. All personnel involved in the project will undergo comprehensive health and safety training. This will include proper handling of equipment, emergency response procedures, and adherence to safety protocols. Construction sites will be secured with appropriate barriers and signage to prevent unauthorized access. Safety officers will be present to monitor and manage site activities. Traffic control measures will be implemented to ensure the safe movement of vehicles and pedestrians around construction zones. This includes clear signage, detours, and coordination with local traffic authorities. Regular updates will be provided to the community regarding project progress, potential disruptions, and safety guidelines. A dedicated contact point will be established for residents to report concerns or incidents.
Joel Mungai	There hasn't been any problem with water supply in Lakeview area. The main issue has been the sewer lines. Will you be handling sewer lines as well?	The ESIA consultant explained that the project majorly focuses on water pipes. For the sewer lines, NAIVAWASCO should be able to tackle that. Samson Kariuki (NAIVAWASCO Technical team) responded that they have already laid a design for the sewer lines and they will soon start the project.
Virginia	How does the new project intend to deal with the stealing of meter boxes within the	Samson Kariuki (NAIVAWASCO Technical team) answered that regarding meter theft,

Participant Name	Issue Raised	Responses
Njuguna	area?	it is upon the members to take care of their goods, they should create a chamber for the new meter boxes.
	Why is it that the rates of water payment is quite high in Lakeview compared to the other parts of Naivasha town.	Samson Kariuki (NAIVAWASCO Technical team) responded that in case one is overcharged, they should get to the office for further support.
Lucy Wambui	Why are we being overcharged despite not having water in the area? The meter boxes might not be working but we'll still be overcharged. Suggestion: Do the water rationing in sections. Instead of the whole estate being affected, construction should start with one area, do the excavation, finish and cover up before moving to the next one.	Samson Kariuki (NAIVAWASCO Technical team) responded, in case there is an issue with the meter boxes and reading has been done wrongly, they should report to the office for further assistance.
Candy Makena	Will there be new charges with the new project and will we have to pay extra for the piping?	The ESIA consultant responded that they will not be charged for anything. The project is fully funded by World Bank which makes I possible to cover all the project expenses.
Sam Kariuki	Suggestion: There has been an issue of vandalization of sewer lids. NAIVAWASCO should come up with a way of creating better lids or, have a hotline that is accessible incase such an issue occurs.	Samson Mwangi (NAIVAWASCO Technical team) responded that they do have a customer care number, however, they will look into it.
	Suggestion: Water billing should be done at the beginning of the month and they should be given enough time to make payments, unlike when billing is done and they are only given 4 days to make payments, or else, their water is disconnected.	

6.3.3 Summary of E&S issues raised through interviews

The consultant administered questionnaires to the community and business people within Naivasha town. The table below shows a summary of the issues raised:

E&S issues raised	Description of the issue
Noise pollution	Residents of Lakeview and Naivasha town are apprehensive about the anticipated noise pollution due to the use of heavy machinery during the

E&S issues raised	Description of the issue
	project. The potential for increased noise levels is a significant concern for those living in proximity to the construction sites.
Insecurity	The construction process introduces risks such as open trenches, which may pose dangers, particularly to children. Additionally, the project could lead to a rise in crime if adequate security measures are not implemented or if the project experiences delays.
Contamination of existing water supply.	There is a notable risk of contaminating the existing water supply and Lake Naivasha during construction. Concerns are particularly high if the project coincides with the rainy season, as dust and debris could be washed into the lake, potentially harming both human and aquatic life.
Reduced water wastage	The primary goal of the project is to replace outdated water pipelines, which is expected to minimize water wastage. By upgrading the infrastructure, the project aims to reduce leakage and ensure a more reliable water supply for essential needs
Air pollution	The project will involve excavations and the transportation of materials, which could lead to air pollution. Residents have suggested mitigating this impact by sprinkling water on construction sites before drilling to minimize dust during dry conditions.
Employment opportunities	The project is anticipated to create job opportunities for local youth, which could help address issues of insecurity and traffic control. Providing employment is seen as a positive outcome that will also aid in proper project coordination.
Traffic accidents	The project's impact on Naivasha town, a key commercial area with busy roads, raises concerns about traffic accidents. Residents suggest that alternative routes should be established to mitigate traffic congestion and reduce the risk of accidents.

6.4 Key informant interview with national and County government administration officers

The table 6.5 below summarizes the key stakeholders consulted during the scoping phase.

Table 6: Details of Stakeholder Engagement / Consultation undertaken for proposed project

Name of Organization	Issues Raised
Nakuru County Government – Kenya Rural Roads Authority (KERRA)	The proposed project will not bring any negative impact to our operations for consultations have been made and agreed upon.
	Improvement to service delivery to the community.
Water Resource Authority	Water pollution and siltation of Lake Naivasha.
	Engage more man power during construction state especially if it will be during the rainy season to avoid water pollution.
Naivasha Municipality	There will be water rationing in the areas within the project slope, pollution from earthworks and machinery.
	Contractor to work within the project timeline and put up measures to reduce pollution and to be adhered on all project cycles.

7 PROJECT ALTERNATIVES

7.1Section Overview

The purpose of this section of the ESIA is to examine feasible alternatives to the project and, highlight the benefits of and general rationale for the project that need to be considered against any potential environmental cost. The general principle involved in identifying option(s) to the proposed development is to ensure that the option chosen, which indeed may be the 'non development' option, would result in optimal returns in social and environmental capital: In effect the option chosen should bode well not only for the developer, but also for the environment and stakeholders in the area. This section is a requirement of the National Environment Management Authority (NEMA) and is critical in consideration of the ideal development with minimal environmental disturbance.

7.2 The "No-action" alternative

The "No Project" alternative would prevent immediate environmental disturbances, preserving existing ecosystems and biodiversity. Natural habitats and water bodies would remain undisturbed, and local communities would avoid the short-term negative impacts associated with construction activities, such as noise, dust, or potential displacement. However, this approach has significant drawbacks. By not proceeding with the project, the existing deficiencies in water supply would persist, potentially exacerbating issues like inadequate access to clean water. This could lead to increased environmental stress due to unsustainable local water use practices. Furthermore, the lack of improvement in water infrastructure would negatively impact the quality of life for local communities, limiting their access to clean and reliable water essential for health, economic development, and overall well-being.

The "No Project" alternative would involve continuing with the current water distribution system. This would mean tolerating the existing high levels of Non-Revenue Water (NRW) due to physical losses such as leaks and bursts, leading to continued operational inefficiencies. Currently the existing supply network is significantly contributing to the current company NRW at Lakeview and CBD Zones. These are the two oldest zones for the Company with 95% of the water network having been inherited from the now defunct Naivasha town council that operated the network before the incorporation of the company. Networks in these zones have the following pipe networks: AC lines, UPVC, GI and HDPE. The proposed project goal is to replace the AC lines with HDPE lines as shall be discussed in details later on in the report.

7.3 Project Design

An alternative design approach for the proposed water network overhaul would involve optimizing the size and material of the new pipelines to balance cost-effectiveness and durability. The current proposal suggests overhauling the AC and PVC pipelines due to their inability to withstand transient flows during pumping, which has contributed to frequent bursts. An alternative design could involve the use of advanced pressure management systems could be incorporated to reduce the risk of bursts by maintaining consistent pressure levels throughout the network. In the case of the Lakeview and CBD zones, the design alternative could involve using a combination of smaller diameter pipes, such as DN40 to DN110, which have been identified as optimal for distribution based on hydraulic calculations. These smaller pipes would

ensure adequate water delivery while minimizing the risk of leaks and bursts due to high pressure. By adopting these alternative design elements, NAIVAWASCO could reduce the frequency of service interruptions, lower O&M costs, and improve overall service delivery to the affected areas.

Choosing an alternative project design could potentially reduce environmental degradation by incorporating features like a smaller footprint or improved energy efficiency. This could minimize impacts on local ecosystems, especially if the design includes less invasive construction techniques or green technology. However, there are potential downsides to consider. New design features might introduce unforeseen environmental issues or technical challenges.

7.4 Location

Instead of overhauling the existing pipelines in their current locations, an alternative location strategy could involve rerouting the pipelines along less congested routes to minimize the risk of external interference, such as damage caused by roadworks or erosion. For example, the current pipelines serving the Lakeview and Central Business District (CBD) areas could be relocated to corridors with less heavy traffic and construction activity. Relocating the pipelines to safer locations could reduce the likelihood of physical damage, which currently accounts for a significant portion of the leaks and bursts experienced by NAIVAWASCO each year. This strategy could also facilitate easier access for maintenance and repair activities, thereby reducing service down-times and operational costs. However, relocating pipelines will result to few connections since the current route is the optimal one and also, the new route could likely involve additional land acquisition costs.

7.5 Layout and replacement of the AC and PVC pipes

The alternative layout for the pipeline networks could involve reconfiguring the system to operate more efficiently by reducing interconnections and creating independent supply zones. The layout of the water distribution networks in the CBD and Lake view zones could be optimized by incorporating more sectional valves and washouts to allow for better isolation of affected areas during maintenance activities. This would minimize the impact of leaks and bursts on the overall system and improve service reliability. The use of district metering areas (DMAs) in the alternative layout could also enhance NAIVAWASCO's ability to monitor water usage and detect leaks more effectively. This would lead to a more responsive system, capable of addressing issues before they escalate into major service interruptions. The intervention involves replacement of old pipelines without altering the layout. This is intended to reduce the non-revenue water.

7.6 Preferred /Selected Alternative

The preferred option is **Project Design with HDPE pipes**. This alternative offers the most balanced approach to addressing the key challenges of the water distribution network in Naivasha. This design alternative proposes the use of HDPE pipes to reduce the likelihood of bursts that have historically caused frequent service interruptions. Additionally, incorporating smaller diameter pipes (DN40 to DN110) for the water distribution networks in these estates ensures that the system can operate at optimal capacity while minimizing the risk of high-pressure failures. The smaller pipes, designed based on hydraulic calculations, will provide a

more resilient water delivery system, reducing the operational costs associated with repairs and maintenance.

Key benefits of this alternative include:

- **Enhanced system reliability**: Pressure management systems reduce the risk of bursts, ensuring fewer interruptions in water supply, which directly improves service delivery for residents.
- **Environmental sustainability**: By avoiding the need for large-scale infrastructure in sensitive areas, this option limits the project's environmental footprint while still enhancing the water infrastructure.

Although this design alternative may involve higher upfront investment costs due to the incorporation of advanced technology, its long-term benefits in terms of system reliability, reduced water loss, and overall service improvement make it the most viable solution. This approach also aligns with NAIVAWASCO's objectives of meeting key performance indicators (KPIs) for water coverage, drinking water quality, and minimizing NRW.

Additionally, this option avoids the significant financial and operational drawbacks associated with the "No Project" alternative, which would perpetuate existing inefficiencies and lead to continued water loss and service interruptions. It also mitigates the challenges of relocating pipelines and reconfiguring the layout, both of which pose additional risks and costs without offering substantial improvements in service delivery.

8 PROJECT POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS AND MITIGATION MEASURES

8.1Overview

This chapter presents the assessment of the issues likely to emanate from implementation of the proposed project and associated infrastructure. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity, probability, and the stakeholders and/or values affected. In accordance with best practice, the analysis includes issues relating to the project's environmental and social sustainability. For potential negative impacts judged to be significant and require mitigation, the analysis is followed by notes on mitigation options. Impacts and their possible mitigation are combined in this chapter for easy reference. As in most impact studies, the analyses focus on potential problems and their solutions.

8.2 Impact identification

8.2.1 Sources of impacts

The impacts associated with the proposed project will emanate from project inputs, activities and outputs. The project inputs that shall be potential sources of impacts include materials taken from local and external sources including sand and cement; skilled and unskilled workforce exerting indirect demand for water supply and machinery used at the project site for various activities. As indicated in table 8.1, the project activities that shall be potential sources of impacts include obtaining raw materials e.g. transportation of raw materials, machinery and labour to the site; site preparation and clearance; topsoil removal; demolition works (for walkways, roads and fences located along project alignment areas); excavation works; disposal of excavated materials; backfilling works and compaction. Project outputs likely to lead to adverse impacts include solid wastes from construction and operation activities; emissions from the site (hydrocarbons, Carbon dioxide, and particulate matter); noise pollution from construction activities and hazardous waste (oil) spillage

Table 8.1: Sources of impacts

Project Inputs	Project Activities	Project Outputs
• Materials taken from local and external sources • Skilled and unskilled workforce • Machinery used at the project site	• Transportation of raw materials • Transportation of machinery • Transportation of labour • Site clearance • Excavation works • Spoil and waste disposal • Backfilling and compaction	• Waste generated • Gaseous emissions from the site • Noise from site activities • Oil spills

8.2.2 Receptors of impacts

The anticipated negative impacts will be experienced on both the physical and human environments. Human environment likely to be affected by project activities include structures within project vicinity and alignment areas; residential premises within project vicinity; businesses within project vicinity, Naivasha district hospital and workers at the site. Natural environment likely to be affected by project activities include surface (L. Naivasha) and ground water resources and air quality. Table 8.2 highlights these receptors.

Table 8.2: Receptors of impacts

Human Environment	Physical Environment
• Residential houses Lave view zone • Business premises within Naivasha town • Naivasha district hospital • Workers at the site	• Surface water resources • Ground water resources • Plants and animals within project alignment area • Ecologically sensitive areas • Soil

8.2.3 Impact Assessment Criteria

The criteria applied in this study are based on industry standards for impact assessment, adopted for use in the assessment of the proposed project impacts. The purpose of impact assessment is to assign relative significance to predicted impacts associated with the project, and to determine the way impacts are to be avoided, mitigated or managed. The rating of impacts assumes that standard construction and operating procedures present in the project description will be implemented. The impact assessment criteria include the spatial context of project impacts; temporal context; and reversibility, magnitude and significance of potential impacts of project construction and operation. The potentially significant environmental and social impacts have been identified based on the nature of the receiving environment, analysis of the proposed activities and analysis of the issues raised by stakeholders during public participation process.

8.3 Impact Assessment Methodology

8.3.1 General

In the impact assessment stage of the ESIA, identified issues are analysed and expected impacts are defined. This analysis identifies the types of impact; predicts the magnitude, probability of occurrence and extent of the impact; and determines the overall significance of the impact

8.3.2 Identification of environmental aspects and impacts

The outstanding environmental and social issues identified as having significance have been assessed using the following methodology.

(i) First, the issues identified were described considering the associated activity and the aspect of that activity that is likely to result into an impact.
(ii) The nature of the impact was then described.
(iii) Once this was undertaken, the significance of the impact was determined.

The following definitions have been used in identification of environmental and social impacts in this study:

(i) An activity

This is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation.

(ii) An environmental aspect

This is an "element of an organisation's activities, products and services which can interact with the environment". The interaction of an aspect with the environment may result in an impact.

(iii) Environmental impacts

These are the consequences of these aspects on environmental resources or receptors of value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. Receptors can comprise, but are not limited to, people or human-made systems, such as residents, communities and social infrastructure, as well as components of the biophysical environment such as aquifers, flora and palaeontology. Impacts on the environment can lead to changes in existing conditions; the impacts can be direct, indirect or cumulative. Direct impacts refer to changes in environmental components that result from direct cause-effect consequences of interactions between the environment and project activities. Indirect impacts result from cause-effect consequences of interactions between the environment and direct impacts. Cumulative impacts refer to the accumulation of changes to the environment caused by human activities.

Aspects and impacts associated with the proposed development have been differentiated into construction and operation phases of the project.

8.3.3 Description of aspects and impacts

The accumulated knowledge and the findings of the environmental investigations form the basis for the prediction of impacts. Once a potential impact has been determined during screening and scoping process, it is necessary to identify which project activity will cause the impact, the probability of occurrence of the impact, and its magnitude and extent (spatial and temporal). This information is important for evaluating the significance of the impact, and for defining mitigation and monitoring strategies and has been used in this study. The aspects and impacts identified have been described based on the following criteria.

8.3.3.1 Spatial scope

The spatial scope for each aspect, receptor and impact has been defined. The geographical coverage (spatial scope) description has taken account of the following factors:

- The physical extent/distribution of the aspect, receptor and the anticipated impact; and
- The nature of the baseline environment within the area of impact.

The spatial scope of the impact has been rated on the following scale:

Activity specific	1	Area specific	2	Whole site	3	Regional/ neighbouring areas	4	National	5

8.3.3.2 Duration

Duration refers to the length of time that the aspect may cause a change either positively or negatively on the environment. The environmental assessment has distinguished between different time periods by assigning a rating to duration based on the following scale:

One day to one month	1	One month to one year	2	One year to ten years	3	Life of operation	4	Post closure	5

8.3.3.3 Severity

The severity of environmental aspect has been determined by the degree of change to the baseline environment, and has included consideration of the following factors:

(i) The reversibility of the impact.

(ii) The sensitivity of the receptor to the stressor.
(iii) The impact duration, its permanency and whether it increases or decreases with time.
(iv) Whether the aspect is controversial or would set a precedent; and
(v) The threat to environmental and health standards and objectives.

The following ratings have been used

Insignificant/ non-harmful	1	Small/ potentially harmful	2	Significant/ slightly harmful	3	Great/ harmful	4	Disastrous/ extremely harmful	5

8.3.3.4 Frequency of Activity

Frequency of activity has considered the repetitiveness of various project activities and how this may impact on the various receptors of the impacts. The following ratings have been used

Annually or less	1	6 monthly	2	Monthly	3	Weekly	4	Daily	5

8.3.3.5 Frequency of the impact

The frequency of the impact occurring refers to how often the aspect impacts or may impact either positively or negatively on the environment. After describing the frequency, the findings have been indicated on the following scale:

Almost never/ almost impossible	1	Very seldom/ highly unlikely	2	Infrequent/ unlikely/ seldom	3	Often/ regularly/ likely/ possible	4	Daily/highly likely/ definitely	5

8.4 Assessment of significance of impacts

8.4.1 General

The purpose of impact evaluation is to assign relative significance to predicted impacts associated with the project, and to determine the way impacts are to be avoided, mitigated or managed. The information presented above in terms of identifying and describing the aspects and impacts have been summarised in a tabular form and significance has been assigned with supporting rationale. Significance has been determined before and after mitigation, taking into consideration all the factors described above. A definition of a "significant impact" for the purposes of this study is: "An impact which, either in isolation or in combination with others, could, in the opinion of the specialist, have a material influence on the decision-making process, including the specification of mitigating measures."

8.4.2 Significance determination

The environmental significance rating is an attempt to evaluate the importance of a particular impact, the consequence and likelihood of which has already been assessed by the relevant specialist. The description and assessment of the aspects and impacts undertaken is presented in a consolidated table (Table 8.3) with the significance of the impact assigned using the process and matrix detailed below. The sum of the first three criteria (spatial scope, duration and severity) provides a collective score for the CONSEQUENCE of each impact. The sum of the last two criteria (frequency of activity and frequency of impact) determines the LIKELIHOOD

of the impact occurring. The product of CONSEQUENCE and LIKELIHOOD leads to the assessment of the SIGNIFICANCE of the impact, shown in the significance matrix below.

Table 8.3: Significance Assessment Matrix

CONSEQUENCE (Severity + Spatial Scope + Duration)															
LIKELIHOOD (Frequency of activity + Frequency of impact	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 8.4 highlights the positive and negative mitigation ratings.

Table 8.4: Positive and Negative Mitigation Ratings

Colour Code	Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
	Very high	126-150	Improve management current	Maintain current management
	High	101-125	Improve management current	Maintain current management
	Medium-high	76-100	Improve management current	Maintain current management
	Medium-low	51-75	Maintain management current	Improve current management
	Low	26-50	Maintain management current	Improve current management
	Very-low	1-25	Maintain management current	Improve current management

The model outcome is then assessed in terms of impact certainty and consideration of available information. Where a particular variable rationally requires weighting or an additional variable requires consideration, the model outcome is adjusted accordingly. Arguments for such adjustments are presented in the text and associated table 8.5.

Table 8.5: Framework for Assessing Environmental Impacts

Spatial Scope	Rating	Duration	Rating	Severity	Rating
Activity specific	1	One day to one month	1	Insignificant/ non- harmful	1
Area specific	2	One month to one year	2	Small/potentially harmful	2
Whole site / plant	3	One year to ten years	3	Significant/ slightly harmful	3
Regional (neighbouring areas)	4	Life of operation	4	Great/harmful	4
National	5	Permanent	5	Disastrous/ extremely harmful	5

Frequency of Activity	Rating	Frequency of Impact	Rating
Annually or less	1	Almost never / almost impossible	1
6 monthly	2	Very seldom / highly unlikely	2
Monthly	3	Infrequent / unlikely / seldom	3
Weekly	4	Often / regularly / likely / possible	4

Daily	5	Daily / highly likely / definitely	5
Significance of impact		**Timing**	
Very Low (1-25) Low (26-50) Medium -Low (51-75) Medium-High (76-100) High (101-125) Very High (126-150)		Pre-construction Construction Operation	

8.5 Description of Feasible Alternatives

Although alternatives were investigated in detail during screening and scoping process, a review of the options based on the impact assessment have been undertaken in comparison with the preferred option.

8.6 Mitigation

Measures to avoid, reduce or manage impacts consistent with best practice have been proposed and the effectiveness of such measures assessed in terms of their ability to avoid, remove an impact entirely, render it insignificant or reduce its magnitude. In assessing the significance of the impact, natural and existing mitigation have been taken into account. Natural and existing mitigation measures are defined as natural conditions, conditions inherent in the project design and existing management measures that alleviate (control, moderate or curb) impacts. In addition, the significance of impacts has been assessed considering any mitigation measures that are proposed.

8.7 Existing environmental and social impacts

The environmental and social impacts of the projects are closely interlinked due to the common objective of addressing deteriorating water networks and improving water service delivery in Naivasha town. The existing water supply systems in these areas are plagued by high incidences of leaks, bursts, and NRW losses, leading to significant environmental degradation and social inconveniences.

In the distribution main overhaul, the key environmental challenge stems from the frequent bursts and leaks, which result in substantial water loss. These water losses exacerbate the strain on Naivasha's already scarce water resources, contributing to a reduction in water availability for both residential and commercial consumers. The physical damage to pipelines, often caused by external interference such as erosion and roadworks, further compounds the environmental impact. The intermittent water supply caused by these dilapidated networks not only disrupts water access but also leads to over-extraction of water from natural sources as NAIVAWASCO attempts to compensate for the losses. Additionally, the repair and replacement activities generate construction waste and necessitate the use of materials that could further strain local ecosystems if not managed properly.

From a social perspective, the frequent water supply interruptions have a significant impact on the daily lives of Naivasha residents, particularly in the Central Business District (CBD) and the densely populated areas of Lakeview estate. The average service downtime of seven hours per burst creates hardship for households, businesses, and institutions reliant on consistent water access. The prolonged downtime and the high number of bursts—averaging three per pipeline per month—indicate a critical need for infrastructural upgrades to meet the demands of a

growing urban population. Furthermore, the interconnections between the pipelines exacerbate the social impact, as a burst in one line often leads to disruptions in adjacent lines, increasing the number of affected customers. The environmental and social challenges observed is on the degradation of old pipes that are prone to clogging, brittleness, and frequent leaks. The outdated networks not only cause extensive water losses, but also contribute to environmental degradation through water pollution and soil erosion.

Socially, the frequent supply failures affect a substantial number of consumers that relies heavily on regular water access for domestic and commercial activities. The social cost of the intermittent supply is considerable. The operational and maintenance costs associated with repairing the leaks and bursts underscore the financial burden on NAIVAWASCO and, by extension, on the communities that depend on these water networks. Issues noted within the project area that may adversely impact the proposed project implementation include the following:

8.7.1 Encroachment of road reserve

Road reserves within the project area have been encroached by businesses. Several business enterprises have been erected within road reserves. These businesses include second hand cloth stores, food kiosks, retail shops and tree nurseries. Some of the businesses are constructed of temporary materials. This has led to a situation where the roads have become narrower, and this may pose challenges during implementation works.



Figure 8-1: Businesses along the road reserve in the Naivasha CBD

Mitigation

- Excavation works to be undertaken during the night to avoid impacts on the traders
- Compensation of the affected traders during project construction

8.7.2 Inherited Old Networks

NAIVAWASCO has inherited outdated and dilapidated water networks, particularly in the Lakeview and CBD areas from defunct municipal. These old systems are unfamiliar to the current team, making it difficult to conduct a comprehensive assessment and accurately predict potential issues. This lack of familiarity could lead to delays in project timelines as additional inspections, tests, and adjustments may be needed to ensure a smooth overhaul.

Mitigation:

- Conduct comprehensive mapping and documentation of the existing infrastructure using Geographic Information Systems (GIS).
- Engage experienced personnel familiar with legacy systems to provide insights and support during the overhaul.
- Ensure all records of previous installations and maintenance activities are digitized for easy reference and use in the overhaul.

8.7.3 Interconnection with other Lines

The existing networks are interconnected, and during the overhaul, it may be challenging to disconnect them without causing disruptions in other parts of the system. Additionally, some parts of the network, such as "spaghetti lines" that have been disabled, may still pose challenges when reconfiguring the new systems.

Mitigation:

- Conduct a detailed survey to identify all existing interconnections and disconnect non-essential or redundant connections.
- Create independent operational zones by installing sectional valves and ensuring proper isolation of networks during maintenance or overhaul activities.

8.7.4 Possibility of Illegal Tapping

As the water networks are transmission lines, there is a possibility that individuals may attempt to tap into the lines illegally during or after the project. Illegal tapping not only reduces revenue but also compromises water quality and safety.

Mitigation:

- Install tamper-proof valves and smart metering technology along the transmission line to monitor unauthorized use.
- Increase surveillance and patrols along the line, particularly in areas prone to illegal connections.
- Implement public awareness campaigns about the legal implications and penalties for illegal tapping.

8.7.5 Road/ Railway Crossings

The pipeline in the CBD and lake view area presents challenges due to 8No. road crossings. There are four major crossings along Mama Ngina and Kenyatta avenue that require careful planning and execution to avoid disrupting traffic and damaging existing infrastructure.

Mitigation:

- Coordinate closely with the Nakuru County Government and KURA/KeNHA/Kenya railway corporation to obtain necessary permits and approvals for road and railway crossings.
- Implement trenchless technology, such as horizontal directional drilling (HDD) – Micro-tunnelling, to minimize surface disruptions and expedite road crossings.
- WSP proposed to use existing AC pipes as sleeves at these crossings.
- Work during off-peak traffic hours to reduce the impact on road users and ensure proper road reinstatement after crossing works.

8.8 Potential impacts and mitigation measures during construction phase

8.8.1 Disruption of socio-economic activities within the project area

Impacts on socio-economic front associated with the proposed project have been looked at from the point of view of individual properties that will be affected by project infrastructure. Most of the properties in question include business premises among them kiosks and shop verandas. Most of these are located along project alignment areas and will be affected during construction process. The disruptions of the socio-economic activities have the potential of leading to losses of revenue.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3 Whole site	2 One month	4 Harmful	5 Daily	4 Likely	9	9	81 Medium-high
Mitigation Measures	• There are 44PAPs, mainly traders and vendors who are doing business within road reserves in Naivasha CBD and Lake view estate. The traders will be compensated and given sufficient notice to relocate temporarily before excavation activities begin. They will be allowed to reconstruct their kiosks after the pipes have been laid and trenches backfilled. The impacts will therefore be short term and low. WSP has proposed to undertake the project during the night to avoid these impacts and it envisaged that minimal or no disruption will occur. The list of PAPs with business identified along the wayleave are provided in appendix E. • In situations where the facilities are outside the road reserve must be affected by the works, the affected individuals shall be compensated as per provisions of World Bank OP 4.12 and applicable Kenyan legislations. • Loss of revenue from disrupted services e.g. water shall be mitigated through expeditious restoration							
With mitigation Measures	1 Activity specific	1 One day to one month	1 Non harmful	4 Weekly	1 Almost impossible	3	6	15 Very Low



Business kiosks along the road in CBD area



Boda Boda shed

8.8.2 Disruption of water supply within the project alignment area

The water networks being overhauled are critical transmission lines serving large sections of Naivasha CBD. During the implementation phase, service downtime is inevitable. As the lines are interconnected, a disruption in one part of the network could affect other areas, leading to widespread service outages. Prolonged service downtime will not only inconvenience consumers but also result in significant revenue losses for NAIVAWASCO. This could further strain customer relations and lead to complaints or legal claims for compensation.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	4	5	3	9	8	72
	Whole site	One month to one year	Harmful	Daily	Infrequent			Medium-Low
Mitigation Measures	• Schedule construction activities during off-peak hours / rationing hours and notify consumers in advance (1week notice) about expected service interruptions. • Implement temporary water supply solutions, such as water tankers or auxiliary lines, to serve critical consumers during downtime. • Install sectional valves to isolate parts of the network during maintenance, reducing the number of affected consumers.							
With mitigation Measures	1	1	1	4	1	3	5	15
	Activity specific	One day to one month	Non harmful	Weekly	Almost impossible			Very Low

8.8.3 Impact on footpath and access to buildings

These impacts shall emanate from destruction of pavements along Mama Ngina street in Naivasha town including access roads within the lake view estate, and fences during excavation of the trenches to lay the pipe. The pavements are made of cabro, concrete slab or earth surface will be affected during trenching works. As provided in the BoQ, the contractor will reinstate the pavements and access to buildings.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
	3	2	4	5	2			63

Without Mitigation	Whole site	One month to one year	Harmful	Daily	Very seldom	9	7	Medium-Low
Mitigation Measures	(v) The destroyed pavement and access will be restored by the contractor and the cost is provided in the attached BoQ							
With mitigation Measures	1	1	1	4	2	3	6	18
	Activity specific	One day to one month	Non harmful	Weekly	Very seldom			Very Low



The pipeline will pass along the live fence in Lakeview zone



Access to these businesses will be affected along Mama Ngina street



Cabro pavement to be affected at B&L hospital in CBD area which will be restored by the contractor and cost is factored in the BoQ

8.8.4 Impact on public roads and railway line

There are instances where the proposed project infrastructure will cross public roads (Mama Ngina street, Nakuru-Naivasha-Mai Mahiu highway) and railway line thus the potential to disrupting traffic flow. Access roads within the project area are likely to be temporarily blocked by excavated materials. Road surfaces may also be interfered with because of trenching works.

WSP has proposed to undertake Micro tunnelling on all the road and railway crossings, also, the existing AC pipes will be used as sleeves to pass through the new lines across the roads. These measures will minimize traffic flow disruption and also avoid opining up trenches while crossing the roads and railway line. As discussed in section 8.7.5, the proponent will minimize the imapcts.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	4	5	2	9	7	63
	Whole site	One month to one year	Harmful	Daily	Very seldom			Medium-Low
Mitigation Measures	(i) Micro tunnelling will be done to avoid excavations (ii) Existing AC pipes will be used as sleeves (iii) All excavated soil shall be used for backfilling of trenched areas and site restoration. (iv) Any damaged road surfaces shall be adequately restored to pre-excavation conditions. (v) Excess spoil materials shall be disposed of in approved tips in compliance with existing laws, rules and regulations							
With mitigation Measures	1	2	1	4	2	3	6	18
	Activity specific	One day to one month	Non harmful	Weekly	Very seldom			Very Low



Affected access roads at Lake view zone

8.8.5 Blockage of drainage channels

Drainage blockages due to temporary disruption of surface runoff as a result of the construction process will be experienced. Inadequate drainage could lead to waterlogging and erosion. Collaboration with the county government is necessary to implement proper drainage systems, which could delay the project if not addressed in a timely manner.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	4	5	2	9	7	72
	Whole site	One month to one year	Harmful	Daily	Very seldom			Medium-Low
Mitigation Measures	(i) Working under dry weather conditions and unclogging all blocked storm water drainage channels shall be implemented.							

	(ii) Collaborate with the Nakuru County Government to upgrade drainage infrastructure along the Lake view zone. (iii) Engage the community in clearing encroached areas and rehabilitating storm drains to improve water flow. (iv) Design the pipeline installation to avoid low-lying areas susceptible to flooding, incorporating proper drainage channels as part of the project.							
With mitigation Measures	1 Activity specific	1 One day to one month	1 Non harmful	4 Weekly	2 Very seldom	3	6	18 Very Low



***Figure** 8-2: Existing drainage at Lake view*



***Figure** 8-3: Existing drainage along Kenyatta avenue*

8.8.6 Accidents and Injuries to workers and community

Activities associated with construction such as excavating of trenches, movement of construction vehicles, the use of equipment and the congregation of workers and staff on site increase the risk of injury. Construction activities will also result in access of the area by vehicles delivering materials to the site that may result in accidents/incidents. Work at the proposed site may involve hazards such as accidental falls into open trenches, slippery walkways, working at heights, exposure to energized circuits, and heavy equipment.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3 Whole site	2 One month to one year	4 Harmful	5 Daily	4 Likely	9	9	81 Mediu m- High
Mitigation Measures	• The Contractor shall conform to all the stipulations of the Occupational Health and Safety Act, 2007. The Act requires the designation of a Health and Safety representative when more than 20 employees are deployed. • The contractor shall provide ample warning signs, guard rails, warning tape, etc., around open excavations, stacks of material, debris, etc. and shall be held liable for all claims as a result of neglect of such precautions and provisions. • Proper access control should be enforced to ensure that no unauthorised persons enter the site. • Material delivery vehicles should be under the control of competent personnel. Ensure that persons							

	handling equipment and materials are suitably trained, supervised and adequately instructed. • Use of requisite Personal Protective Equipment (PPE) always during construction works • Maintain work areas to minimize slipping and tripping hazards. • Use proper techniques for trenching e.g. slopping and benching to prevent collapse. • When installing or repairing mains adjacent to roadways, implement procedures and traffic controls, such as establishment of work zones so as to separate workers from traffic and from equipment as much as possible; reduction of allowed vehicle speeds in work zones to 10km/hr; and use of high-visibility safety apparel for workers in the vicinity of traffic							
With mitigation Measures	1 Activity specific	2 One month to one year	1 Non harmful	5 Daily	1 Almost impossible	4	6	24 Very Low

8.8.7 Community safety Risks

The public as well as workers are at risk on open trenches; safety hazards during trenching and laying pipeline. The project will generate substantial amount of traffic compared to the non-project situation. This traffic will be travelling on the public roads within the project area. Accidents could occur due to excessive speeds, unsafe loading, poor road surfaces, poor vehicle maintenance, and unwary pedestrians, especially drunken men, and children.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3 Whole site	2 One month to one year	4 Harmful	5 Daily	4 Likely	9	9	81 Medium-high
Mitigation Measures	• Provision of access ramps across open trenches; • limited excavation to only what can be backfilled in 24 hours to minimize duration of open excavations; priority backfilling at access points • Establish and enforce a strict code of conduct for all project drivers including outside suppliers delivering materials. The code should focus on safety, especially speed, and loading, especially banning all carriage of staff, workers and passengers except in seats.							
With mitigation Measures	1 Activity specific	2 One month to one year	1 Non harmful	5 Daily	1 Almost impossible	4	6	24 Very Low

8.8.8 Solid waste generation

Construction will result in the generation of various solid wastes, principally surplus aggregates, spoils generated from excavation of chambers, metal scraps, plastics (wrappings and containers) and wood.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	2 Regional	2 One month to one year	2 Potentially harmful	5 Six monthly	3 Likely	6	8	48 Medium to low

Mitigation Measures	• Express condition shall be put in the contract that before the contractor is issued with a completion certificate; he will clear the site of all debris and restore it to a state acceptable to the environmental consultant. • Construction site management plans will be required for all works. This plan will include a waste management plan for all activities during the construction period. • Bins/ receptacles shall be placed at appropriate locations within the site as collection centres to facilitate separation and sorting of the various types of wastes. • The contractor shall work hand in hand with private waste handlers and local council to facilitate sound waste management; and • The wastes shall be properly segregated and separated to encourage recycling of some useful waste materials.							
With mitigation Measures	1 Activity specific	1 One month to one year	1 Non harmful	5 Daily	1 Almost impossible	3	6	18 Very Low

8.8.9 Soil erosion

Soil erosion may occur due to uncontrolled excavation of trenches during rainy seasons, from inadequacies in backfilling construction works and improper drainage of storm water. Excavation works will expose soil to agents of erosion leading to soil erosion problems. Occurrence of the impact will be short term and will be restricted to construction phase of the project. Implementation of mitigation measures can reduce the impact to significance of low to negligible.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3 Whole site	3 One year to ten years	2 Potentially harmful	5 Six monthly	4 Likely	8	9	72 Mediu m- Low
Mitigation Measures	• Avoid hampering drainage of surface water and plan for restoration measures after construction. • At the end of construction works, level off the soils and facilitate vegetation regeneration.							
With mitigation Measures	1 Activity specific	1 One day to one month	1 Non harmful	5 Daily	1 Almost impossible	3	6	18 Very Low

8.8.10 Air Pollution

The expected air pollutants from the proposed project will include dust, particulate matter and gaseous emissions from construction materials. Dust will be generated from the excavations, batching activities, earth moving and materials delivery. Particulate matter will be generated by dry construction materials including sand, cement, gravel, murram, etc. Smoke, hydrocarbons and nitrogenous gases will be emitted from machinery exhausts. These will be expected to increase slightly and will be localized hence expected to be experienced within 30m radius of the project. Air pollution is expected to be a low-key impact during the construction period.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	4	2	3	5	3	9	8	72
	Regional	One month to one year	Harmful	Daily	Infrequent			Medium-Low
Mitigation Measures	• Impose speed limits (10 km/h in all areas within the site boundaries). • Damping down of access roads, stockpiles and cleared areas must take place to minimize dust pollution. • Ensure that no refuse wastes are burnt on the premises or surroundings. Refuse wastes should be removed by an official contractor and dumped at an approved site in compliance with local laws and regulations. More significantly, an Integrated Solid Waste Management system is encouraged. • Proper rehabilitation and restoration of disturbed areas is required in order to minimize bare patches. • Vehicles to be used during the construction phase are to be kept in good working condition and should not be the source of excessive fumes. • Transported materials must be done in such a manner that they do not fly or fall off the vehicle by covering or wetting friable materials. • Sprinkle water before undertaking very dusty operations to reduce dust pollution. • Dust and air pollution due to dust when excavated material is stock piled, should be limited by means of wetting (particularly dry season), covering with foil or working in small sections so that the trenches are backfilled with excavated soil within shortest possible period (maximum 2 days).							
With mitigation Measures	1	1	1	3	1	3	4	12
	Activity specific	One day to one month	Non harmful	Monthly	Almost impossible			Very Low

8.8.11 Noise Impact

Construction activities associated with the proposed project are likely to increase noise level to more than what is experienced under non project scenario. Use of heavy construction machinery including excavators, water pumps and generators will lead to relative noise levels. Fabrication of site equipment and concrete mixing both at the contractor's workshop and at the construction site will generate significant noise levels. Material delivery is also expected to lead to significant noise levels during construction phase. Operation phase of the project is however not associated with significant noise pollution.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	1	2	2	2	4	5	6	24
	Activity specific	One month to one year	Potentially harmful	Six monthly	Likely			Very low
Mitigation Measures	• Schedule road traffic movements to normal working hours (08H00 –17H00). • Silencers on equipment such as generators will be properly designed. • Where need be, all exposed workers will be provided with functional ear muffs, whose use is mandatory, and closely enforced, monitored and supervised.							
With mitigation Measures	1	2	1	2	1	4	3	12
	Activity specific	One month to one year	Non harmful	Six monthly	Almost impossible			Very Low

8.9 Potential impacts and mitigation measures during operation phase

8.9.1 Water system leaks and loss of pressure

Water system leaks can reduce the pressure of the water system compromising its integrity and ability to protect water quality (by allowing contaminated water to leak into the system) and increasing the demands on the source water supply and the quantity of chemicals. Leaks in the distribution system can result from improper installation or maintenance, inadequate corrosion protection, stress from traffic and vibrations and overloading among other factors.

Significance of impact

Mitigation status	Spatial Extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	4	2	4	5	3	10	8	80
	Regional	One month to one year	Harmful	Daily	Infrequent			Mediu m- High
Mitigation Measures	• Ensure construction meets applicable standards and industry practices. • Conduct regular inspection and maintenance. • Implement a leak detection and repair program (including records of past leaks and unaccounted- for water to identify potential problem areas);							
With mitigation Measures	2	1	1	5	1	4	6	24
	Area Specific	One day to one month	Non harmful	Daily	Almost impossible			Very Low

8.9.2 Water Discharges

Water lines may be periodically flushed to remove accumulated sediments or other impurities that have accumulated in the pipe. Flushing is performed by isolating sections of the distribution system and opening flushing valves or, more commonly, fire hydrants to cause a large volume of flow to pass through the isolated pipeline and suspend the settled sediment. The major environmental aspect of water pipe flushing is the discharge of flushed water, which may be high in suspended solids and other contaminants that can harm surface water bodies.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	1	2	2	2	6	4	24
	Regional	One day to one month	Potentially harmful	Six monthly	Highly unlikely			Very low
Mitigation Measures	• Where possible, flushed water should be carried in bowsers for discharge • Discharge the flush water into a separate storm system with storm water management measures such as a detention pond, where solids can settle and residual chlorine consumed before the water is discharged; • Where water is flushed into the environment, erosion should be minimised during flushing by avoiding discharge into areas that are susceptible to erosion and spreading the flow to reduce flow velocities.							
With mitigation Measures	2	1	1	2	1	4	3	12
	Area specific	One day to one month	Non harmful	Six monthly	Almost impossible			Very Low

8.9.3 Deficiencies in water distribution system

The water distribution system is a critical component in delivery of safe potable water. Even if water is effectively treated to remove contaminants and destroy pathogens, waterborne diseases outbreaks can occur because of deficiencies in the water distribution system. Exposure of water to pathogens from storage facilities and from external sources may lead to long term impacts whose effects will be experienced regionally. The severity of the impacts will be high without mitigation measures.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	4	2	4	5	4	10	9	90
	Regional	One month to one year	Harmful	Daily	Likely			Medium - High
Mitigation Measures	(i) Construct, operate, and manage the water distribution system in accordance with applicable national requirements and internationally accepted standards. (ii) Construct and maintain the distribution system so that it acts as a barrier and prevents external contamination from entering the water system by: • Inspecting storage facilities regularly and rehabilitating or replacing storage facilities when needed. This may include draining and removing sediments, applying rust proofing, and repairing structures • Ensuring that all installation, repair, replacement, and rehabilitation work conforms to requirements for sanitary protection and materials quality • Testing material, soil, and water quality and implementing best practices to prevent corrosion, such as cathodic protection (iii) Maintain adequate water pressure and flow throughout the system by: • Implementing a leak detection and repair program • Reducing residence time in pipes • Maintaining positive residual pressure of at least 20 pounds per square inch (psi) • Monitoring hydraulic parameters, such as inflows, outflows, and water levels in all storage tanks, discharge flows and pressures for pumps, flows and/or pressure for regulating valves, and pressure at critical points, and using system modelling to assess the hydraulic integrity of the system (iv) Prevent introduction of contamination from the distribution system itself by: • Minimizing microbial growth and biofilm development (e.g. by ensuring adequate residual disinfection levels). Collect samples from several locations throughout the distribution system, including the farthest point, and test for both free and combined chlorine residual to ensure that adequate chlorine residual is maintained • Using construction materials that do not contribute to release undesirable metals and other substance or interact with residual disinfectants							
With mitigation Measures	2	1	1	5	1	4	6	24
	Area specific	One day to one month	Non harmful	Daily	Almost impossible			Very Low

8.10 Climate change and vulnerability assessment

Climate Change Act of 2016 is an Act of parliament to provide for a regulatory framework for enhanced response to climate change, to provide for mechanism and measures to achieve low

carbon climate development and for connected purposes. The purpose of climate risk vulnerability assessment (CRVA) is to understand the climate and assess climate change threats to the proposed development to assess adaptation measures that are proposed in the design; to determine to what extent the performance and design of the project is vulnerable to climate change, and to recommend measures that will improve the climate resilience of the proposed project.

Climate change have been observed in Kenya. These include general warming, reduced amount of intense rainfall during the rainy season, and more intense and frequent rainfall during the rest of the year (Government of Kenya, 2010). Other literature also reports changes in the climate of Kenya, such as severe or prolonged drought (UNICEF, 2010), desertification (Plan Kenya, 2013), and changing rainfall patterns (de Wit & Stankiewicz, 2006; UNICEF, 2010). A report by Chaocheva (2016) observed a slight and insignificant increase in precipitation in Nakuru county and a more significant increase in minimum temperature, while National Climate Change Response Strategy (NCCRS, 2010) state that climate change in Kenya is *"already unmistakable and intensifying at an alarming rate with evident countrywide temperature increases and rainfall irregularities and intensification"*.

The observed trends are expected to intensify under expected climate change scenarios. Temperature increases are also expected for Nakuru county. In a study combining 21 different climate change forecast models in mild to extreme scenarios, an increase in minimum and maximum projected temperature is clearly visible even for mild scenarios (see **Error! Reference source not found.**) and Higher temperatures lead to higher evaporation rates. It may also lead to increased water demand, especially in the agricultural sector.

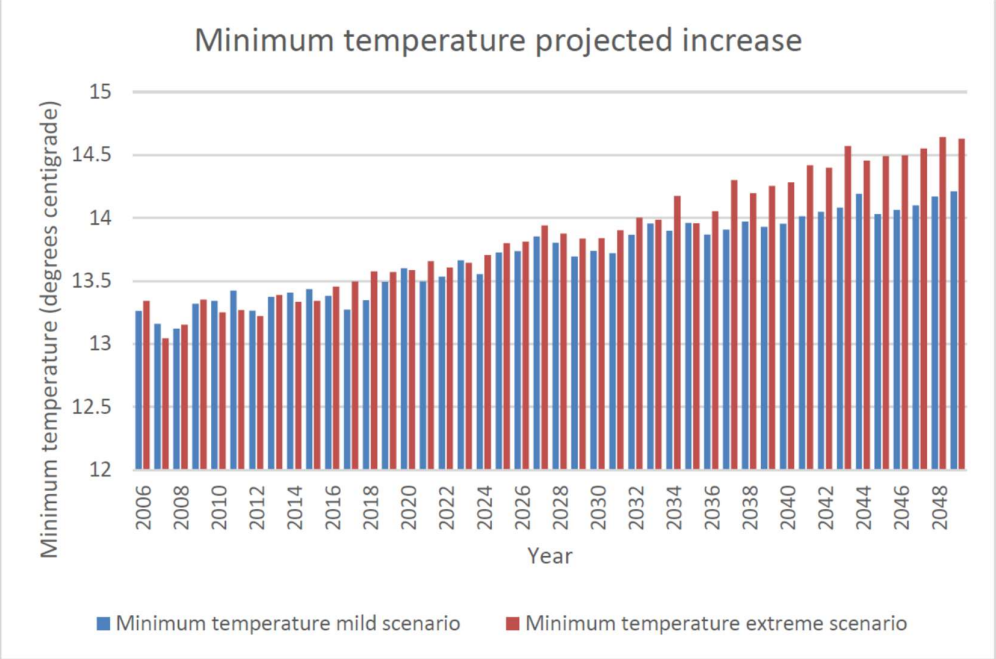


Figure 8-2: Projected increase in minimum temperature based on a combination of 21 climate change models.

(Source: Nakuru county water assessment report, 2019)

Results of various studies indicate that rainfall in Nakuru County is expected to increase as well, by at least 6%. This seems positive, but more annual precipitation does not necessarily mean that more water is available for consumption or for agricultural use. Higher temperatures will cause higher rates of (evapo)transpiration. Besides, the precipitation surplus is expected to fall during heavy rainfall events, and if the infiltration capacity of the soil is limited, the excess water will quickly run down to the lakes. Results of various studies indicate that it is likely that the amount of rain in heavy rainfall events will increase by 32%. This will lead to a considerably increase in runoff, flash floods, landslides, gully formation and soil erosion, all leading to serious land degradation. Erosion and landslides can have destructive impact on infrastructure, including water pipes.

Climate change affects the four components of food security - food availability, food accessibility, food utilization and food system stability - in various direct and indirect ways. As a result of climate change, there will be increased frequency and intensity of extreme weather events like droughts and floods, which will lead to losses of productive assets, personal possessions and even life. This has already been observed but will intensify in the future if efforts are not raised to stop global warming. For instance, due to droughts, the country's famine cycles have reduced from 20 years (1964-1984) to 12 years (1984-1996), to two years (2004-2006) and to yearly (2007/2008/2009), necessitating the Government's distribution of 528,341.77 metric tonnes of assorted foodstuffs. Extreme climatic variations coupled with improper land use including deforestation have resulted into Kenya reporting successive seasons of crop failure, increasing the country's food insecurity.

Climate change can impact the availability and quality of both surface and groundwater and affect agricultural production and associated ecosystems. Increasing variability of rainfall can influence the flow of water in surface systems and the rates of recharge and discharge from aquifers. Currently, main water sources in the county are groundwater. The potential effects of climate change on groundwater will be much on shallow aquifers.

Risk Impacts Identified:

- Reduced water availability due to decreased rainfall or prolonged droughts.
- Degradation of water quality from higher temperatures and altered flow patterns.
- Infrastructure stress and potential damage from extreme weather events.

Adaptation Strategies:

- Upgrade and design water infrastructure to be more resilient to extreme weather.
- Implement water conservation measures and diversify water sources (e.g., rainwater harvesting, recycled water).
- Establish robust monitoring systems and early warning mechanisms for rapid response.
- Enhance community engagement and capacity building to ensure local preparedness.

8.11 Cumulative impacts

The Environmental and Social Assessment have taken into consideration assessment of potential cumulative impacts of this project and other project planned and ongoing along/adjacent to the project area. The cumulative impacts are summarized in Table below.

Environmental issue	Potential Cumulative Impacts	Mitigation Measures
Water Supply and Wastewater Generation	The project will increase water supply capacity, which may lead to a proportional increase in wastewater generation. This could strain existing wastewater treatment facilities and affect water quality in nearby water bodies if not managed properly, necessitating upgraded treatment facilities to prevent pollution.	Plan for future upgrades to wastewater treatment facilities and other infrastructure to accommodate increased demand and mitigate potential negative impacts.
Infrastructure Strain	Upgrades and repairs to existing pipelines might cause temporary disruptions. However, the improved infrastructure will ultimately lead to better service delivery. Long-term impacts will include enhanced reliability of water supply and reduced maintenance needs, which could ease the burden on existing infrastructure.	Implement construction in phases to limit the scope of disruption at any given time. This approach allows for continuous operation of existing infrastructure and reduces the overall impact on service delivery.
Dust	Dust from excavation and construction activities can affect air quality and public health. The cumulative effect of dust from this project and other concurrent developments may exacerbate respiratory issues and degrade environmental quality in the project area.	Regular monitoring of noise, dust, water quality, and other environmental parameters to assess the cumulative effects and address any emerging issues.
Noise	Construction activities for the pipeline project will generate noise, which, when combined with noise from other nearby projects, could lead to significant cumulative noise pollution. This impact may affect residential areas, schools, and other noise-sensitive receptors.	

9 ENVIRONMENTAL & SOCIAL MANAGEMENT AND MONITORING PLAN

9.1Introduction

The purpose of developing an Environmental and Social Management Plan (ESMP) for the proposed project is to initiate a mechanism for implementing mitigation measures for the potential negative environmental impacts and monitor the efficiency of these mitigation measures based on relevant environmental indicators. The ESMP identifies certain roles and responsibilities for different stakeholders for implementation, supervision and monitoring.

The objectives of the ESMP are:

- To provide evidence of practical and achievable plans for the management of the proposed project.
- To provide the Proponent and the relevant Lead Agencies with a framework to confirm compliance with relevant laws and regulations.
- To provide community with evidence of the management of the project in an environmentally acceptable manner.

Conversely, Environmental monitoring provides feedback about the actual environmental impacts of a project. Monitoring results help judge the success of mitigation measures in protecting the environment. They are also used to ensure compliance with environmental standards, and to facilitate any needed project design or operational changes. A monitoring plan, backed up by powers to ensure corrective action when the monitoring results show it necessary, is a proven way to ensure effective implementation of mitigation measures. By tracking a project's actual impacts, monitoring reduces the environmental risks associated with that project, and allows for project modifications to be made where required.

9.2 Management Responsibilities

NAIVAWASCO has capacity to supervise and monitor implementation of the ESMP. In order to implement the management plan, it is recommended that E&S team should be fully dedicated to this project during construction. The E&S team will be expected to co-ordinate and monitor RAP implementation during construction and provide monitoring. Other recommended participants could include the respective Water Officers from county government and NEMA team.

9.3 Environmental Management Guidelines

Upon completion and commissioning of the water project, it will be necessary to establish appropriate operational guidelines on environmental conservation and social linkages to enable the operations' management to identify critical environmental and social issues and institute appropriate actions towards minimizing associated conflicts. Basically, the guidelines should cover among other areas environmental management progammes, standard operation procedures, compliance monitoring schedule and environmental audit schedules as required by law. Social harmony of the facilities and associated component will be achieved through collaborations with the stakeholders or community management committees at various water points. It is recommended that the communities' in-charge of the water intervention facilities must have an accountable structure. While appreciating that there is an existing social

framework, it should be recognized that they lack in organizational capacity to manage water facilities at a commercial level. The groups will therefore, need to get re-organized to provide for clear responsibilities, documentation and record keeping as well as resource accounting.

9.4 Environmental Education and Awareness Raising

NAIVAWASCO field staff and the beneficiaries will need to understand the basic environmental, water use principles associated with the projects. In this regard, therefore, the following steps will need to be considered.

(i) Creation of liaisons on all matters related to environment, utilization of water, health, safety, sanitation and hygiene issues of the water resource development,
(ii) Encourage contribution of improvement ideas from the beneficiaries on specific issues related to the management of the facilities, water accessibility, water availability, sharing, etc. say through a questionnaires or direct interactions,
(iii) Establish initiatives that would instil a sense of ownership of the facilities and related components to all beneficiaries.

9.5 Decommissioning Process

Due to the long-term life of the intervention facilities and related components, a decommissioning audit will be undertaken before the process for any of the components commences, following a notice to decommission. The decommissioning process will be guided by a comprehensive decommissioning plan developed through the decommissioning audit process. However, the following features will need to be decommissioned upon completion of the works.

(i) Contractor's camp and installations that will need to be removed without compromising on the safety and general welfare of the immediate residents. Special care to be given to associated wastes and dust emitted in the process,
(ii) Materials stores that will comprise fresh materials and used items. Each category will be moved safely out of site ensuring minimal or no impacts to the related environment and social setting,
(iii) Wastes and debris holding sites will be cleared with maximum re-use of the debris either on surfacing the passageways or other grounds such as schools and church compounds.

9.6 Environmental & Social Management Plan (ESMP)

This ESMP is prepared for the three project stages where potential significant negative impacts manifest.

These are:

i. Construction Phase ESMP.
ii. Operation Phase ESMP; and
iii. Decommissioning Phase ESMP.

ESMP

Activity / Issue	Action Required	Responsibility	Parameters to Monitor	Monitoring Means	Frequency of Monitoring	Estimated Annual Cost (Kshs)
	Construction phase					
Disruption of businesses	• Undertake construction activities during weekends and at night to minimize disruption • If not possible to avoid disruption, compensate the identified 44PAPs as per the WB policy. • Issue formal notices to businesses and allow them to relocate temporarily before work starts.	NAIVAWASCO	Implementation of the PAP register provided in appendix E	PAPs compensated	One-time, before construction starts	289,000
Disruption of water supply within the project alignment area	• Schedule construction activities during off-peak hours and notify consumers in advance about expected service interruptions. • Implement temporary water supply solutions, such as water tankers or auxiliary lines, to serve critical consumers during downtime. • Install sectional valves to isolate parts of the network during maintenance, reducing the number of affected consumers.	NAIVAWASCO Contractor	Number of complains Water shortage	Grievance log	Pre-construction	100,000
Impact on footpath and access to buildings	• The destroyed pavement along Mama Ngina street and access within Lake view will be restored by the contractor	Contractor	Number of complains	Grievance log	construction	As per the BoQ (see appendix H)

Activity / Issue	Action Required	Responsibility	Parameters to Monitor	Monitoring Means	Frequency of Monitoring	Estimated Annual Cost (Kshs)
Old Networks	• Engage legacy system experts for guidance and smooth overhaul. • Leave existing asbestos cement pipe buried in the ground	NAIVAWASCO, Consultants	Engagement of experts, number of inspections conducted	Consultation records, expert inspection reports	Throughout project	50,000
Accessibility and Potential Conflicts	• Hold public participation meetings to resolve access and encroachment issues.	NAIVAWASCO, Community Liaison Officer	Number of meetings held, community feedback	Meeting minutes, grievance logs	Monthly	100,000
	• Provide alternative access routes during construction.	Contractor	Established alternative routes	Traffic management plan, site inspection reports	Ongoing during construction	100,000
Impact on public infrastructure/roads	(vi) Micro tunneling should be done to avoid excavations (vii) All excavated soil shall be used for backfilling of trenched areas and site restoration. (viii) Damaged road surfaces shall be adequately restored to pre-excavation conditions. (ix) Excess spoil materials shall be disposed of in approved tips in compliance with existing laws, rules and regulations	Contractor	Established alternative routes	Site inspection	Ongoing during construction	1,000,000
Blockage of drainage channels	(x) Working under dry weather conditions and unclogging all blocked	Contractor	Flooding	Site inspection	Ongoing during construction	100,000

Activity / Issue	Action Required	Responsibility	Parameters to Monitor	Monitoring Means	Frequency of Monitoring	Estimated Annual Cost (Kshs)
	storm water drainage channels shall be implemented. (xi) Collaborate with the Nakuru County Government to upgrade drainage infrastructure along the Lake view zone. (xii) Engage the community in clearing encroached areas and rehabilitating storm drains to improve water flow. (xiii) Design the pipeline installation to avoid low-lying areas susceptible to flooding, incorporating proper drainage channels as part of the project.		Complains on outfalls			
Solid Waste Generation	(xiv) Develop and implement a waste management plan during construction.	Contractor	Waste management plan completion, compliance with plan	Waste management records, site inspections	Weekly	50,000
	Ensure proper segregation and disposal of all waste in collaboration with licensed waste handlers.	Contractor, Local Waste Management Companies	Waste segregation, disposal records	Waste disposal logs, waste handler contracts	Ongoing during construction	60,000
Soil Erosion	Implement proper drainage and backfilling techniques post-excavation.	Contractor, Project Engineers	Completion of backfilling, proper drainage installation	Inspection reports, site visits	During construction and post-construction	20,000

Activity / Issue	Action Required	Responsibility	Parameters to Monitor	Monitoring Means	Frequency of Monitoring	Estimated Annual Cost (Kshs)
	Ensure vegetation regeneration after construction is completed.	Contractor	Area of restored vegetation, completion of landscaping	Post-construction inspection reports	Post-construction, monthly	30,000
Accidents and Injuries to Workers and Residents	Ensure compliance with the Occupational Health and Safety Act (2007).	Contractor, Health & Safety Officers	Number of safety incidents, availability of Personal Protective Equipment (PPE)	Safety audit reports, incident logs	Daily during construction	50,000
	Install warning signs, barriers, and traffic controls in high-risk areas.	Contractor	Number of safety installations in place, site conditions	Site inspection, safety report	Daily during construction	70,000
Road/Railway Crossings	Coordinate with local authorities to schedule road/Railway crossings during off-peak hours.	Contractor, KURA, KeNHA, KRC, Nakuru County Govt.	Number of scheduled road crossings, traffic flow management	Traffic permits, work schedule records	During road crossings	70,000
	Implement trenchless technology to minimize disruption. Undertake micro - tunneling and as proposed by the WSP, use the existing AC pipes as sleeves.	Contractor	Number of trenchless crossings completed	Trenchless technology reports	During road crossings	1,000,000
Disruption of Socio-Economic Activities	Notify businesses of upcoming disruptions; restore affected areas promptly.	Contractor, Local Authorities	Number of notifications issued,	Notification logs, site	Ongoing during construction	50,000

Activity / Issue	Action Required	Responsibility	Parameters to Monitor	Monitoring Means	Frequency of Monitoring	Estimated Annual Cost (Kshs)
			promptness of restoration	inspection reports		
	Provide compensation as indicated above or alternative working times to avoid disruptions by making arrangements with Project Affected Persons (PAPs).	Contractor, Local Authorities	Compensation records, feedback from PAPs	Compensation reports, grievance records	As per the PAPs register	300,000
TOTAL						**4,539,000**
	Operation phase					
Illegal Tapping	Install tamper-proof valves and smart metering systems.	NAIVAWASCO, Contractor	Number of smart meters installed, tamper-proof valves in place	Site inspection, installation records	During operation	500,000
	Increase surveillance and patrols to prevent illegal connections.	Security Teams	Patrol schedules, number of illegal taps identified	Patrol logs, incident reports	During operation	200,000
TOTAL						**700,000**

9.7 Environmental & Social Monitoring

The management of environment and social impacts and consequences of every proposed project is a regular, all purpose and continuous activity, which commences from the beginning of the project and the initial plan of its establishment, and until termination of the project life and thereafter. The performance of this management rests on an appropriate administrative structure, known as the environmental & social management unit, which is a section of the management and operation aggregate of the plan. Outlooks and the principals of environmental conservations must proceed in all the various angles of management.

The objectives of this plan are to render suitable methods and perform effective measures of acceptable costs, to reduce the destructive impacts arising from the establishment and operation of the proposed project in regards the regional environment and its accordance with the standard and desirable conditions, in rendering monitoring and control plans, public participation and environmental training. Hence, in this chapter, in addition to rendering the plan for each monitoring index, by specifying the responsible or relative organizations and estimating the organizational and implementation requirements, conditions for the execution of environmental plan are alleviated.

9.7.1 Internal Monitoring

Though most of the mitigation measures will be implemented by the Construction contractor as per contract condition, the overall responsibility related supervision and monitoring of ESMP implementation and compliance of HSE requirement lies with project proponent. The evaluation of compliance of ESMP implementation and HSE management will be guided by Construction ESMP (CESMP) to be prepared by the contractor based on site specific conditions before start of construction and approved by Project proponent. The CESMP shall comprise of relevant sub-plans such as Erosion control and site restoration, biodiversity protection, Air Quality, Noise & Vibration, Waste Management, Traffic Management apart from Health & Safety Plan and emergency preparedness plan in line with mitigation measures suggested in ESIA.

The objective of internal monitoring and audit will be:

- To identify gaps in implementation of the ESMP by the contractor
- Ensure compliance to legal requirements provided in EMCA 1999
- Guide the contractor's management of HSE requirements from time to time where unforeseen impacts are encountered

The Environmental and social WSP Staff will continue the monitoring process during the operation and decommissioning phases of the projects ensuring that the minimum allowable Environmental parameters are maintained. These parameters include,

1. Workforce Training

The contractor shall provide induction of workers to ensure they are adequately trained on HSE management on top of the specific skills required for their job description. The proponent should monitor induction training and toolbox talks records regularly. The contractor shall also train site specific HSE supervisors to enforce the trainings.

2. Monitoring of Accidents Prevention/ Health Management

The Proponent will procure services of an independent environmental, health and safety (HSE) consultant to undertake frequent audits on the contractor during project implementation. The consultant will undertake regular site inspection visits (frequency shall be agreed upon with Contractor) to monitor how the contractor is managing his work force and activities with regard to accident prevention and health management.

The contractor's safety manager on the other hand shall ensure that appropriate safety signage and personal protective equipment is availed to the construction workers at all times.

Indicators that will be used in evaluation of accident prevention and health risks management includes.

- Provision of adequate personal protective equipment to workers at all phases of the project
- Presence of displayed safety warning signs and markings at active sites and on tower structures on completion
- Adequate human waste disposal and sanitation facilities are present at active sites
- Community awareness on safety risks associated with the project
- Compiled records of actual accidents/ incidences that have been encountered
- Report health cases that are related to the project

3. Soil Erosion and Conservation Monitoring

Construction activities such excavations and transportation of construction materials within the project areas may lead to loosen soil structure thereby resulting in erosion. The contractor will be responsible for ensuring that appropriate soil conservation and erosion prevention measures are practiced throughout the construction phase.

4. Noise Levels Monitoring

Emission of noise is expected during the construction phase. Major sources of noise will be from machinery such as excavators. However, the noise levels may not be an issue as emission is site specific and low Regular monitoring of these noise levels by the Contractor should be conducted to ensure that they recommended limits are not exceeded. Consultation with the communities will aid in establishing the extent of this impact

5. Air Quality Protection

Dust and emissions from machinery should be monitored by the contractor and adequate measures employed in ensuring air quality. This will include watering down of active sites/ roads and other areas generating the dust or maintenance of machinery with excessive smoke emissions. In addition, where excessive wind is observed, dust generating activities can be halted for some time.

6. Solid and Liquid Waste Management Monitoring

Monitoring of waste generated at both the site and workers campsite during the construction phase shall be done by the contractor's HSE manager. He will ensure that;

- Records of the type and waste amounts generated at the sites is kept
- Adequate and separate waste management facilities are provided at each site. The equipment shall be such that it aids in waste segregation
- All generated waste is bound to the specific sites boundary and littering of the environment is discouraged
- Human waste disposal facilities are provided at each site
- Collected waste is properly disposed away from site at dumping sites approved by the local county government

7. Biodiversity monitoring
    - Monitor invasive species as they appear for timely control and physical removal

9.7.2 External Monitoring

The Kenyan government's environment management body NEMA shall issue approval for the implementation of the proposed project. Moreover, it shall ensure that the provided mitigation measures are implemented in implementation of the project. NEMA shall offer oversight of the implementing bodies through review of monitoring reports. The proponent shall therefore provide the agency with annual progress reports on environment, health and safety management

9.7.3 Environmental Audits (EA)

Environmental audits during all phases of the project implementation are key in ensuring full compliance to ESMP requirements. The goal of EA will be to establish if the proponent is complying with environmental requirements and enforcing the existing legislation. The purpose of EA is to determine the extent to which the activities and programs conform to the approved environmental management plan. The Consultant recommends that an independent consultant will be sourced to oversee environmental management throughout the construction phase and during the operational phase and decommissioning phase. He will provide Environmental audits in line with NEMA's requirement.

9.8 Grievance Management/Redress Mechanism

A Grievance Redress Mechanism GRM has been established to receive and facilitate resolution of complainants (project affected people, local community and workers) concerns and grievances regarding the project's performance during the construction, operation and decommissioning phases of the project. The mechanism should be able to address the concerns and complaints in a timely fashion by using an easy to understand, transparent and effective grievance redress process that is readily accessible to all segments of the project area population including workers and community members.

This GRM has been developed with the intention of providing an effective tool for early identification, evaluation and resolving of grievances during the full cycle of the project. The range of issues that are likely to arise requiring this process include:

- Unfair or biased job allocations.
- Poor management of construction activities.
- Compensation payment for services rendered or damages to property,
- Failure to fulfil commitments.

- Interference with public utilities.
- Accidents due to inappropriate planning of vehicle movement.
- Conflicts between migrant workers and local communities.
- Disturbance due to excessive noise or other nuisance during construction or operation.
- Unfair treatment of workers or unsafe working conditions.
- Issues related to Gender (GBV, SEA and VAC).
- Any other issues related to environment, health and safety issues

Since the range of issues is diverse, the GRM should be comprehensive enough to tackle complaints without any costs and also provide privacy to complainants especially gender issues.

An effective GRM should have the following:

- Identification of personnel (Grievance Officer who will be receiving and recording grievances at the site level);
- Process of evaluating grievances and determining which process to follow;
- Process of making decisions on providing resolutions.
- Notification procedures.
- Timeframes within which issues are to be resolved.
- Procedure for escalation of issues that cannot be resolved at the site level;

Publicizing of the GRM

The developed GRM should be publicized to ensure that all stakeholders (workers, community members, contractor, project management etc) are aware of the existence of the GRM and how it shall be used to resolve grievances.

Grievance Redress Committee (GRC) and Meeting Calendar

The GRC

The developer shall facilitate the formation of a two-tier Grievance Redress Committee (GRC) both at village level and project level. This committee shall comprise of the following representatives:

Level 1

- Affected persons
- Location Chief
- A Representative from the Community (Male and Female)
- Community liaison officer

Level 2

- Project manager/GRC officer
- Community liaison officer
- EHS Officer;
- Contractor EHS representative

GRC Meeting Calendar

The GRC shall roll out its meeting calendar to the stakeholders so that they are aware of when to expect their issues resolved. It should endeavour to meet as often as possible so that grievances do not remain unresolved for a long period. Other than the issues that the GRC Officer will be able to provide immediate solution when the complainants come lodge their complaints, the registered complaints will take between 21-45 days for resolution. It is therefore

suggested that the GRC meets monthly or as dictated by any registered urgent grievance. In case complainant/ appellant is not satisfied with the decision of GRC they can approach court of law for resolution.

Special Representatives in the Committee

The proponent to consider having special representatives in the grievance committee (Female Members) who can deliberate and resolve grievances touching on gender issues like sexual harassment, rape etc). This will help in safeguarding privacy of victims of rape and sexual harassment. It will also provide confidence to victims to come forth and register their complaints no matter how personal.

The Committee shall have the following functions:

- To keep a live register of all grievances lodged by complainants;
- To provide support to affected communities on issues arising from environmental or social impacts;
- To record grievances of the affected community by categorizing and prioritizing them, and providing solutions within a stipulated time period;
- To report to the aggrieved parties regularly and in a timely fashion, developments regarding their grievances and decisions of the GRC.
- To escalate any unresolved issues to the management in a timely fashion so that solutions are reached in good time.

Training Workshop

The project proponent shall hold a training workshop for stakeholders (workers and community members) to educate and sensitise them regarding the operations of the GRM. This training shall be carried out before rolling it out so that the team is ready to receive and resolve grievances immediately stakeholders get to know of its existence.

Receiving and Recording of Grievances

The Grievance Officer (Proponent E & S Officer) shall receive anonymously record the grievance in a grievance form and assess the type of grievance.

If it is an issue that can be resolved immediately then a solution shall be provided by the Grievance Officer. If it requires deliberation of the GRC then the Grievance Officer shall indicate the timeframe when the complainant should expect the issues to be resolved.

The Grievance form that shall be used to record grievances shall contain the following information:

- Unique Serial number of the complaint;
- Date of receipt of the complaint;
- Particulars of the complainant (Name, Address, Contact details);
- Nature of Complaint (Subject of the complaint, Brief description of the complaint, where the issue occurred and when, suggestion on what the complainant wants done).

GRC Reports

The GRC shall prepare detailed monthly reports that shall be submitted to the management. The reports shall contain the following among other issues:

- The grievances recorded during the reporting period
- The resolutions provided to the complainants

- The period taken to resolve the issue
- The response received from the complainant after receiving feedback from the GRC
- Escalated Grievances and the timeframe taken to provide solution from the management
- Classification and Analysis of the grievances for lessons learnt and improvement of project operations
- Minutes of all the meetings of the GRC.

9.9 Framework for Implementation of the ESMP

The Contractor will be expected to address all aspects of the construction activities in compliance with all laws and regulations, approvals, licenses and permits which are applicable to the proposed project. The Contractor shall ensure that he is familiar with the ESMP for the project. He shall prepare the work plan and strategy taking into account the relevant provisions of the ESMP. The prepared Management plans shall be reviewed and approved by Environment and Social Safeguards Officer of the project implementor.

The Contractor will also be expected to evaluate the construction activities/components and prepare appropriate project Construction Environment and Social Management Plan including:

1) Waste Management Plan;
2) Biodiversity Management Plan
3) Hazardous Waste and Materials Management Plan;
4) Occupational Safety and Health Management Plan (OSHMP)'
5) Traffic Management Plan;
6) Water Management Plan
7) Community Engagement Plan;
8) Child Protection Strategy;
9) Workers Code of Conduct;
10) Labour Recruitment and Migrant Labour Management Plan;
11) Grievance Redress Mechanism;
12) Prevention and Protection Against GBV and Sexual Exploitation;

9.9.1 Institutional Framework for implementation of ESMP

Project Proponent Obligations & Responsibilities

NAIVAWASCO has full time E&S team who will monitor implementation of the ESMP. Project proponent will maintain a monitoring and oversight capability by dedicating an E&S expert to the project to ensure that the contractor and its subcontractors are fulfilling their E&S obligations. Responsibility for implementing the environmental and social mitigation and monitoring actions included in the ESMP will be passed on to contractor and its constructors.

Contractor upon issue of the 'notice to proceed' (NTP).

Proponent will:

- ensure that contracts with contractor and its sub-contractors are consistent with the components of the ESMP that are within their scope of responsibility and have the capacity to fulfil these requirements.
- review CESMP, including standard environmental and social protection procedures prior to starting construction; and
- maintain oversight of their ESMP performance. A monitoring process to track the contractor's compliance with the approved CESMP will be implemented during construction phase and the results reported.

Contractor Obligation and responsibilities

During the construction phase, responsibility for many of the environmental and social mitigation and monitoring actions will be passed on to the construction contractors. In these situations, Proponent will maintain a monitoring and oversight capability to ensure that contractors are fulfilling their obligations.

Contractor and their sub-contractors will prepare a CESMP, which will include:

- Sub plans for environmental management in line with the project ESMP as well as the mitigation measures proposed in the project EIA and any conditions imposed by NEMA to the potable water networks project.
- Site specific plans to apply in the field, including EHS Plan, emergency response and contingency plans, as appropriate; and
- proposed mitigation programme for identified sensitive areas (i.e. Impala Sanctuary Park).

9.9.2 Organization Roles and Responsibilities

The Contractor will be expected to engage the following safeguards officers on a full-time basis for the period of the project.

- EHS Expert (Environmentalist);
- CLO (Community Liaison Officer – Community Representative) / sociologists.

Before commencement of construction process, the Contractor will be expected to show familiarity with the methodology on the implementation of Environmental and Social Safeguards.

The above officers will have the responsibility of assisting the Contractor to comply with the safeguard's requirements. Among other duties, the safeguards officers will be responsible for carrying out roles as listed in Table 9.1 below.

The Safeguards Team will be reporting to the Project Manager/Supervisor on Safeguards achievements, issues and challenges on regular basis.

Table 9.1: Roles of Safeguards Officers Engaged by the Contractor

Title/Designation	Duties/Roles
Environment and social experts	• Assist the Contractor to Develop CESMPs • Supervision of Health and Safety and implementation of Tool Box Talks • Implement Environmental Safeguards in the project to protect people and the environment • Ensure timely approvals and permits, wherever required • Coordinate environmental compliance in the project • Oversight waste management • Ensure environmental information reaches team leaders • Carry out surveillance on safety issues and safety training • Interface between the Contractor and the workers and Community • Support on social safeguards and helps mobilize and organize Community and other stakeholder meetings. • Record incidences taking place during construction work and liaises with the Project Supervisor to address the emerging issues. • Record Grievances

Title/Designation	Duties/Roles
	• Assist the Grievance/EHS Officers with communicating safeguards issues to the community • Attend Grievance Redress Committee (GRC) Meetings • Preparation of Environmental, Health and Safety Reports

9.9.3 Training, Education and Competency

Site Supervisor shall ensure that every employee/worker (direct or contractual) is aware of the EHS risks associated with the work being carried out at the site and is trained and competent in the relevant work practices and maintenance procedures. Training needs shall be identified and executed to ensure all staff are provided with adequate safety training for all levels of employees. The safety training should provide staff with the knowledge and skills necessary for organizing and managing occupational safety and health programmes. The team leaders with leadership skills and knowledge to lead should be supported to implement and apply occupational safety and health activities. Workers with the knowledge, skills and right attitudes should be encouraged/supported to enable them to work safely.

Areas that could be considered for training of various cadres of workers are:

- HSE Policy and how it applies to the workplace;
- Hazards/Risks and Emergency Response Procedures;
- Importance of Safety Induction and Toolbox Talks;
- Appropriate use of Personal Protective Equipment (PPE).

The above inductions and trainings will improve on competency of the workers and lower incidence of injury and improvement on working safely.

9.9.4 Assessment and Improvement

It is noted that often projects collect data on environment, safety and social aspects of the project however this data is never evaluated for improvement on the implementation of the ESMP. Data on injury incidences should periodically analysed considering source of injury, frequency of occurrence and whether any safety measures were overlooked so that improvements can be made on lessons learnt.

9.9.5 Incident Management

All incidences occurring within the project shall be managed through the incident management procedure that has been put in place and conforms with DOSHS. Every team that is carrying out a task must have a person appointed to be in charge. The officer in charge shall be familiar with all incident management protocols All the procedures for different occurrences shall be documented using appropriate forms as guided by DOSHS. Team leaders shall be sensitized on the use of the forms and the required protocols of reporting incidences and timeframe in which all incidences must be reported. The incident reporting forms must always be within reach of the team leader or EHS Officer.

9.9.6 Reporting

It should be ensured that provisions for reporting incidents, accidents and dangerous occurrences during construction are promptly done using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO). The team leader or Officer in charge of

a Task Team shall be inducted on the reporting protocols and requirements. The training or induction shall include:

- Procedure of making a report on incidences;
- The protocol to be followed and reporting hierarchy;
- How the forms should be filled (without errors or omissions);
- Reporting timeframe.

9.9.7 Management Review

The project Environmental and social Management and Incident reports shall be prepared and submitted on a monthly basis. Review by management shall be done on a quarterly basis and feedback given to the safeguard's teams.

9.9.8 Liaison and Communication to Stakeholders

Regular transparent communication between the project and the community and other stakeholders and vice versa is critical in building a good understanding between the parties involved. This good understanding shall be very important in managing unexpected situations that might arise during project implementation.

10 CONCLUSION AND RECOMMENDATIONS

10.1 Conclusions

The Project will directly contribute in achieving vision 2030 through increased water supply. It will improve the economic development in Kenya through the availability of good quality water supply and creation of employment.

The Project's impact on the physical environment will be manageable, mostly short-term construction-related impacts, which will be mitigated. The report has outlined mitigation measures in the ESMP matrix in chapter 8 to be implemented during the various project phases.

Given that the Environmental Assessment undertaken under this Project, and considering the Project's strong economic justification, the Project satisfactorily meets environmental protection requirements provided that the mitigation, monitoring, and reporting plans are carried out.

The environmental, and social Impact Assessment (ESIA) of the proposed project has been conducted in accordance with national legislative requirement, county by-laws; World Bank Operational Policies; and World Bank Group/IFC EHS guidelines. The ESIA study has been carried out based on the site visit, baseline environmental and social condition survey including Ecological Study on biodiversity, stakeholder consultation, analysis of the possible project intervention. The experts identified and evaluated potential environmental impacts associated with all aspects of the proposed project.

The key potential environmental impacts due to the project construction as established by the ESIA study are some losses of vegetation, air and noise pollution, moderate loss of habitat for some mammals, insects and amphibians, solid waste generation and disposal, increase in traffic and occupational health and safety. The economic opportunities in terms of local employment and provision of services during construction and operation phases are assessed as positive impacts. During the operation of the proposed project, the key issues related to the environment has been identified from the ESIA study are ecological, visual impact and occupational health and safety.

The Environmental and Social Management Plan (ESMP) has described mitigation measures for impacts specific to the project activities and also discuss implementation mechanism for recommended mitigation measures along with a monitoring plan. Implementation of the ESMP will help the proponent to comply with the national regulatory framework as well as to meet World Bank Operational Policies.

10.2 Recommendations

The following are also recommended with respect to the proposed Project.

- That strict adherence to the Environmental Management Plans should be observed;
- That any unforeseen impacts shall be immediately notified to the environmental assessor to ensure that they are immediately addressed and mitigated;
- Project Construction works to commence after approval and issuance of the license;
- The project contractor shall need to hold meetings with local communities before commencement of construction to firm up agreements of engagement.

APPENDICES

Appendix A- Minutes of the Community Meetings

MINUTES OF PUBLIC CONSULTATION MEETING FOR ESIA STUDY FOR THE PROPOSED INTERVENTIONS FOR NAIVASHA WATER AND SANITATION COMPANY LTD HELD ON 13/08/2024 IN LAKEVIEW ESTATE NAIVASHA.

Date:	13/08/2024
County:	Nakuru
Location:	Naivasha
Meeting Venue:	ACK Open ground
Starting time:	3.00 pm
End time:	4:30 pm
Participants:	**Male:** 10 **Female:** 4
Project representatives Present:	• Teresiah Ochieng –ESIA Consultant representative • Samson Mwangi – Naivasha Water and sanitation company Ltd (NAIVAWASCO) Representative.

1. Agenda of the Meeting

The agenda was as follows:

1. Opening remarks/prayer
2. Introduction of participants
3. Overview of the agenda of the meeting
4. Project Description
5. Question and answer session
6. Closing and adjourning of meeting

2. Commencement of the Meeting:

- The meeting was opened by the Area Chief, Philip Ariri who in turn requested Sam Kariuki to open the meeting with a prayer.
- He then proceeded to state the agenda of the meeting as a public participation meeting.
- The chief introduced the area leadership before inviting NAIVAWASCO team and the consultant team to take over the meeting.

3. Project Description (NAIVAWASCO Technical Team)

- After the introduction, Samson Mwangi (NAIVAWASCO Technical Team) explained the project nature and its objectives and the positive and negative impact the project may impose on the community. He got to show the map of where the water pipes will pass.

Project Objectives:

RELIABILITY: To ensure a more reliable water supply to the community.

AFFORDABILITY: To make the improved water system affordable for all members of the affected community.

QUALITY: To enhance the quality of water provided.

4. ESIA Process (ESIA Consultant Representative)

- The ESIA consultant explained that the requirement for an ESIA is enshrined in the Environmental Management and Coordination Act (EMCA), 1999, (amended in 2015) which is the framework law on environmental management in Kenya. The Act provides for environmental protection through processes such as Environmental Impact Assessment, Environmental Audit and Monitoring.
- The Second Schedule of the Act identifies development of the proposed interventions as requiring EIA studies
- By way of consideration of the nature of anticipated environmental and social impacts in terms of severity, ease of reversibility, longevity and the geographical scope which may be impacted by the project, it has been determined the project to be subjected to a Full ESIA Study to enable an in-depth identification and analysis of potential impacts, and subsequent devising of appropriate mitigation and enhancement measures
- The ESIA process entails screening a project to determine whether an EIA is required or not, and if needed, the level of scrutiny (environmental assessment) that the project should be subjected to. Screening is following by a baseline and scoping study to determine the nature and magnitude of anticipated environmental and social impacts
- Stakeholder consultation is a key aspect of the EIA Study and, is anchored in the Constitution of Kenya 2010 and is also supported by the Public Participation Bill of 2018. It is therefore crucial that stakeholders in any given development are identified and engaged at various levels with an aim of obtaining their views, concerns, suggestions and recommendations, to be incorporated in the project.
- The consultant explained that it is for this reason that stakeholder engagement is being carried out.
- The consultant explained that once the ESIA Report is submitted to NEMA. NEMA will then review the report and make a decision as to whether to issue an EIA license with conditions or not issue the EIA license.
- The consultant explained the impact of the project to the environment and the mitigation measures that will be taken to minimize the negative impact and maximize the positive impacts.

5. Interactive Session with Participants

- The meeting then progressed to an interactive session moderated by ESIA consultant from WSTF whereby the participants were given the opportunity to ask questions, make comments, seek clarification, air their views, concerns and recommendations for incorporation into the project development.

Table1: issues raised and responses given

Participant Name	Issue Raised	Responses
Njuguna Njoroge	In lakeview estate, we do not have an issue with water and the leakages were already fixed since new pipes were installed recently. Will you be removing the new pipes or will you be installing new pipes in different areas?	Samson Mwangi(NAIVAWASCO Technical Team) responded that there is a new line that they are focusing on, the new pipes that were installed will not be removed. He went ahead and showed the map and explained further the proposed lines.
	Suggestion: Before the project commences, they should give notice early enough so they can find different ways of meeting their day to day life in terms of roads and the issue of water rationing. Suggestion: The project should take the shortest time possible since the issue of insecurity might rise. In that, when drilling is done, the open trenches might be dangerous to the kids within the estate.	The ESIA consultant explained that they will give a 7 days notice prior.
	Which safety measures will be taken during and after the project is being done?	The ESIA consultant provided comprehensive safety mitigation measures that will be taken during and after the project to ensure community well-being and improve water reliability and quality: Measures will be taken to minimize environmental impact, such as proper disposal of construction waste, protection of water sources from contamination, and dust control practices. All personnel involved in the project will undergo comprehensive health and safety training. This will include proper handling of equipment, emergency response procedures, and adherence to safety protocols. Construction sites will be secured with appropriate barriers and signage to prevent unauthorized access. Safety officers will be present to monitor and manage site activities. Traffic control measures will be implemented to ensure the safe movement of vehicles and pedestrians around construction zones. This

Participant Name	Issue Raised	Responses
		includes clear signage, detours, and coordination with local traffic authorities. Regular updates will be provided to the community regarding project progress, potential disruptions, and safety guidelines. A dedicated contact point will be established for residents to report concerns or incidents.
Joel Mungai	There hasn't been any problem with water supply in Lakeview area. The main issue has been the sewer lines. Will you be handling sewer lines as well?	The ESIA consultant explained that the project majorly focuses on water pipes. For the sewer lines, NAIVAWASCO should be able to tackle that. Samson Kariuki (NAIVAWASCO Technical team) responded that they have already laid a design for the sewer lines and they will soon start the project.
Virginia Njuguna	How does the new project intend to deal with the stealing of meter boxes within the area?	Samson Kariuki (NAIVAWASCO Technical team) answered that regarding meter theft, it is upon the members to take care of their goods, they should create a chamber for the new meter boxes.
	Why is it that the rates of water payment is quite high in Lakeview compared to the other parts of Naivasha town.	Samson Kariuki (NAIVAWASCO Technical team) responded that in case one is overcharged, they should get to the office for further support.
Lucy Wambui	Why are we being overcharged despite not having water in the area? The meter boxes might not be working but we'll still be overcharged. Suggestion: Do the water rationing in sections. Instead of the whole estate being affected, construction should start with one area, do the excavation, finish and cover up before moving to the next one.	Samson Kariuki (NAIVAWASCO Technical team) responded, in case there is an issue with the meter boxes and reading has been done wrongly, they should report to the office for further assistance.
Candy Makena	Will there be new charges with the new project and will we have to pay extra for the piping?	The ESIA consultant responded that they will not be charged for anything. The project is fully funded by World Bank which makes I possible to cover all the project expenses.
Sam Kariuki	Suggestion: There has been an issue of vandalization of sewer lids. NAIVAWASCO should come up with a way of creating better lids or,	Samson Mwangi (NAIVAWASCO Technical team) responded that they do have a customer care number, however, they will look into it.

Participant Name	Issue Raised	Responses
	have a hotline that is accessible incase such an issue occurs.	
	Suggestion: Water billing should be done at the beginning of the month and they should be given enough time to make payments, unlike when billing is done and they are only given 4 days to make payments, or else, their water is disconnected.	

6. Grievance Redress Committee

A Local grievance redress committee was constituted facilitated by the Area Chief. The committee composed of the following members:

1) Chairman – The Area Chief Philip Ariri
2) Youth representative:
3) Women representative:
4) Activist representative: Njuguna Njoroge
5) Vulnerable persons representative:

7. Closing and adjournment

The ESIA Consultant thanked the participants for creating time to attend the meeting. The Consultant said that the adjournment of the meeting did not signal the end of engagement. The participants were invited to share further comments and views via the address provided in the project background information document.

The Area Chief made his closing remarks by thanking the public for availing themselves for the meeting despite their busy schedules and for the contributions they had made on behalf of Lakeview Estate.

The meeting ended with a word of prayer from one of the residents: Sam Kariuki.

Confirmation of Minutes

Minutes prepared by: ---------- Date ----------

Minutes confirmed by: ---------- Date ----------

Position: ----------

Appendix B-Attendance List

ATTENDANCE LIST

PUBLIC PARTICIPATION MEETING FOR THE PROPOSED LAYING OF 7.9KM DN32 TO DN63MM HDPE LINES AT LAKEVIEW ZONE HELD ON 12TH AUGUST AT ASSISTANT CHIEF'S CAMP, LAKE VIEW ESTATE

S/No.	NAME	GENDER	PHONE NUMBER	SIGNATURE
1.	Virginia Nyugura	Femal	0722902285	
2.	Lucy Wambui Muchuku	Femal	0720327418	
3.	Stephen Wachira Mburu	Male	0720175696	
4.	JOEL K MUNGAI	Male	0723890588	
5.	JAMLICK M KIRATHE	MALE	0729266500	
6.	NJUGUNA NJORUGE	MALE	0713408646	
7.	Teresiah Ochieng'	Female	0701358446	
8.	SAMSON MWANGI	MALE	0714388847	
9.	Candy Makena	Female	0722-202645	
10.	Sam Kariuki	Male	0799-418282	

ATTENDANCE LIST

PUBLIC PARTICIPATION MEETING FOR THE PROPOSED LAYING OF 7.9KM DN32 TO DN63MM HDPE LINES AT LAKEVIEW ZONE HELD ON 12TH AUGUST AT ASSISTANT CHIEF'S CAMP, LAKE VIEW ESTATE

S/No.	NAME	GENDER	PHONE NUMBER	SIGNATURE
1.	JOHN KIBU KUNGU.	MALE.	0715872224	
2.	MARTIN MAMBUTO	M	D723926906	
3.	BOBO ADAMLE	M	D7182172255	
4.	philip Airi	M	0724772153	
5.				
6.				
7.				
8.				
9.				
10.				

Appendix C-Questionnaires



Adobe Acrobat Document

Appendix D: Design report



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Appendix E: BoQ

PART A: PRELIMINARY & GENERAL ITEMS

ITEM No.	DESCRIPTION	UNIT	QTY	RATE KSH	AMOUNT KSH
1	CONTRACTUAL REQUIREMENT				
1.1	Allow for provision of Performance Security in accordance with Conditions of Contract	Item	LS	100,000	100,000
1.2	Allow for provision of Insurance of Works and Contractor's Equipment in accordance with the Conditions of Contract	Item	LS	100,000	100,000
1.3	Allow for provision of Third Party Insurance (including Employer's Property) all in accordance with the Conditions of Contract	Item	LS	80,000	80,000
1.4	Allow for provision of Insurance against Accident to Workmen in accordance with the Conditions of Contract	Item	LS	80,000	80,000
1.5	Allow a Provisional Sum of KShs. 400,000 for re-location of services by Telekom, KPLC and/or any other institution and for statutory costs for road/railway crossings. Liaison with these Authorities will be the responsibility of the Contractor for the timely execution of the Works	Item	LS	400,000	400,000
	SPECIFIED REQUIREMENT				
1.6	Allow a Provisional Sum of KES 50,000 for additional Survey Works, if required, as directed by the Engineer.	Item	P.C	50,000	50,000
1.7	Allow a sum for factory inspection of pipes, fittings, mechanical & electrical plant manufacturing by the Engineer and Employer.	Item	LS	70,000	70,000
1.8	Allow a Sum of KES 35,000 for a project sign post, and an additional sum of 70,000 for Branding works	Item	LS	105,000	105,000
1.9	Allow a Provisional sum of Ksh.700,000 for Environmental and Social Impact Assement for the Project. Rate to include all requisite levies for acquiring this project NEMA License	Item	LS	700,000.00	700,000.00
	PAGE TOTAL CARRIED TO SECTION COLLECTION SHEET				1,685,000

PART B: MAIN BILL

ITEM No.	DESCRIPTION	UNIT	QTY	RATE KSH	AMOUNT KSH
2.00					
2.1	EXCAVATIONS				
	Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations with the specifications. Depth of excavation not exceeding 1.5m unless otherwise specified				
2.1.1	Excavation and backfilling in normal material for Dia 160 mm pipe for depth n.e 1.8 m	m	1800	180	324,000.00
2.1.2	Ditto but for 110mm	m	500	180	90,000.00
2.1.3	Ditto but for 90mm	m	500	180	90,000.00
2.1.4	Ditto but for 75mm	m	1200	180	216,000.00
2.1.5	Ditto but for 63mm	m	2400	180	432,000.00
2.1.6	Ditto but for 50mm	m	400	180	72,000.00
2.1.7	Ditto but for 40mm	m	1500	180	270,000.00
2.1.8	Provisional for excavation in hard rock	m3	45	6500	292,500.00
2.1.9	Provisional for excavation in soft rock	m3	80	5500	440,000.00

Appendix F: PAPs Register



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