MURANG'A WATER AND SANITATION COPANY LIMITED

MARAGUA WATER SUPPLY PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

(PROJECT REPORT)

April 2017

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FORM 2 (r.19)
Application Reference No:

FOR OFFICIAL USE

THE ENVIRONMENT MANAGEMENT CO-ORDINATION ACT
SUBMISSION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT REPORT

PART A: DETAILS OF PROPONENT

A1. Name of proponent (Person or Firm): **Murang'a Water and Sanitation Company (MUWASCO)**

A2 PIN No. .....

A3 Address. **P.O Box 1050 – 10200, Murang'a, Kenya**

A4 Name of contact person .....**Eng. Daniel Ng'ang'a**.....

A5 Telephone No: of Contact Person .....**+254701-038 226/+254712 292 544** .....

A6 Fax No: .....**N/A**.....

A7 E-mail: .....managingdirector@muwasco.co.ke.....

PART B: DETAILS OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT REPORT.

B1 Title of the proposed project: Environmental and Social Impact Assessment (ESIA) Project Report for the Maragua Water Supply Project

B2 Objectives and scope of the project: to carry out Environmental and Social Impact Assessment (ESIA) for the proposed construction of Maragua Water Supply Project.

B3 Description of the activities: The Work involved collection, analysis and presentation of all information pertaining to the planning, construction and operation of the water supply project as well as baseline social, health and safety, ecological and environmental information. Collection of information included desk studies, study of the technical design and directed consultation with project affected people, local leaders and lead agencies. The proposed project was described and all relevant legal framework for which the proposed work would cover, either at design, construction, operation or closure stage explored. The social and environmental impacts likely to emanate at the four stages of the project, whether positive or adverse were projected and explained to detail. A Plan to reduce, minimise or altogether eliminate the adverse impacts was drawn up (ESMP) detailing the nature and scope of the impact, mitigation or management measures and responsibility for implementation apportioned. A bill of the cost of mitigation was also drawn up. Health and Safety guidelines relevant especially during construction stage were outlined and a schedule for evaluation and monitoring of the effectiveness of mitigation measures proposed

B4 Location of the proposed project: **Murang'a County**

PART C: DECLARATION BY THE PROPONENT

I hereby certify that the particulars given above are correct and true to the best of my knowledge.

Name ..... **Eng. Daniel Ng'ang'a** .....Designation....**Managing Director** Signature.....

On behalf of ... **Muang'a Water and Sanitation Company**.....Date.....
(Firm Name and Seal)

PART D: DETAILS OF ENVIRONMENTALAND SOCIALIMPACT ASSESSMENT EXPERT

Name (Individual/firm)	**Eng. Prof. Lawrence Gumbe**
Certificate of registration No.	**0831**
Address	**P.O. Box 10677-00100 Nairobi**
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PART E: OFFICIAL USE

Approved/not approved. .....

Comments:

.....

.....

.....

.....

Officer..... Sign ..... Date .....

Important Notes: Please submit the following:

(a) Three copies of this form
(b) 5 copies of the project study report and a soft copy
(c) The prescribed fees to:
Director-General,
The National Environment Management
Authority, Kapiti Road, South C,
P.O. Box 47146,
NAIROBI.

Tel. 254-02-609013/27/79 or 608999 Fax. 254-02-608997

DECLARATION

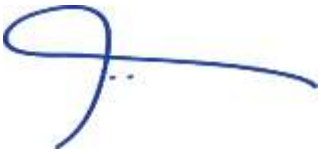
Project Title: Consultancy Services to Carry Out Environmental and Social Impact Assessment for Maragua Water Supply Project Funded Under OBA

Declaration by the Consultant

I hereby certify that the information contained herein are true to the best of my knowledge and belief.

Signature of the EIA Registered Expert

NEMA Registration No (Lead Environmental Expert): 0831



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NEMA Registration no (LOG Associates): 0203

Declaration by Proponent

I hereby certify that the information contained herein is true to the best of my knowledge and belief.

Signature of Proponent

Eng. Daniel Ng'ang'a
Managing Director
Murang'a Water and Sanitation Company Ltd
P.O Box 1050 – 10200,
Murang'a, Kenya

EXECUTIVE SUMMARY

Purpose

Murang'a Water and Sanitation Company (MUWASCO), herein referred to as the proponent, intends to develop a water supply infrastructure intended to improve the water supply to Maragua town. The project entails laying of 9.2 Km transmission main 280mm outside diameter water pipeline of UPVC material from Shimo (near Kiawembeu water treatment works) to Gakoigo (Chief's Camp) along the existing public road reserve. The proposed line would also traverse across few parcels of private land with the necessary mitigation measures considered.

In complying with the Kenyan development regulations, the proponent commissioned **Log Associates Ltd** - herein referred to as the Consultant – to prepare this **Environmental and Social Impact Project Report** for the Maragua Water Supply Project. The report provides the project background as well as an assessment of the associated beneficial and adverse environmental and social impacts of the development

Project Need and Justification

Maragua region particularly the town experiences significant water shortages. Although MUWASCO has the potential to supply the town with adequate water, this potential has not been achieved due to inadequate transmission and distribution infrastructure. Moreover, the existing infrastructure is dilapidated resulting in regular breakdowns and high maintenance costs. This results in water rationing and rampant non-flow cases within the town and its environs. The rampant expansion of the town as a result of devolution and industrial growth is set to further worsen the situation

The current water situation has also driven the residents to consume untreated water from unsafe sources such as boreholes, shallow wells, rain water and unprotected springs. In addition to the health risk they present, these sources are costly to Maragua residents, an area considered as low income area according to Majidata

The Maragua Water Supply Project is thus necessitated by these challenges and is anticipated to serve about 4,700 residents in Maragua and its environs. This shall be through construction of the Kiharu – Maragua town water supply pipeline that will be receiving water from the more reliable 450mm Kiawambeu - Kiharu mainline pipe served by Kiawambeu water treatment works

These challenges withstanding, MUWASCO intends to address them by improving the supply of water to Maragua and is anticipate to improve service delivery in the project area

The ESIA Objective and Methodology

Pursuant to the Environmental Management and Coordination Act (EMCA) 1999, Legal Notice No. 150 of 19 August 2016 part 3C, water supply and distribution infrastructure construction projects must undergo an Environmental and Social Impact Assessment. As part of the project planning, this Environmental and Social Impact Assessment of the Maragua Water Supply project has been carried out to assess the environmental and social impacts associated with the project design, construction, commissioning and decommissioning phases

The ESIA for the proposed project was conducted through a participatory and collaborative approach and in compliance to the National rules and regulations notably the Environmental (Impact Assessment and Audit) Regulations 2003 (amended 2016). These regulations are generally compatible with the procedures and guidelines of International Funding Institutions such as the World Bank

The consultant conducted key informant interviews with relevant stakeholders, public participation forums, and comprehensive desk review and field observations so as to gather first-hand information about the project area and identify pertinent environmental issues. Environmental baseline conditions captured from literature and field observations are presented under Chapter 4 of this report. Moreover, issues and concerns identified from field assessments are documented in section chapter 6 of the report and further addressed in chapters 7 & 8

Public Consultation and Participation

Consultation and public participation is a key component of the ESIA process that helps in gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting Project alternatives and designing viable and sustainable impact mitigation measures

The consultant conducted key informant interviews with various stakeholders from the National Government agencies and representatives at the County level as well as relevant County government ministries. Members of the public were consulted through the public participation Barazas. The consultations were done with a view of gathering their views on various aspects regarding the proposed project while also creating awareness on the proposed project. The issues arising out of consultation sessions were documented and have been incorporated into this report in Section 5

Project Description

The proposed project is located in Murang'a County and traverses across Kiharu and Murang'a South Sub-Counties. The project entails laying of 9.2 Km transmission main

280mm outside diameter (OD) water pipeline of UPVC material from Shimo (near Kiawembeu water treatment works) to Gakoigo (Chief's Camp), construction of 1No. Reinforced Concrete storage tank (1250m^3), laying 27.8km of distribution lines from OD 225 mm to OD 63 mm and associated ancillary works. The proposed project will receive water from the 450mm dia Kiawambeu - Kiharu mainline supply and will be constructed along the existing public road reserve and traverse some few parcels of land. The project is funded by World Bank through the Water Services Trust Fund as a results and impact based loan; and shall be implemented by MUWASCO

The project's main target population is in Murang'a South Sub-county especially Maragua town. The project aims at triggering construction of 110mm – 63mm diameter distribution network as well as metering of new connections within the target area. The main project activities will be digging and backfilling of the pipeline trench and construction of associated valve chambers

Project Cost

Based on the technical design's bills of quantity, the implementation of the project is estimated at Kenya Shillings One Hundred and Thirty Million only (KSh. 130,000,000.00)

Policy, Legal and Administrative Framework

The Kenyan Government has provided comprehensive policy and legal frameworks that address environmental management. At the apex of these regulations is the Environmental management and Coordination Act (EMCA) 1999 that outlines detailed provisions for environmental management and conservation in Kenya.

The Act established the National Environmental Management Authority in 2002 mandated to supervise and coordinate all matters relating to the environment including EIAs, Environmental Audits, monitoring of environmental restoration orders, conservation orders and easements. The authority has also published environmental guidelines for environmental impact assessments which have been used to guide the execution of this ESIA

In addition to the local policy and legal provisions for environmental management, international organizations such as the World Bank have also come up with environmental safeguard policies and procedures that are also fundamental to environmental management initiatives. These have also been used as best practices references in the development of this ESIA report. Chapter 3 of this report details the various policy and legal frameworks pertinent to this assessment and their relevance to the project

Anticipated Project Impacts

The proposed project is anticipated to have both beneficial and adverse impacts on the environment and the communities involved. The impacts of the project are expected to spread across the the pre-construction, construction, operation and decommissioning phases of the project.

Implementation of the project will have far-reaching environmental, socio-economic benefits to the project area, Murang'a County and the country at-large. The project will provide an improved and reliable water supply for the residents of the project areas; the stabilised supply of water will improve the hygiene and sanitation practises of the areas resulting to reduced incidence of water-borne diseases. The project will promote the socio-economic development of the project areas; water-reliant businesses (i.e. such as hotels) will be opened to take advantage of the project. The employment of local workers during the construction and decommissioning phases will also inject money into the local economy. The county government will benefit from an expanded source of local revenue as a result of revitalisation of the local economy. The project proponent will also collect more revenue from new individual connections; this will provide the company with the much-needed capital to improve the coverage of water supply thereby boosting the level of customer satisfaction.

The negative impacts anticipated are mainly related to the construction and decommissioning of the pipeline and associated infrastructure. The impacts expected during the construction and decommissioning phases include: displacement of people, the risk of water inflicted land damages, soil erosion, siltation of surface water resources, degradation of air and water quality, interruption of existing infrastructure and services, effect on socio-economic activities, increased human and vehicular traffic, generation of solid wastes and health & safety hazards. The operation phase is expected to have fewer impacts; however, increased water supply will result to a subsequent increased generation of waste-water from Maragua town; the town doesn't have a functional sewerage system; this scenario will lead to the discharge of effluent into the local water resources thereby presenting a public health challenge. Illegal connection by the upstream community members may also arise; this may result in interruption of water supply to the target area as well as water related conflicts.

Environmental and Social Management Plan

The purpose of the ESMP is to ensure proper management of environmental and social impacts and risks identified during the assessment. The ESMP specifies the mitigation and management measures for each impact/ risk, party allocated responsibility, means of monitoring and frequency, objective verifiable indicators and an indicative budget. The ESMP also establishes a monitoring plan, capacity building plan and institutional arrangements to support its implementation.

Potential Impact	Mitigation/ Enhancement Measures	Responsibility
	Construction Phase / Pre-construction Phase	
Employment opportunities for local community	• The contractor shall reserve opportunities for semi-skilled and casual work for interested members of the local communities	Contractor
Injection of money to the local economy	• The contractor's staff shall strive to purchase basic items that may be required while construction is in progress from the local shopping centres (e.g. airtime, snacks)	Contractor
Capacity Building	• Sensitize local community on issues on environment, health and safety • Conduct HSE trainings to construction workers	Contractor MUWASCO
Partial loss of land use rights	• Community sensitization and awareness creation regarding the project	MUWASCO
	• Conduct a Resettlement Action Plan (RAP) along the proposed pipeline and compensate PAPs with private land along the wayleave	MUWASCO/ Consultant
Loss of Flora and Fauna	• The proponent shall ensure that clearing of vegetation clearing is limited to the pipeline trench area (i.e. 0.5 meters width) within the road reserve • Transportation of construction materials to be done through the existing local roads • Avoidance of vegetation clearing along riparian land • Sensitization of construction work-force on environmental conservation and ecological protection • Re-vegetation of completed pipeline route with fibrous rooted indigenous vegetation species	MUWASCO Contractor
Slope Instability	• Use of manual labour for trenching and backfilling • Avoid utilisation of heavy machinery near steep landscapes • Construction activities to be conducted during dry season	Contractor
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Sprinkling of backfilled trenches with water • Compaction of backfilled trenches • Re-vegetation of excavated areas • Channelling of surface water runoff away from the pipeline route	Contractor
Air Quality Degradation	• Supply and construction vehicles will only use the designated transport routes. The drivers will also be advised to stick to prescribed speed limits • The contractor will ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases • The contractor shall ensure appropriate vehicle speed is used on murram road sections that will be used by construction vehicles to minimize the creation of dusts	Contractor

Potential Impact	Mitigation/ Enhancement Measures	Responsibility
	• Construction workers will be provided with dust masks to mitigate	
Interruption of Existing Infrastructure	• The proponent will liaise with KURA and KeRRA for authorisation to cut through main roads and feeder roads that fall under their jurisdiction. • The contractor will immediately restore the damaged sections of roads and water supply networks to pre-construction conditions.	MUWASCO Contractor
Impact on Socio-Economic Activities	• Notification to local community members whose farms have encroached on the reserve will be notified of pending construction activities	MUWASCO
Increased Vehicular and Human Traffic	• Transportation of construction material to specific sites will be done through the existing local roads • The contractor will rehabilitate the local roads that will be damaged during construction activities • Consultation with the local communities on planned road diversions when the need arises • Restriction of Vehicular and Human Traffic to the road reserve where possible • Sensitization of drivers to comply with prescribed speed limits	Contractor
Generation of solid wastes	• Provision of solid waste collection facilities (waste bins) • Contracting licensed solid waste handlers • Sensitization of construction workers on proper disposal of solid wastes	Contractor
Health and Safety Hazards	• Continuous supervision of occupational, health and safety management to ensure compliance	MUWASCO
	• Occupational Safety and Health Training for contractor's staff	Contractor
	• Conduct orientation talks and visits	Contractor
	• Conduct toolbox talks	Contractor
Water quality degradation	• The contractor will maintain all site vehicles and equipment is a serviceable state. • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels • Water from cleaning of equipment will be utilised within the project site and will not be discharged into water courses.	Contractor
Operation Phase		
Improved and reliable water supply for the residents of Maragua Town and its environs	• Improve customer experience through better water supply services • Reduction of water outages/ rationing • Expansion of coverage area	MUWASCO
Increased reliability of water supply to the residents of Kiharu Sub-County	• Improve customer experience through better water supply services • Reduction of water outages/ rationing	MUWASCO

Potential Impact	Mitigation/ Enhancement Measures	Responsibility
	• Expansion of coverage area	
Improved Service Delivery by the County Government	• Improve customer experience through better water supply services • Reduction of water outages/ rationing • Improve customer relations	MUWASCO
Benefits from MUWASCO's CSR activities	• Consultation with the local communities to identify priorities for intervention	MUWASCO
Slope-instability	• Repair and maintenance staff shall drain the pipeline sections to be worked on to avoid spillage of water • Pipeline leakages or bursts shall be swiftly attended to	MUWASCO
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Compaction and stabilization of backfilled trenches • Re-vegetation of excavated areas • Channelling of surface water runoff away from the pipeline route	Contractor
Illegal connection to the new pipeline	• The project proponent will ensure that communities living along the pipeline route are adequately served with piped water and that no illegal connections are installed. The proponent will also ensure that all consumers are metered with appropriate billing and revenue collection • The proponent will also conduct water balance studies and NRW audits to identify and plug points of water loss	MUWASCO
Generation of liquid and solid wastes	• The proponent shall raise funds to construct a functional sewerage system for Maragua town as a long-term mitigation measure against increased volume of waste-water due to increased water supply and population • As a short-term intervention, Sub-county public health officers should enforce the construction and usage of septic-tanks for disposal of waste water by the residents of the town • Solid wastes generated during repair and maintenance activities will be collected and disposed-off in designated manner	MUWASCO
Health and Safety Hazards	• Train all workers on Health, Safety and Environment (HSE) with an aim of improving awareness • The proponent will erect appropriate safety signage during repair and maintenance activities • The proponent shall provide first-aid facilities for R&M staff • Proponent's staff will be required to use PPEs during R&M work	MUWASCO

Potential Impact	Mitigation/ Enhancement Measures	Responsibility
	Decommissioning Phase	
Employment opportunities for local community	• The contractor shall reserve opportunities for semi-skilled and casual work for interested members of the local communities	Contractor
Reduced availability of potable water to beneficiaries	• The proponent shall provide an alternative source of potable water to the beneficiaries of the project	MUWASCO
Slope Instability	• Use of manual labour for excavation and backfilling • Avoid utilisation of heavy machinery near steep landscapes • Decommissioning activities to be conducted during dry season	Contractor
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Sprinkling of backfilled trenches with water • Compaction of backfilled trenches • Re-vegetation of excavated areas • Channelling of surface water runoff away from the pipeline route	Contractor
Air Quality Degradation	• Evacuation vehicles will only use the designated transport routes. The drivers will also be advised to stick to prescribed speed limits • The contractor will ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases • The contractor shall sprinkle murram road sections that will be used by construction vehicles on a needs basis to eliminate the creation of dusts • Construction workers will be provided with dust masks to mitigate	Contractor
Interruption of Existing Infrastructure and Socio-Economic Activities	• The proponent will liaise with KURA and KeRRA for authorisation to cut through main roads and feeder roads that fall under their jurisdiction. • The contractor will immediately restore the damaged sections of roads and water supply networks to pre-construction conditions	MUWASCO Contractor
Impact on Socio-Economic Activities	• Notification to local community members whose farms have encroached on the reserve will be notified of pending decommissioning activities	MUWASCO
Loss of Flora and Fauna	• The proponent shall ensure minimal clearing of vegetation • Transportation of decommissioning wastes to be done through the existing local roads • Sensitization of decommissioning work-force on environmental conservation and ecological protection • Re-vegetation of cleared areas with indigenous vegetation species	MUWASCO Contractor

Potential Impact	Mitigation/ Enhancement Measures	Responsibility
Increased Vehicular and Human Traffic	• Transportation of decommissioning wastes to specific sites will be done through the existing local roads • The contractor will rehabilitate the local roads that will be damaged during decommissioning activities • Consultation with the local communities on planned road diversions • Restriction of Vehicular and Human Traffic to the road reserve where possible • Sensitization of drivers to comply with prescribed speed limits	Contractor
Generation of solid wastes	• Provision of solid waste collection facilities (waste bins) • Contracting licensed solid waste handlers • Sensitization of construction workers on proper disposal of solid wastes	Contractor
Health and Safety Hazards	• Continuous supervision of occupational, health and safety management to ensure compliance	MUWASCO
	• Occupational Safety and Health Training for contractor's staff	Contractor
	• Orientation talks and visits	Contractor
	• Toolbox talks	Contractor
Water quality degradation	• The contractor will maintain all site vehicles and equipment is a serviceable state. • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels • Water from cleaning of equipment will be utilised within the project site and will not be discharged into water courses.	Contractor

Resettlement Action Plan

The Maragua water supply project does not affect the settlement, hence the project **does not lead to physical displacement of persons**. A significant amount of land parcels has been traversed by the proposed pipeline hence the project would result to **partial loss of land use** along the proposed wayleave. The latter is attributed to the fact that affected PAPs would still farm (controlled farming that does not affect the water pipeline) on the land after project completion. The crops affected would be paid in full to cover for the losses that would have occurred during the construction period. The crops that were found grown on the field included maize, beans, arrow roots, French beans and butter nuts.

Thirty-three (33) plots for the affected persons were found along the wayleave. One (1) of the plot is a quarry but the remaining thirty-two (32) are farm lands used for planting variety of crops.

The size of the plot of land ranges between 72.5 to 1131 square metres with majority of land owners being men. Plots owned by men are 27 which accounts for 81.81% and 6 by women accounting for only 18.18% of the total.

The sum compensation on the piece of land owned is KSh 3,561,960.00, that for crops is KShs 1,164,271.56, with 15% contingencies amounting to KSh708,934.73. The final cost of RAP was found to be KSh5,435,166.29. Table 1 below shows the summarised data of RAP.

Table 1: Summary table of RAP

Gender		Cost of Land (KSh)	Cost of crops (KSh)	Contingencies (KSh)	Total cost (KSh)
Male	Female				
26	6	3,561,960.00	1,164,271.56	708,934.73	5,435,166.29

Conclusion and Recommendation

Through the assessment and evaluation of all environmental and social concerns or the proposed Maragua Water Supply Project, it can be concluded that its implementation will have net environmental, economic, social and health benefits to Maragua residents. On the other hand, the project implementation is envisaged to have some negative impacts depending on the phase of its implementation. These impacts have been discussed in great details and appropriate measures proposed. The greatest benefit of the proposed project will be the increased supply and reliability of clean water services to Maragua residents

Most of the adverse impacts will be temporary in nature during the construction phase and can be appropriately managed to acceptable levels with implementation of the recommended measures to ensure maximum benefits from the project. The ESMMP prepared – which included mitigation plan, monitoring and enforcement requirements and responsible persons/organizations will serve as a comprehensive guideline for impact enhancement and mitigation. Coordination between the proponent and the contractor is highly encouraged for successful implementation of the ESMMP

Report Structure

This report has been prepared under the following chapters;

Chapter 1: **Introduction;** this chapter describes the purpose of the report, its background and justification. It also explains the objectives, scopes and provides the methodology adopted in the study process.

Chapter 2: **Project description.** Describes the proposed Maragua water supply project in terms of its location, the proponent and stakeholders, proposed pipeline route, project design, materials and activities. This chapter also presents the project cost and implementation schedule

Chapter 3: **Policy, Legal and Institutional Framework:** Identifies and analyses the various policy and legal frameworks pertinent to the proposed project.at the local and international level. The chapter also identifies the various institutions responsible for water resources management and environmental management in Kenya

Chapter 4: **Baseline Environment.** Provides a description of the existing physical, biological, and socio-economic environment so as to achieve an understanding of the environmental setting of the study area

Chapter 5: **Analysis of the Project Alternatives** – Analyses the No project alternative, supply pipeline alternative, the different water source alternatives and the design alternatives

Chapter 6: **Consultation and Public Participation:** Details the various stakeholders that were consulted during the assessment. Further, it identifies the various concerns raised during the key informant interviews and public participation barazas

Chapter 7: **Environmental and Social Impacts Assessment and Mitigation Measures:** Details the various environmental and social benefits anticipated from the project. It also identifies the various adverse impacts that may result from the project and outlines their mitigation measures

Chapter 8: **Environmental and Social Management and Monitoring Plan:** Provides the environmental and social management plan necessary for impact enhancement and mitigation through –out the stages of project implementation

Chapter 9: **Resettlement Action Plan.** Contains the procedures it will follow and the actions it will take to properly resettle and compensate affected people and communities (for loss of land use).

Chapter 10: **Conclusion and recommendations.** Provides a summary of the report, its findings and recommendations.

Chapter 11: **References.** Provides a details list of documents cited in the report.

Chapter 12: **Annexes:** Contains the minutes of public consultation meetings, list of key informants consulted and a gallery of selected field photos

LIST OF ACRONYMS AND ABBREVIATIONS

BOQS	Bill of Quantities
CLTS	Community Lead Total Sanitation
CPP	Consultation and Public Participation
CSR	Corporate Social responsibility
DCC	Deputy County Commissioner
Dia	Diameter
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
ESMP	Environmental and Social Management Plan
GDP	Gross Domestic Product
GI	Galvanised Iron
GOK	Government of Kenya
HDPE	High Density Polyethylene
KeRRA	Kenya Rural Roads Authority
KIHBS	Kenya Integrated Household Budget Survey
KURA	Kenya Urban Roads Authority
MUWASCO	Murang'a South Water and Sanitation Company
NEAP	National Environmental Action Plan
NECC	National Environmental Complaints Committee
NEMA	National Environmental Management Authority
NHIF	National Hospital Insurance Fund
NRW	Non-Revenue Water
NSSF	National Social Security Fund
OD	Open Defecation
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
SCAMP	Sub-catchment Management Plan
SERC	Standards and Enforcement Review Committee
SESA	Strategic Environmental and Social Assessment
UPVC	Un-plasticized Polyvinyl Chloride
WASREB	Water Services Regulatory Board
WRMA	Water Resources Management Authority
WSP	Water Service Provider
WSTF	Water Services Trust Fund

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CHAPTER 1: INTRODUCTION

1.1. Purpose

Murang'a Water & Sanitation Company (MUWASCO), herein referred to as the Proponent, has proposed to implement the **Maragua Water Supply Project** (herein referred to as the project) to improve and increase water supply to Maragua Town. The proposed project entails laying of 9.2 Km transmission main 280mm outside diameter water pipeline of UPVC material from Shimo (near Kiawembeu water treatment works) to Gakoigo (Chief's Camp) along the public road reserve. The proposed line would also traverse across few parcels of private land with the necessary mitigation measures considered. The target population is in Murang'a South Sub-County, especially Maragua town.

In complying with the Kenyan development regulations, the proponent commissioned Log Associates Ltd - herein referred to as the Consultant – has been commissioned by the client to prepare this **Environmental and Social Impact Project Report** for the Maragua Water Supply Project

1.2. Background

Murang'a Water & Sanitation Company (MUWASCO) is one of the Water Service Providers contracted by Tana Water Services Board (TWSB) as an agent to provide efficient, reliable and economical water and sewerage services in Murang'a town and its environs. The company was registered in March 2006 under the Companies Act CAP 486 of the laws of Kenya. MUWASCO's jurisdiction covers an area of 145km$^{2.}$ but currently, only 60km^{2} which represent 41% coverage of the total area of jurisdiction has been covered. The WSP is currently operating one water treatment plant (Kiawambeu) and one sewerage treatment plant (Karii). Kayahwe water treatment plant is has not yet been put to use. Currently the company has 10,000 active water connections and 3,900 sewerage connections. The WSP serves a population of approximately 60,000.

The company has two sources of water; the River Kayahwe and River Irati along which the two water treatment works are situated. In addition, the company has a sewerage treatment plant at Karii. Currently, all water supply is done using electricity pumping which is a major cost to the company as well as a cause of water supply interruptions in cases of power black outs.

Most of the service areas covered by the company experience water shortages with the worst hit urban area being Maragua town. This is due to challenges in water transmission resulting from dilapidated infrastructure. The proponent is thus in the process of addressing such challenges and the Maragua Water Supply Project is one of the Improvement initiatives. The project will be

funded by World Bank through the Water Services Trust Fund as a result and impacts based funding

1.3. Project Justification

According to initial assessments by MUWASCO, Maragua region, particularly the town, has significant water shortages. The area has a high rate of expansion triggered by devolution, industrial growth. Currently, MUWASCO has the potential to meet the increasing water demand within the town. However, this potential has not been fully exploited as a result of inadequate transmission and distribution network. The existing infrastructure is dilapidated increasing the high levels of network breakdowns, levels of non-revenue water and consequent escalation of the operation and maintenance costs.

The situation has resulted into the development of a rationing programme. In effect, residents have had to supplement their unmet water demands with boreholes, shallow wells, rain harvesting, unprotected springs just to mention a few. However, the mentioned sources have not been well reliable and cases of related health effects have been observed. These sources have also proved to be costly to the residents considering the project area is considered a low-income area according to Majidata.

Maragua Water Supply project intends to address this situation by improving access to water for the residents of Maragua and its environs through construction of the Kiharu – Maragua town water supply pipeline. Considering the yielding capacity of these water sources, the proponent intends to utilize Kiawembeu water treatment works and transmission mains (which is the most dependable) to supply water to Maragua town. The pipeline is intended to transmit water directly to Maragua town while supplying only social amenities (schools, hospitals and churches) along the route. It is anticipated that more than 47,000 residents in Maragua and its environs will benefit from the project

1.4. Objective

The main objective of the study is to carry an Environmental and Social Impact Assessment for the proposed project- Maragua Water Supply Project. As part of the project planning, the ESIA process is meant to identify significant environmental and social impacts associated with the design, construction, commissioning and decommissioning proposed project and recommend appropriate enhancement and mitigation measures for the positive and negative impacts respectively.

The ESIA will generate an Environmental Management Plan that describes in detail the mitigation measures to be carried out, costing, scheduling and responsibility of such measures, and a detailed monitoring process and its schedule.

1.5. Scope of Activities

The scope of activities for this assessment entailed;

1. Description of the proposed project
2. Description of the physical, biological and social environment
3. Description of the health and safety situation and social safeguards
4. Description of pertinent Legislative and Regulatory Considerations:
5. Determination of the Potential Environmental Impacts of the Proposed Project:
6. Analysis of the occupational health and safety concerns
7. Development of environmental and social management plan to mitigate negative impacts
8. Development of the ESIA monitoring plan

1.6. Study Approach and Methodology

1.6.1. Approach

The Assessment process adopted a participatory and collaborative approach in the course of the assignment. These approaches encouraged active involvement of the stakeholders, who had crucial perspectives and knowledge of the areas' conditions, traditions and social structure. It also assisted the personnel to acquire reliable data, using a variety of formal and informal techniques that could were employed within a short timescale.

The assignment was conducted in line with the NEMA guidelines for an ESIA outlined in Environmental Management and Coordination Act (EMCA) 1999, and in consideration of international guidelines on environmental and social policies, guidelines and assessment procedures.

1.6.2 Methodology

The assessment was guided by the methodology described by the EMCA 1999 and the Environmental (Impact assessment/ Audit Regulations (2003).and World Bank's safeguard policies. The various amendments to the Act, notably, the EMCA (amendments) 2015 and Legislative Supplement No. 63 of 19 August 2016 were also consulted extensively during the assessment

The ESIA study was carried out through a mix of methods namely; desk review, field assessments and public consultations with the communities of possible project beneficiaries, the project affected persons and relevant County and National Government institutions and agencies. The method followed is as described in the following sections;

i. Desk review

A desktop study was conducted to review available published and unpublished reports, development plans and maps to compile relevant baseline biophysical and socio-economic information about the study area.

The biophysical information was compiled on environmental aspects such as Topography, Climate, Soils, Water Resources, land use and flora and fauna. On the socio-economic environment, the study compiled information on aspects such as population, access to water, and health.

ii. Field visits

Field visits were conducted to assess the project area, collect environmental data and site-specific information on the biophysical and socio-economic environment. The exercise was meant to verify and supplement secondary data. Specific key feature were captured in photographs.

While at the site, environmental data were recorded and potential impacts identified. In addition, environmental features relevant to the study were noted and photographs taken as record of key features.

iii. Public Consultations

Public consultations were undertaken through key informant interviews and public meetings (barazas). The consultations were meant to create awareness of the proposed project, assess the reaction of the affected communities and identify any potential adverse social and environmental effects.

- *Public Consultations meetings*

Consultations with the communities were conducted in the project area with the help of the local administration especially the chiefs and assistant chiefs. The discussions during these public meetings were centered on key emerging issues relating to the project as well as the communities. A total of seven public consultative meetings were held at the following locations; Mbiri (Ndikwe), Nginda (Iregi), Mariira, Itaga, Kaharo, Maragua town and Samar.

- *Key Informant Interviews (KII)*

One-on-one interviews with county and national government agencies and institutions in the project area were undertaken i.e. from Muranga County Headquarters in Muranga, Muranga

South Sub County Headquarters in Kenol, Kigumo South sub county headquarters in Kigumo, the water departments, the roads department, NEMA, Public Health Offices in Kenol and Maragua and the County Environment Departments

These interviews were conducted to augment and confirm data and information obtained using the other tools and methodologies.

iv. Impact assessment and analysis

The assessment and analyses methodologies for ESIA studies were based on multi- disciplinary approaches and structured to allow for holistic study and assessment of the following key components of the environment in relation to the proposed Project:

- Physical/chemical component;
- Biological/ecological component;
- Sociological/cultural component; and
- Economic/operational component.

The anticipated project impacts were then classified as either positive or adverse and appropriate mitigation measures assessed before recommendation

CHAPTER 2: PROJECT DESCRIPTION

2.1. Introduction

The project is located in Maragua; a low-income peri-urban settlement situated along the Kenol – Murang'a road in Murang'a County. The proposed pipeline traverses across Kiharu Sub County (Mbiri Location) and Murang'a South Sub County (Nginda Location). The target population is in Murang'a South Sub-County, especially Maragua town which is currently under Murang'a water and sanitation company's Service area. Figure 2.1 presents the project layout within the project area.

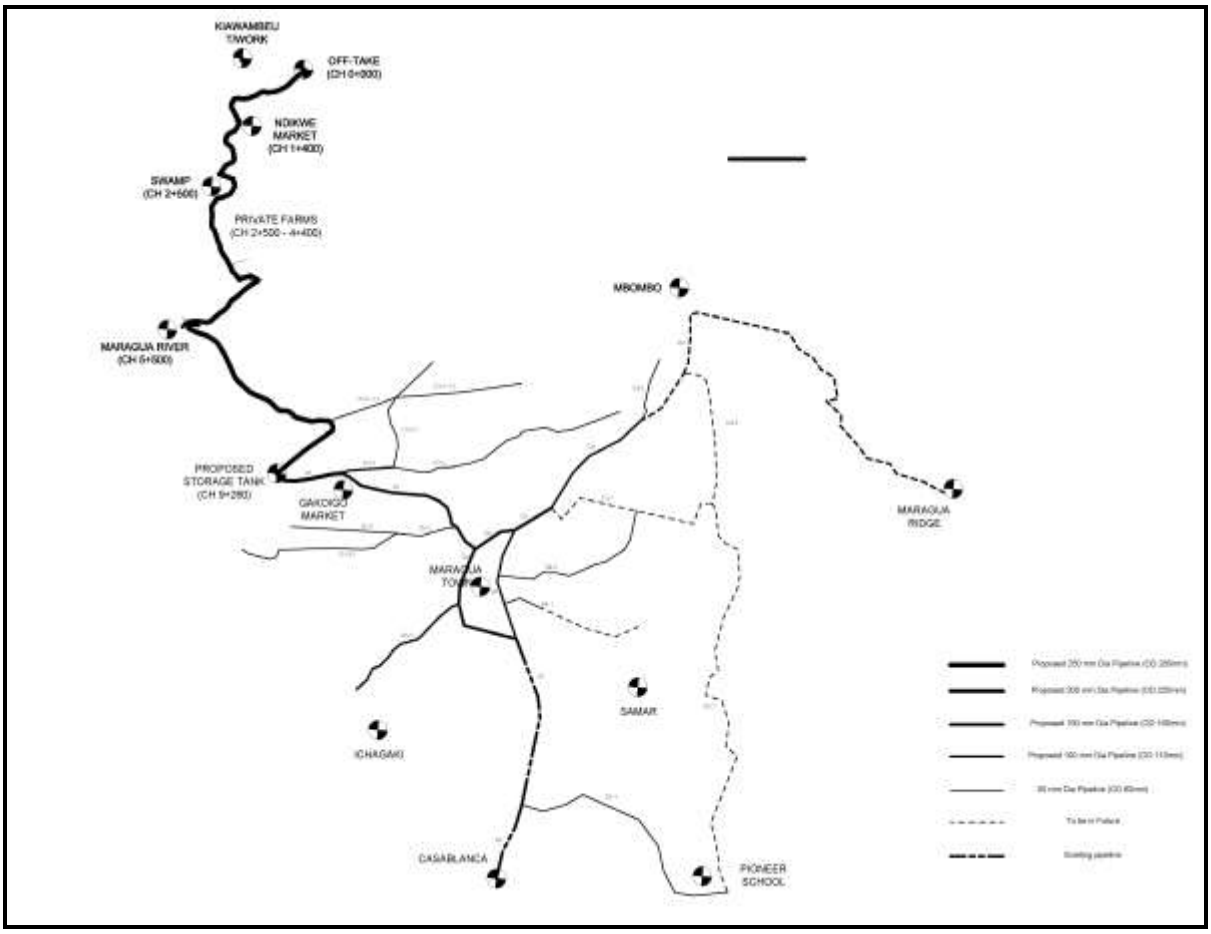

Figure 2.1: Project layout within the project area

Source: Losai Management Ltd; Design Report

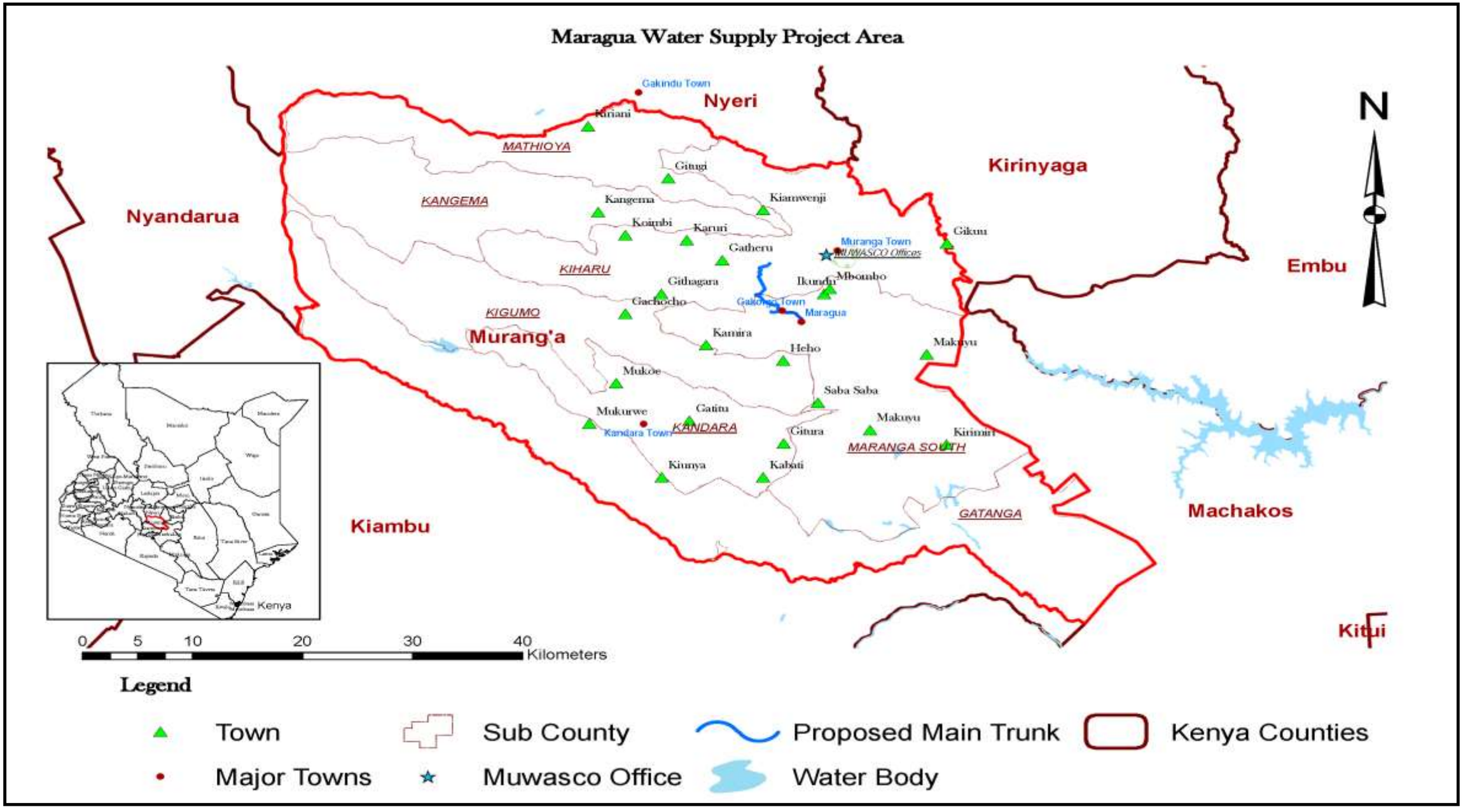

Figure 2.2: Project Location and Pipeline Route

Source: Log Associates; ArcGIS® software by Esri

2.2. The Project Proponent and Key Stakeholders

The proposed Maragua Water Supply project will be constructed by Murang'a Water and Sanitation Company (MUWASCO) through the Water Services Trust Fund's (WSTF) result based financing loan. Other stakeholders that will play a key role during the construction and operation phases of the project include the following

i. Water Resources Management Authority
ii. County Government of Murang'a
iii. Water Services Regulatory Board
iv. Ministry of Water and Irrigation
v. Affected communities around the project area including social institutions

2.3. Existing Water Sources for the Project Area

MUWASCO has an existing water treatment plant (Kiawambeu) and one sewerage treatment plant (Karii). Kayahwe water treatment plant is still not operational. Currently the company has 10,000 active water connections and 3,900 sewerage connections. The water service provider serves a population of approximately 60,000 people.

The two main sources of water along which the two water treatment works are situated in the company include;

- River Kayahwe
- River Irati

Currently, all water supply is done using electricity pumping which is a major cost to the company as well as a cause of water supply interruptions in cases of power black outs.

Most of the service areas covered by the company experience water shortages with the worst hit urban area being Maragua town located in Murang'a South Sub County. This is due to the challenges in water transmission resulting from dilapidated infrastructure.

2.4 Supply Pipeline Route

The proposed water supply project will receive water from the 450mm Kiawambeu - Kiharu mainline which emanates from the Kiawambeu water treatment works. The pipeline will tap the Kiawambeu - Kiharu mainline line from a chamber located in Shimo (near Kiawembeu water treatment works) at 037.10521°E, 00.73641°S (WGS 84) in Kiharu Sub-county and span approximately 9.2km to Maragua town along the public road reserve. The pipeline however traverses a few private parcels of land at Mbiri location in Kiharu Sub County near Ndikwe primary school.

From the chamber at Shimo, the pipeline will run parallel along the existing road reserve towards the road junction at Ndikwe Market in Mbiri, Kiharu sub county. Just after the tarmac road the proposed pipeline crosses to another marram road along the road reserve. The pipeline then runs parallel to the marram road along the road reserve to a swampy area. At the swamp area, the pipeline branches left where it traverses across a few parcels of land to avoid a nearby quarry. Here, private land is affected. The proposed pipeline then runs across Maragua Bridge before running parallel along the tarmac road reserve to Iregi before terminating at Gakiogo. Construction of 1No. Reinforced Concrete storage tank (1250m^3) is proposed at the Chief's Camp in Gakoigo 037. 10637°E, 00. 78457°S (WGS 84) where the water will be reserved before distribution. The distribution network of pipelines from a dia. of 225 mm to 63 mm and associated ancillary works will then emanate from the tank at the Chief's Camp in Gakoigo to Maragua town via Genda and its environs. *Figure 2.2* presents the mapped pipeline route across the two sub counties

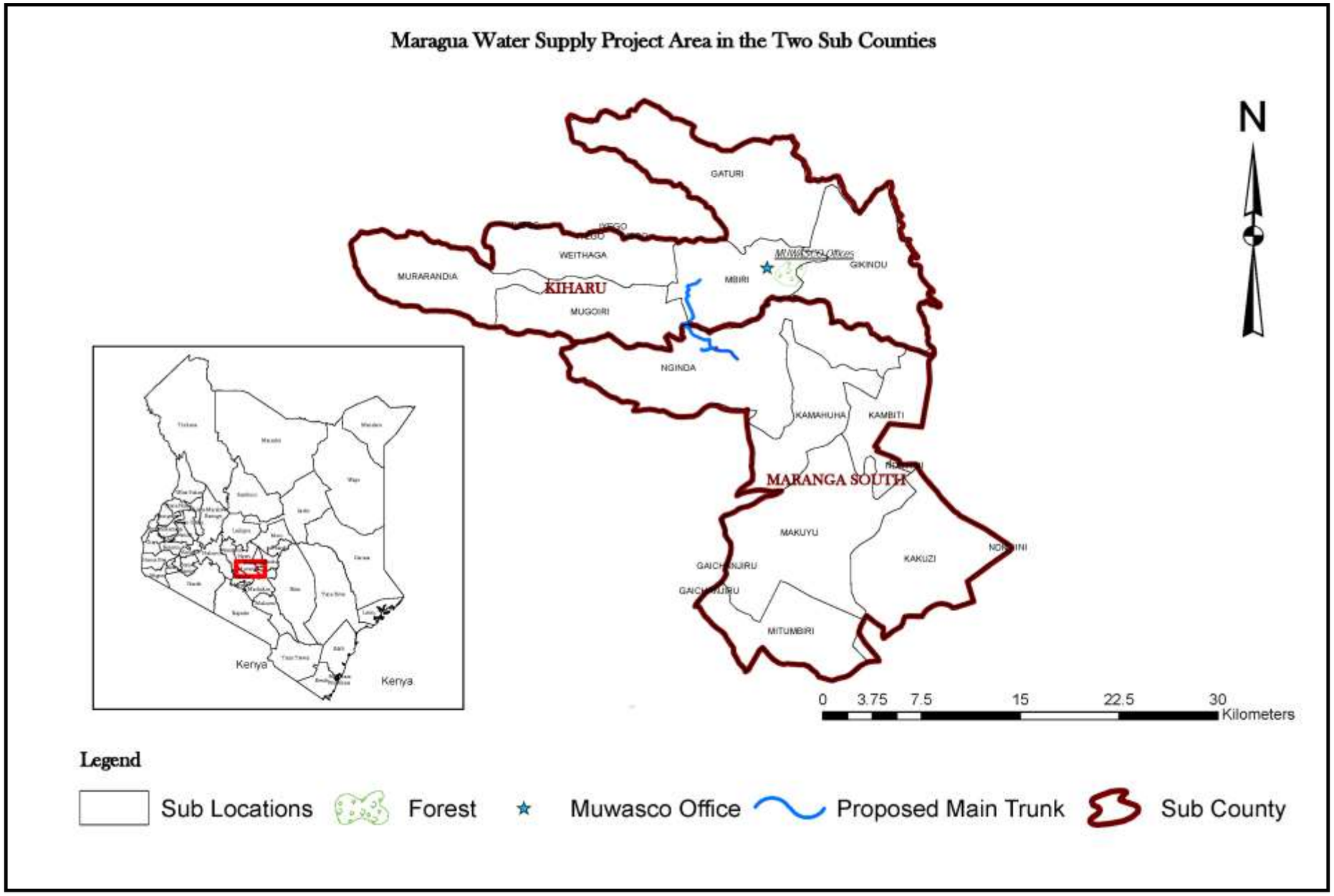

Figure 2.3: Map Showing Project Location and Pipeline Route

2.5. Project Design and Material

Design

The proposed supply pipeline shall run underground although its route and regulated at associated valve chambers. The pipeline shall run parallel to an existing 10" pipeline - reduced to 5" - along the public road reserve. The pipeline is intended to transmit water to Maragua town without any distribution connections along the way. However, water deficient social amenities such as schools, hospital/dispensaries and churches along the route will be connected to the Pipeline.

Material

The proposed Maragua Water Supply project entails construction of approximately nine point two (9.2) kilometers of 250mm pipeline and associated valve chambers. The project will be constructed using modern construction material and procedures while ensuring that the safety of the neighboring communities and the environment is not compromised. These materials shall be locally and internationally accepted that meet the threshold public health, occupational safety and health as well as environmental standards. The main construction materials and equipment for this project will be;

- HDPE pipeline and accessories (sockets, joints)
- Appropriate valves (e.g. air valves, sluice valves, washouts)
- Pipe jointing equipment and accessories
- Reinforcement steel
- Concrete Molds
- Raw construction materials e.g. sand, cement, gravel, hardcore, among others
- Excavation tools (Manual and Mechanical)
- General labour force (skilled and unskilled)

2.6. Project Activities

2.6.1. Preconstruction and Project Design

The proponent developed a comprehensive proposal justifying the need and to determine its suitability to meet the water demand of Maragua residents as described in this report. The ESIA is part of this process and it establishes areas of environmental and social issues and proposes the appropriate mitigation measures to be undertaken at the construction, commissioning, operation and decommissioning phases

2.6.2. Design Work

The design of the project entailed significant ground activities including reconnaissance survey, topographical survey, hydrology of the water offtake source, identification of the water demand, development of design layout and associates BoQs and tender documents.

Moreover, interaction with the local communities to gather first-hand information with respect to physical features and desired design considerations is also undertaken at this stage, implementation schedules are also prepared at this stage

The environmental and social impact assessment study utilizes the design outputs to determine the quantifiable impacts and recommend the appropriate management plan to eliminate or reduce them

2.6.3. Construction Phase

Site Clearing and Trenching

Considering that the proposed pipeline will traverse the project site within the established road reserve, vegetation clearing will be done to pave way for campsite establishment and laying of the pipeline. Along the reserve, the predominant vegetation is grass and short bushes that prevents soil erosion along the road drainage

Moreover, site clearance and trenching will disturb top soil material rich in organic and humic content. The excavated material should be appropriately used for backfilling and land reclamation -where in excess

Public Amenities

The proposed pipeline is anticipated to cross public roads, private farms and run next to power lines and an existing water pipeline. These are likely to be disrupted during the construction and thus need to be appropriately managed in collaboration with the relevant services providers and authorities

Pipe Laying

This shall involve pipeline transportation, placement of the pipes in the dug trenches, pipe joining works and backfilling. This shall be undertaken by the contractor with involvement of casual workers preferably from the surrounding community members

Restoration Activities

On completion of the project construction, there will be restoration of all the damaged road sections and road reserve areas. Landscaping of the backfilled areas through re-vegetation and/or leveling to encourage growth of natural grass will be undertaken as a means of environmental conservation and aesthetics

2.6.4. Commissioning

This shall be the formal hand-over and operationalization of the supply pipeline upon completion by the contractor. To achieve successful hand-over process, the proponent shall ensure that there are no unresolved social concerns and that the facility has been completed

as per the design details, affected sites have been well rehabilitated and that all components of the pipeline are operational

On top of the paperwork submitted it will be appropriate for the proponent to conduct physical evaluation of the installation together with the contractor, WSTF, relevant County Executive Members and Government Departments and the design consultant

2.6.5. Pipeline Operation

The water supply will be monitored to ensure that it conveys the designed flows and at the same time relieving allowable volumes from the abstraction sources. The process shall be continuous with regular checks along the pipeline to check for leakages and illegal connections that may occur over time

2.6.6 Decommissioning Phase

While it is not envisaged that the water supply pipeline will be decommissioned in the near future, the need may arise at some point. Should the need arise, a decommissioning audit of the water pipeline and its components will need to be undertaken at least twelve (12) months prior to the exercise and be approved by NEMA. The decommissioning audit report will include a comprehensive decommissioning plan to guide the process

2.7. Project Cost and Implementation Schedule

The duration of project construction works is yet to be determined but is estimated to commence in July 2017. However, this period will be dependent on completion of preliminary activities including land permission for reserve use, relevant permits from WRMA and contractor mobilization

The cost estimate for construction of the supply pipeline and associated structures is **Kenya Shillings One Hundred and Thirty Million only (KSh. 130,000,000.00)**

CHAPTER 3: POLICY, LEGAL AND ISNTITUTIONAL FRAMEWORK

This chapter outlines the relevant policy, legal and institutional framework governing the preceding component. The ESIA was carried out within the Kenyan legislative and regulatory framework and in line with World Bank's safeguard policies.

3.1. Overview

Environmental and Social Impact Assessment serves to ensure that new projects and programmes are implemented with appropriate measures to enhance possible positive and mitigate adverse impacts on the environment and peoples' health and safety; as well as enhance sustainable operations with respect to the environmental resources and co-existence with other socio-economics activities within the neighbourhood.

The Government of Kenya (GOK) has put in place adequate policy, legal and statutory measures in ensuring the protection of the environment and persons against any harm from new projects. The National Environmental Management Authority (NEMA) is the overall oversight authority charged with management of environmental issues across all development sectors. The necessary policies and legislations that ensure environmental impacts assessments and annual environmental audits are carried out on new and running projects respectively and a report submitted to NEMA for approval and issuance of relevant certificates are applied. On the other hand, the Water Act 2002 harmonizes and streamlines the management of water resources, water supply and sanitation services

The Kenya National Environmental Action Plan (NEAP 1994) indicates that the GOK recognizes the negative impacts on the ecosystem that result from industrial, economic and social development programmes that disregard environmental sustainability. Appropriate policies and legal guidelines were consequently formulated and the existing ones harmonized and/or in the process of development. The NEAP process thus introduced environmental assessments in Kenya that indulges key stakeholders including but not limited to service and goods industrialists, business community, legislators and local authorities. This climaxed into development of the Policy on Environment and Development under sessional Paper No. 6 of 1999

This chapter details the policy, legal and institutional framework pertinent to the proposed project

3.2. Policy Framework

The Kenya Environmental Policy seeks to achieve sound environmental management through sustainable development that ensures that the needs of the future generations are not compromised as a result of current use. This subsection details the various policy provisions pertinent to environmental management.

3.2.1. Constitution of Kenya, 2010

The constitution of Kenya spells out the fundamental rights of every Kenyan citizen. Article 42 of the bill or rights of the Constitution provides that 'every Kenyan has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures'

The Constitution goes further ahead and stipulates under article 69 of part II, chapter 5 (environmental and Natural Resources) that the State shall;

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

Moreover, every person has been mandated to cooperate with the State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources

In addition to the environmental and natural resources provision, part 1 of the same chapter emphasizes the following;

i. Land use and management shall by law benefit local communities
ii. Community land is protected from encroachment by State.
iii. Law shall protect Rivers, forests and water bodies.
iv. Equitable access to land.
v. All lawful land rights are secured; only someone who has stolen land needs to worry.
vi. County governments will manage land in trust of the people in accordance with the constitution.

In addition to these provisions, article 70 provides that if a person alleges that their right to a clean and healthy environment recognized and protected under article 42, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress.

Relevance to the Project

The Constitution of Kenya stipulates for sustainable and sound management of the environment in relation to development projects. Article 69, the project proponent is mandated to cooperate with State organs and other persons to protect and conserve the environment. MUWASCO should therefore ensure compliance with the constitution in so far as ensuring sustainable development. Moreover, the project should aim at ensuring sustainability of the livelihoods and biological resources within the project area while taking cognizance to the powers given under the constitution to communities and individuals to enforce their rights through legal redress.

3.2.2. Kenya Vision 2030

The Kenya Vision 2030 provides the national development blueprint for the period 2008 to 2030 emanating from the Economic Recovery Strategy for Wealth and Employment Creation. Following the post-election violence in 2007/2008, the GDP growth rate that had rose to 7% in 2007 dipped to 1.7% in 2008. The Visions objective is to transform the Country into a middle-income economy with a consistent annual growth of 10% by year 2030.

The Vision outlines the 2030 goal for urban areas as to achieve a "well housed population living in an environmentally-secure urban development" The vision envisages to achieve this by bringing basic infrastructure and services including roads, street lights, water and sanitation facilities, storm water drains, footpaths and others to the people. In achieving these, the vision emphasizes on the need promoting environmental conservation to better support the economic pillar.

Relevance to the Project

The proposed project intends to improve water supply and service delivery in Maragua town – an upcoming urban- centre – through construction of water supply infrastructure. This initiative is part of the process in achieving the goals of Vision 2030 for Maragua residents. The proponent should also endeavor to protect the environment in supporting the economic pillar of the vision

3.2.3. National Environment Policy, 2013

The Policy sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources. The policy further acknowledges that natural resources are under immense pressure from human activities particularly for critical ecosystems including forest, grasslands and arid and semi-arid lands.

The policy seeks to develop an integrated approach to environmental management, strengthening the legal and institutional framework for effective coordination, promoting environmental management tools

Relevance to the Project

This EIA study will develop an environmental and social management and monitoring plan to mitigate the impacts that may result during the construction and operation phases of the project. This tool is aimed at promoting coordination of environmental management of the project such that sensitive ecosystems are not destabilized by the subsequent project activities

3.2.4. National Policy on Water Resources Management and Development (1999)

The Sessional paper No. 1 of 1999 was established with the objective of preserving, conserving and protecting available water resources and to ensure that water is allocated in a sustainable, rational and economic way. The policy further desires to supply water of good quality and in sufficient quantities that meets the various water needs while ensuring safe disposal of waste water and environmental protection. To achieve these goals, water supply through increased household connections and developing other resources and improved sanitation is required

Relevance to the Project

While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors of socio-economic progress, it recognizes the by-products of this process as waste water. The proposed project is towards providing sufficient and good quality water supply to Maragua residents. As an ongoing process, it is important for the proponent to put in place strategies and plans for waste water management having in mind that the project area lacks a sewerage system

3.2.5. National Environment Action Plan (NEAP) 1994 (revised 2007)

This plan indicates that the Government recognized the negative impacts on ecosystems that come about as a result of economic and social development programmes that disregard environmental sustainability. In addressing this, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished or are in the process of development

Relevance to the Project

The EIA process came about as part of the NEAP process and among the important participants identified were the then District Development Committees. This implies that a multi-sectoral approach is desired in identifying and solving environmental problems. The proponent should therefore strive to engage partners and stakeholders in identifying and solving environmental issues

3.2.6. The National Land Policy, 2009

In chapter 4 of the land policy under Environmental Management Principles, the policy provides actions for addressing the environmental problems such as the degradation of natural resources, soil erosion, and pollution. The policy also recommends for appropriate waste management systems and procedures, including waste and waste water treatment, reuse and recycling.

The policy goes further to advocate for environmental assessment and audit as a land management tool to ensure environmental impact assessments and audits are carried out on all land developments that may degrade the environment and take appropriate actions to correct the situation. Public participation has been indicated as key in the monitoring and protection of the environment.

Chapter 4 further advocates for the implementation of the polluter pays principle which ensures that polluters meet the cost of cleaning up the pollution they cause, and encourage industries to use cleaner production technologies.

Relevance to the Project

The proposed project shall pass through the existing public road reserve and as such, the proponent is required to ensure environmental protection of the subject land. Moreover, this study is what is advocated for in the policy on top of the public consultations conducted

3.2.6. Sessional Paper No. 6 of 1999 on Environmental and Sustainable Development, 1993

Some of the important objectives of this paper include;

i. To ensure that an independent environmental impact assessment (EIA) report is prepared for any development before implementation

ii. To ensure that from the onset, all development policies, programmes and projects take environmental considerations into account,

iii. To ensure that effluent treatment standards which will conform to acceptable health standards

The paper covers various categories on development issues that require a sustainable approach. The policy recommends for the need of enhances public awareness raising and appreciation of clean environment as well as participation of stakeholders in the management of wastes within their localities. On human settlement, it encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities for decent housing of every family

Relevance to the Project

The policy identifies the need for better planning in both rural and urban areas and provision of basic needs such as water. The objective Maragua water supply project is to provide clean water to the residents of Maragua Township and any needy institution along the pipeline route. The project will thus be addressing the objectives of this policy partly

3.2.7. Gender Policy, 2011

This Policy Framework aims at mainstreaming gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya

The policy provides direction for setting priorities to ensure that all ministerial strategies and their performance frameworks integrate gender equality objectives and indicators and identify actions for tackling inequality. In addition, each program will develop integrated gender equality strategies at the initiative level in priority areas. Within selected interventions, the policy will also scale-up specific initiatives to advance gender equality

Relevance to the Project

This policy will be referred to during project implementation especially during hiring of staff to be involved in the implementation of the project. Moreover, the project will be of benefit to women and girls who are tasked with fetching water from far flung sources in the project area

3.3. Legislative Framework

There exists national statutes and regulations on environmental management that Murang'a Water and Sanitation Company will have a legal duty and social responsibility in ensuring the proposed water supply project is implemented in a manner that does not compromise the current status of natural resources, environmental resources, socio-cultural setting as well as the economic potential of the communities in the project area

This subsection details the various pertinent national laws governing environmental management. The supreme environmental resources management legislation is the Environmental management and Coordination Act (EMCA 1999) which supersedes any contradicting regulation at all times.

3.3.1. Environmental Management and Coordination Act, 1999 (Amended 2015)

The Environmental Management and Coordination Act, 1999 coupled with the Environmental Management and Coordination (Amendment) Act, 2015 provide legal and institutional framework for environment management in Kenya. EMCA as such supersedes

all environmental regulations that me be contrary to the provisions therein owing to its comprehensive coverage of environment management and judicial enforcement

Part II of the Act confers to every person the right to clean and healthy environment and to its judicial enforcement. Every citizen is also charged with the duty to safeguard and enhance the environment. In achieving this provision, part VI of the Act directs that any new programme, activity or operation should undergo environmental impact assessment and a report prepared for submission to the National Environment Management Authority (NEMA), who in turn may issue a license as appropriate. As per Environmental Management and Coordination Act, 1999, Legal Notice 150 (2016) - Replacement of the Second Schedule - Water resources infrastructure is listed as one of the activities that must undergo environmental impact assessment

Section 42 of the Act deals specifically with the protection of rivers, lakes and wetlands. The Act forbids interference with water bodies without the express permission from the Director General of NEMA. The permission can be granted subject to the findings of an Environmental Impact Assessment. The Act also empowers the Minister of Environment to declare a lakeshore, wetland, coastal zone or riverbank as protected area and impose such restrictions, as he considers necessary to protect the lakeshore, wetland, coastal zone and riverbank from environmental degradation. The Environmental (Impact Assessment and Audit) regulations, 2003, provide the basis and procedure of carrying out EIAs and EAs

Relevance to the Project

Murang'a Water and Sanitation Company intends to carry out a water supply project entailing construction of a water pipeline from Shimo (near Kiawembeu water treatment works) to Maragua Town. As per Legal Notice 150 of EMCA 1999, this project falls under Medium Risk Projects, 3-C (Water Resources and Infrastructure including water supply and distribution infrastructure). The project is therefore required to undergo environmental impact assessment.

The Act has further provided for the development of several subsidiary legislations and guidelines which govern environmental management and are relevant to the project implementation. These are tabulated in *table 3.1*;

Table 3.1: EMCA Legislations relevant to the project

Legislation	Description	Relevance to Proposed Project
1. The Environmental (Impact Assessment and Audit) Regulations, 2003 (Amended 2016, Legal notice 149)	These Regulations contain rules relative to the content and procedures of an EIA, to environmental audit and to Monitoring and strategic environmental assessment. These rules regulate other matters such as the appeal for, and registration of, information regarding EIA. The rules also provide the applicable environmental licensing fees for the different project categories	According to the second schedule of EMCA, the construction of a water supply infrastructure must undergo EIA in order to determine the adverse impacts. The proponent has complied with this requirement by preparing ESIA project report for the same. The project report has been prepared in accordance with the EIA/EA regulations
2. The EMCA (Wetlands, River Banks, Lake Shores and Sea Shore Management Plan) Regulations (2009)	These Regulations require the protection of wetlands, riverbanks, lakeshore and sea shore areas which provide ecological habitats.	The project will be part of water transmission from river resources in the project area and hence the regulation is relevant. The proponent has taken measures to ensure that the ecology of the river resources will be protected by adopting adequate mitigation measures
3. The EMCA-(Fossil Fuel Emission Control) Regulations (2006)	These Regulations sets emission standards for internal combustion engines, provides for the licensing of persons responsible for treating fuel, provides for the appointment of environmental inspectors required to inspect emissions, and authorizes NEMA to enter into partnerships in order to conduct emission inspections.	During construction, there will be use of motor vehicles for transportation of the project materials to and from site. The motor vehicles will utilize fossil fuel. In keeping with this regulation, the proponent will ensure that all machinery are frequently serviced and maintained to keep with the emission standards as per the regulation
4. The EMCA (Conservation of Biological Diversity and Resources, Access to Genetic Resources and	These regulations ensure that activities do not have an adverse impact on any ecosystem.	The project will be implemented along a road reserve with a drainage facility that drains into the surrounding rivers hence the regulation is relevant. The proponent has taken

Legislation	Description	Relevance to Proposed Project
Benefit Sharing) Regulations (2006)		measures to ensure that the ecology of the river will be protected by adopting adequate mitigation measures
5. The EMCA (Water Quality) Regulations (2006)	These Regulations outline the water quality standards that should be met for different uses including effluent discharge. The following schedules in the Water Quality Regulation set out the relevant standards and monitoring requirements: First Schedule: Quality Standards for Sources of Domestic Water; Second Schedule: Quality Monitoring for Sources of Domestic Water; Third Schedule: Standards for Effluent Discharge into the Environment; Fourth Schedule: Monitoring Guide for Discharge into the Environment; Fifth Schedule: Standards for Effluent Discharge into Public Sewers; and Sixth Schedule: Monitoring for Discharge of Treated Effluent into the Environment. The Water Resource Management Authority and NEMA are key administering authorities.	The Maragua water supply project is expected to Supply and distribute water to the local communities. The Proponent is expected to adhere to water quality standards during the project construction and operation phase
6. The EMCA (Noise and Excessive Vibration Pollution) Control Regulations (2009)	This regulation establishes environmental standards that should be met for noise. NEMA is a key administering authority. The following schedules in the Noise and Excessive Vibration Pollution Control Regulation set out the relevant standards and monitoring requirements: First Schedule – Maximum Permissible Intrusive Noise Levels. Second Schedule – Maximum Permissible Noise Levels for Construction Sites. Third Schedule – Maximum Permissible Noise Levels for Mines and Quarries. Fourth Schedule– Application for a License to Emit Noise/Vibrations in	During construction, noise and Vibration impacts will be generated by heavy equipment and machinery. Similarly, there is likelihood of noise pollution from the increased traffic in the area The proponent will have to adhere with this regulation in order to keep with the law and ensure compliance to environmental management

Legislation	Description	Relevance to Proposed Project
	Excess of Permissible Levels. Fifth Schedule–License to Emit Noise/Vibrations in Excess of Permissible Levels. Sixth Schedule – Application for a Permit to Carry out Activities. Seventh Schedule - Permit to Emit Noise in Excess. Eighth Schedule - Minimum Requirements for Strategic Noise and Excessive Vibrations Mapping. Ninth Schedule – Minimum Requirements for Action Plans. Tenth Schedule - Improvement Notice.	
7. The EMCA (Waste Management) Regulations (2006)	These Regulations provides for general waste management and for the management of solid waste, industrial waste, hazardous waste, biomedical waste, radioactive waste, pesticides and toxic waste. These Regulations prohibit the pollution of public places, provide for the granting of licenses for waste transportation and waste disposal facilities, and require an EIA to be undertaken on any site disposing of or generating biomedical waste	Proponent will have to adhere to these regulations because of the fact that during construction, waste will be generated from the construction material as well as by the construction workers

3.3.2. Water Act, 2002

According to Section 5 of this Act, the right to use of water from any water resource is hereby vested in the Minister (Cabinet Secretary), except to the extent that it is alienated by or under this Act or any other written law

Section 4 (1) of the same Act states, that the Minister shall have and may exercise control over every water resource in accordance with this Act.

Subsection 2 states that it shall be the duty of the Minister to promote the investigation, conservation and proper use of water resources throughout Kenya and to ensure the effective exercise and performance by any authorities or persons under the control of the Minister of their powers and duties in relation to water. Subsection 3 further states that the Minister shall be assisted in discharge of his duties under this Section by Director of Water.

Part II of section 18 provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority to demand from any person, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept and the information thereof furnished to the authority on demand.

Section 25 of the Act requires a permit to be obtained for among others any use of water from a water resources, discharge of a pollutant into any water resource. According to section 29 of the same Act, application for such a permit shall be subject to public consultation as well as an environmental impact assessment as per the Environmental Management and Coordination Act 1999. The conditions of the permit may also be varied if the authority feels that the water so used is causing deterioration of water quality or causing shortage of water for other purposes that the authority may consider has priority. This is provided for under section 35 of the Act.

Section 73 of the Act allows a person with a license to supply water (licensee) to make regulations for purposes of protecting against degradation of sources of water, which he is authorized to take. Under the Act, the licensee could be a local authority, a private Trust or an individual and the law will apply accordingly under the supervision of the Regulatory Board. Section 75 and sub-section 1 allows a licensee for water supply to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing water belonging to the licensee or which he is authorized to take for supply from being polluted. However, if the proposed works will affect or is likely to affect any body of water in the catchment, the licensee shall obtain consent from the Water Resources Management Authority.

Section 76 states that no person shall discharge any trade effluent from any trade premises into sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of the effluent, maximum quantity anticipated, flow rate of the effluent and any other information deemed necessary. The consent shall be issued on conditions including the payment rates for the discharge as may be provided under section 77 of the same Act.

Relevance to the Project

The proponent operates as a result of the act. MUWASCO intends to increase the water supply in Maragua town through tapping of the Kiawambeu - Kiharu mainline for which the Company has acquired a permit. Relevant permits must thus be acquired/renewed at all times in compliance with the law and consequent notification of the relevant authorities under the Act

3.3.3. Water Management Rules, 2007

The rules set out the procedures for obtaining water use permits and the conditions placed on permit holders. Sections 54 to 69 of the Water Resources Management Rules 2007 impose certain statutory requirements on dam owners and users in regard.

Section 16 of the Water Rules requires approval from the Water Resources Management Authority (WRMA) for a variety of activities that affect water resources, including the storage of water in dams and pans. Approval by WRMA is conferred through a Water Permit. A permit is valid for five years and must be renewed.

Section 104 of the Water Resource Management Rules requires certain water permit holders to pay water use charges. The intention of the water use charges was to raise revenue for water resource management, raise revenue for catchment conservation activities, improve efficiency of water resource abstraction and provide a system of data collection on water resource usage.

Relevance to the Project

The proponent shall be guided by the procedures set in this rule in updating the water use permits acquired from WRMA

3.3.4. Occupational Safety and Health Act, 2007

The act provides for the safety, health and welfare of workers and all persons lawfully present at work places to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. Section 3 (1) states "that the Act shall apply to all workplaces where any person is at work, whether temporarily or permanently". Under this Act, the duties of the Occupier are provided thus in Section 6 as:

- Every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace.
- Without prejudice to the generality of an occupier's duty under subsection (1), the duty of the occupier includes:
- The provision and maintenance of plant and systems and procedures of work that are safe and without risks to health;
- Arrangements for ensuring safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances
- The provision of such information, instruction, training and supervision as is necessary to ensure the safety and health at work of every person employed
- The maintenance of any workplace under the occupier's control, in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks to health;

- The provision and maintenance of a working environment for every person employed that is, safe, without risks to health, and adequate as regards facilities and arrangements for the employees' welfare at work;
- Informing all persons employed of any risks from new technologies; and imminent danger; and ensuring that every person employed participates in the application and review of safety and health measures.
- Every occupier shall carry out appropriate risk assessments in relation to the safety and health of persons employed and, on the basis of these results, adopt preventive and protective measures to ensure that under all conditions of their intended use, all chemicals, machinery, equipment, tools and process under the control of the occupier are safe and without risk to health and comply with the requirements of safety and health provisions in this Act.
- Every occupier shall send a copy of a report of risk assessment carried out under this section to the area occupational safety and health officer;
- Every occupier shall take immediate steps to stop any operation or activity where there is an imminent and serious danger to safety and health and to evacuate all persons employed as appropriate.
- It is the duty of every occupier to register his workplace unless such workplace is exempted from registration under this Act.
- An occupier who fails to comply with a duty imposed on him under this section commits an offence and shall on conviction be liable to a fine not exceeding five hundred thousand shillings or to imprisonment for a term not exceeding six months or to both

Part VI of the Occupational Safety and Health Act, 2007, addresses provisions concerning health which includes, cleanliness, overcrowding, ventilation, lighting, drainage of floors and sanitary conveniences

Section 76 (4) states that "An employer shall not require or permit any of his employees to engage in the **manual handling or** transportation of a load which by reason of its weight is likely to cause the employee to suffer bodily injury".

Other provisions covered under this Safety – general provisions include:

Section 77: Safe means of access and safe place of employment;
Section 78: fire prevention;
Section 79: Precautions in places where dangerous fumes are likely to be present;
Section 81: Safety provisions in case of fire; and
Section 82: Evacuation procedures.

Part IX of the Occupational Safety and Health Act, 2007 also provides for Chemical Safety,
Part X provides for Welfare – General Provisions,
Part XI Health, Safety and Welfare Special Provisions and

Part XII Special applications.

Relevance to the Project

At the start of the project construction, the pipe route and associated material storage areas will become work places. All activities conducted at such places will have to comply with the act. The proponent shall ensure that the provisions under this act are applied appropriately

3.3.5. Work Injury Benefits Act, 2007

The provides for compensation to employees for work related injuries and diseases contracted in the course of employment. Section 7 directs all employers to obtain and maintain an insurance policy in respect of any liability that the employer may incur under this Act to any of his employees.

Section 10 gives direction on compensation for work related injuries. Part (1) of the Section states that an employee who is involved in an accident resulting in the employee's disablement or death is entitled to compensation.

Relevance to the Project

The project proponent will need to observe the provisions of this Act during the course of the project. The contractor employed by the company should also meet this requirement during the project construction

3.3.6. Public Health Act, 1986 (Revised 2012)

The *Public Health Act (Cap. 242)*, in Part IX Section 8 & 9 states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Any noxious matter or waste water flowing or discharged into a water course is deemed as a nuisance. Part Xll Section 136 states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of pests shall be deemed nuisances The Act addresses matters of sanitation, hygiene and general environmental health and safety.

Relevance to the Project

Wastes generated from the construction material and by the construction workers should be disposed in manner that ensures the project area residents' health is not affected. The proponent shall adhere to these provisions especially during the construction stage of the project. Appropriate mitigation measures shall be instituted to comply with these requirements

3.3.7. Land Act, 2012 (Revised 2015)

The lands Act was enacted in May 2012 and revised in 2015 to provide for the review, consolidation and rationalization of land laws and to provide a framework for sustainable management and utilization of all categories of land. The act provides the legal framework for administration and management of public and private land, leases, charges, compulsory acquisition, easements and related rights. Section 61 of Kenyan constitution recognizes three classification of land namely;

Public land: It includes all un-alienated government land held and occupied by government agencies, territorial sea and sea bed, all public roads whether gazetted or not and any land not classified as private or community land under the Constitution; and any other land declared to be public land by an Act of Parliament.

Community land: This is all land vested in and held by communities identified on the basis of ethnicity, culture or similar community of interest. Any unregistered community land shall be held in trust by county governments on behalf of the communities.

Private land: This is land which is registered and held by any person under freehold tenure; or land held by any person under leasehold tenure; and any other land declared private land under an Act of Parliament.

Relevance to the Project

The proposed project shall be constructed along the public road reserve within the project area. The proposed pipeline also traverses across several parcels of private land in Mbiri location. The Act thus classifies the pipeline routes as public along the road reserves and private along the individuals' parcels of land. Easement/ acquisition of these land shall require coordination with the relevant government agencies (public land) and individual owners of the land (private land) in its usage.

3.3.8. The Factories Act (Cap 514)

This Act deals with factories and ***other places of work***. Sections 21 and 22 of the Act provide that moving parts of machinery should be secured so as to be safe to every person employed or working at the premises. Part VI of the Act provides for the general welfare of the workers with respect to supply of drinking water, washing facilities and first aid among other aspects.

Section 4 of Kenya subsidiary legislation of 2004, Legal Notice No. 31 of Kenya Gazette Supplement No. 25 of 24th May, 2004 of the Factories Act Cap 514, requires that, all workplace owners to establish a safety and health committee, which shall consist of safety representatives from the management and the workers. The number of the committee members will range from 3 to 7 depending on the size (number) of employees.

Relevance to the Project

The project sites shall become workplaces during the construction period. This Act shall compliment the provisions of the Occupational Health and Safety Act (2007) and the proponent shall put in place measures for monitoring HSE issues at these worksites

3.3.9. Physical Planning Act (Cap 286)

Under the Physical Planning Act (CAP 286), physical development activities are supposed to be carried out according to the physical plans. Accordingly, the processes of physical planning involve two stages; the plan making stage and the development control stage.

Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area may be used.

Section 29 of the physical Planning Act gives the county councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development.

The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. At the same time, sub-section 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority.

Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The environmental impact assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA 1999.

Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice

specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to its original conditions.

Relevance to the Project

The proposed water supply will be constructed along the road reserve and as such, the proponent will be required to apply for permission from the Murang'a County government to use the reserve. Moreover, the proponent will have to adhere to the existing physical plan in implementing the project

3.3.10. The Penal Code (Cap. 63)

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

Relevance to the Project

The project intends to supply water to Maragua town residents and the neighbouring areas. The proponent is tasked to provide clean water free from any contamination at all times during the operation phase

3.3.11. Employment Act, 2007

Provides for the State's restriction in employing child of between thirteen and sixteen years of age to attend machinery.

Section 58 (1) No person shall employ a child of between thirteen and sixteen years of age, other than one serving under a contract of apprenticeship or indentured learnership in accordance with the provisions of the Industrial Training Act, in an industrial undertaking to attend to machinery. (2) No person shall employ a child in any opencast workings or sub-surface workings that are entered by means of a shaft

Relevance to the Project

Manual labour is expected in trenching for the pipeline and backfilling of the excavated areas. The proponent shall be required to monitor the employment process for the local community to ensure that no persons of minority age are engaged in the construction work and during project operation

3.3.12. County Government Act No. 17, 2012

This act provides for the roles and duties of County governments. Part II of the Act empowers the county government to be in charge of function described in Article 186 of the constitution, (county roads, water and Sanitation, Health), Part XI of the Act vest the responsibility of planning and development facilitation to the county government with collaboration with national government, this arrangement has been adopted for interventions in order not to conflict with provisions of the Kenyan Constitution.

Relevance to the Project

The Project once commissioned shall be handed over to Murang'a Water and Sanitation Company (MUWASCO) which is a water utility, under Murang'a County Government, for operation and maintenance in accordance with the Act

3.3.14. The Kenya Roads Act Of 2007

The Act stipulates the legal and institutional aspects of the road sub-sector policy. The Act provides for the establishment of three independent Road Authorities, namely: (i) Kenya National Highways Authority (KeNHA), responsible for the administration, control, development and maintenance of all class A, B and C roads in Kenya, (ii) Kenya Rural Roads Authority (KeRRA), responsible for rural and small town roads including class D, E roads and Special Purpose Roads and (iii) Kenya Urban Roads Authority (KURA) responsible for all City and Municipal Roads. The Authorities fall under the Ministry of Transport and Infrastructure, which will retain the role of policy formulation, and general oversight of public roads including regulatory aspects such as technical standards.

Section 22 of the Act details the procedure for acquisition of any land required by an authority for the purposes of its functions under this Act.

Relevance to the Project

The water supply pipeline shall be crossing some sections of the project area roads. The proponent shall laisse with the relevant road authority in acquisition of permits for road crossings

3.3.15. HIV and AIDS Prevention and Control Act, 2006

This legislation prevents discrimination in all forms and subtleties against persons with or persons perceived or suspected of having HIV and AIDS. Without prejudice to the generality of subsection (1), no person shall compel another to undergo an HIV test as a precondition to, or for continued enjoyment of employment.

Relevance to the Project

All employees, suppliers and contractors in this project shall be treated fairly and in accordance to the provisions of this Act

3.4. Institutional Framework for Environment Management

Environmental Management in Kenya is largely stipulated in EMCA 1999. The Act has established several institutions responsible for environment regulation and monitoring. The Ministry in charge of overall environmental management guidance is the ministry of environmental. Under it are several other bodies and authorities as detailed in this subsection

3.4.1 Ministry of Environment and Natural Resources (MENR)

The Ministry is charged with the responsibility to monitor, protect, conserve and manage the environment and natural resources through sustainable exploitation for socio-economic development aimed at eradication of poverty, improving living standards and ensuring that a clean environment is sustained. MENR's mission statement and key objective is to facilitate good governance in the protection, restoration, conservation, development and management of the environment and natural resources for equitable and sustainable development.

3.4.2. National Environment Management Authority (NEMA)

NEMA is the administrative body that is responsible for the coordination of the various environmental management activities in Kenya. NEMA is also the principal government authority for implementing all environmental policies. NEMA is also responsible for granting EIA approvals and for monitoring and assessing activities in order to ensure that the environment is not degraded by such project activities.

The authority's core functions are:

- Advise the Government on legislative and other measures for the management of the environment or the implementation of relevant international conventions, treaties and agreements.
- Undertake and coordinate research, investigation and surveys, collect, collate and disseminate information on the findings of such research, investigations or surveys.
- Promote the integration of environmental considerations into development policies, plans, programmes and projects, with a view to ensuring the proper management and rational utilization of environmental resources, on sustainable yield basis, for the improvement of the quality of human life in Kenya.
- Coordinating the various environmental management activities being undertaken by the lead agencies

- To take stock of the natural resources in Kenya and their utilization and conservation.
- Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur e.g. floods, landslides and oil spills. Carry out surveys, which will assist in the proper management and conservation of the environment.
- Mobilize and monitor the use of financial and human resources for environmental management.
- Identify projects and programmes for which environmental audit or environmental monitoring must be conducted under this Act.
- Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities. Management objectives must be adhered to and adequate early warning on impending environmental emergencies is given.

3.4.3. National Environmental Council (NEC)

The body was established under section 4(3) of EMCA 1999 and it consists of the line Ministry's Cabinet Secretary as the chairman, the principal secretary, representatives from public universities, research institutions, NGOs, the Director General to NEMA and such number of members as may from time to time be determined by the line Ministry's Cabinet Secretary

3.4.4. National Environmental Tribunal (NET)

The tribunal is provided for under Section 125 of the Act. Its core purpose is to preside over appeals from administrative decisions by organs responsible for enforcement of environmental standards. An appeal may be lodged by a project proponent upon denial of an EIA license or by a local community upon the grant of an EIA license to a project proponent. NEMA may also refer any matter that involves a point of law or is of unusual importance or complexity to NET for direction.

3.4.5. National Environmental Action Plan Committee

The committee was established under Section 37 of the Act. The committee is responsible inter alia, for the development of a five-year national environment action plan. The national environment action plan contains among other aspects analysis of the natural resources of Kenya and their distribution, quantity and various uses.

The committee is also responsible for recommending legal and fiscal incentives for business that incorporate environmental requirements into their planning and operational processes as well set out guidelines for the planning and management of the environment and natural

resources. Upon adoption by Parliament, the national environment action plan becomes binding on all organs of government.

3.4.6. Standards and Enforcement Review Committee (SERC)

The SERC operates under NEMA as established under Section 70 of EMCA 1999. It serves as a technical committee mandated with the task of formulation of environmental standards, methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures. The Principal Secretary under the Cabinet Secretary is the Chairman of the SERC. The members of the SERC are set out in the third schedule of EMCA 1999.

3.4.7. National Environmental Complaints Committee

The National Environmental Complaints Committee (NECC) is the body charged with the task of investigating complaints or allegations regarding the condition of the environment in Kenya and suspected cases of environmental degradation. The NECC also undertakes public interest litigation on behalf of the citizens in environmental matters. It is composed of seven members appointed by the Cabinet Secretary for Environment and Natural Resources headed by a chairman who is a person qualified to be appointed as a judge of the High Court of Kenya and members nominated by the Attorney-General, the Council of County Governors (Secretary), the Law Society of Kenya and the business community.

3.4.8. County Environment Committees

Section 29 (1) of EMCA 1999 provides that the Cabinet Secretary shall by notice in the gazette appoint County Environment Committees of NEMA in respect of every County. These committees assist NEMA in effectively carrying out its function of proper management of the environment at this level. It is instructive to note that the membership of these committees includes inter alia representatives of farmers or pastoralists, business community, women and youth.

3.5. Institutional Structure of the Water Sector

Water resources management in Kenya is currently guided by the National Policy on Water Resources Management and the Water Act 2002. The National Water Development Policy aims to facilitate the provision of water in sufficient quantity and quality and within a reasonable distance to meet all competing used in a sustainable, rational and economical way. The policy distinguishes policy formulation, regulation and services provision and defines clear roles for sector actors within a decentralized institutional framework and includes private sector participation and increased community development.

The following administrative agencies are responsible for regulation of water and sanitation development in Kenya.

3.5.1. Ministry of Water and Irrigation (MWI)

This is the overall Ministry in charge of water in Kenya. It is responsible for policy development, sector co-ordination, monitoring and supervision to ensure effective Water and Sewerage Services in the Country, sustainability of Water Resources and development of Water resources for irrigation, commercial, industrial, power generation and other uses. It's mission statement is to contribute to national development by promoting and supporting integrated water resource management to enhance water availability and accessibility. The MWI has the following technical departments: Water Services, Water Resources, Water Storage and Land Reclamation, and Irrigation and Drainage.

3.5.2. Water Services Trust Fund (WSTF)

The water services trust fund serves to assist in the financing of water deficient service area through providing financial support to improve water services towards;

- Active community participation in the management of water services
- Capital investment to community water schemes in underserved areas
- Capacity building activities and initiative among communities
- Water services activities outlined in the Water Services Strategic Plan as prioritized by the Government
- Awareness creation and information dissemination regarding community management of water services

This project shall be a beneficiary of the body's financing services in partnership with World Bank

3.5.3. Water Resources Management Authority (WRMA)

WRMA is a state corporation, established under the Water Act 2002 and charged with being the lead agency in water resources management. Among other functions, WRMA is responsible for issuing permits for water use. The Authority charged with the responsibility of ensuring sustainable management of the Nations water resources through;

- Regulation and protection of water resources quality from adverse impacts,
- Classification, monitoring and allocation of water resources.
- Implementation of policies and strategies relating to management of Water resources
- Development of principles, guidelines and procedures for the allocation of water,
- Development of Catchments level management strategies including appointment of catchments area advisory committees,

3.5.4. Water Services Regulatory Board (WASREB)

The Board is responsible for the regulation of the water and sewerage services in partnership with the people of Kenya. Its mandate covers the following key areas;

Regulating provision of water and sewerage services including licensing, quality assurance and issuance of guidelines for tariffs, prices and disputes resolution.

- Overseeing the implementation of policies and strategies relating to provision of water services licensing of Water Services Boards and approving their appointed Water Services Providers,
- Monitoring the performance of the Water Services Boards and Water Services Providers,
- Establishes the procedure of customer complaints,
- Informs the public on the sector performance,
- Provides advice to the Minister in charge of water affairs.

3.5.5. Water Services Boards (WSB)

The WSBs are charged with the responsibility of providing water and sewerage services in their areas of jurisdiction efficiently and economically. MUWASCO falls under the Tana Athi Water Service Board which is among the eight catchment Boards established under the Water Act 2002 through gazette Notice 1775 of 21st March 2003. Under the Act the Boards are mandated to;

- Appoint and contract Water Service Provider
- Develop the facilities, prepare business plans and performance targets
- Plan for efficient and economical provision of Water and sewerage services within their areas of jurisdiction;
- Asset holding of Central Government facilities
- Build capacities of water service providers to embrace efficiency, accountability and responsibility to water supplies,
- Monitoring and supervision of water and sewerage services provision by WSPs.

3.5.6. Water Services Providers (WSP)

This are state owned utilities or water companies that have been since commercialized to enhance their performance and efficiency while aiming to achieve financial autonomy, accountability and strategic investment.

The relevant water service provider under this project is the Murang'a Water and Sanitation Company (MUWASCO)

3.6. NEMA Compliance

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

3.7. Sectoral Integration

Sectoral Integration encourages provision of sustainable development and a healthy environment to all Kenyans. The NEC mandates NEMA with the following key functions; policy direction, setting national goals and objectives and determining policies and priorities for protection of the environment, promotion of cooperation among public departments, local authorities, private sector, non-governmental organizations and such other organizations engaged in environmental protection programmes and performing such other functions as contained in the Act

Other stakeholders include Ministry of Water and Irrigation, Ministry of Environment and Natural Resources, Ministry of Health and Sanitation, Ministry of Lands, Housing and Urban Development, Ministry of Transport and Infrastructure, Murang'a County administration and ministries and MUWASCO

3.8. The World Bank Safeguards

The World Bank has well set safeguard policies aimed at ensuring the organization's funded projects adhere to environmental and social protection. These safeguards include;

3.8.1. OP/BP 4.01 (Environmental Assessment)

This policy is applied to borrowing countries under the Bank's lending activities in order to ensure that development projects are sustainable and environmentally sound. Although its operational policies and requirements vary in certain respects, the World Bank follows a relatively standard procedure for the preparation and approval of an environmental assessment study

The World Bank considers environmental impact assessment (EIA) as one among a range of instruments for environmental assessment. Other instruments used by the World Bank include regional or sectoral environmental assessment, strategic environmental and social assessment (SESA), environmental audit, hazard or risk assessment, environmental management plan (EMP) and environmental and social management framework (ESMF). The Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of environmental assessment. Proposed projects are classified into one of three categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts:

- ***Category A***: the proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. For a Category A project, the Proponent is responsible for preparing an EIA report.

- ***Category B***: the proposed project has potential adverse environmental impacts on human populations or environmentally important areas such as wetlands, forests, grasslands, and other natural habitats - but these are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A projects. Like Category A the environmental assessment examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

- ***Category C:*** the proposed project is likely to have minimal or no adverse environmental impacts. beyond screening, no further environmental assessment action is required for a Category C project

Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental associated with Bank lending operations. The purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable and that potentially affected people have been properly consulted. The Maragua Water Supply project falls under **category C** since the project has **minimal effects** on the environment and surrounding. The project does not lead to permanent displacement of any PAPs within the area.

3.8.2. OP/BP 4.04 (Natural Habitats)

The natural habitats policy is meant to enhance environmentally sustainable development through protection, conservation, maintenance and rehabilitation of natural habitat and their functions. World Bank supported developments are required to take consider and ensure conservation of biodiversity as well as the diverse environmental services and products that the natural habitats present to the communities

The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water area where most of the native plant and animal species are still present). This project has no notable interaction with notable natural habitats apart from limited localized riverine aquatic systems.

3.8.3 Banks Operational Policy OP/BP 4.09 (Pests Control Management)

The policy is meant to minimize and manage the environmental and health risks associated with pesticides use and promote and support safe, effective and environmentally sound pest management. The safeguard is not triggered under this Project.

3.8.4 World Bank OP/BP 4.10 (Indigenous Peoples)

The objective of this policy is to design and implement projects in a way that fosters full respect for Indigenous Peoples' dignity human rights and cultural uniqueness and so that they receive culturally compatible social and economic benefits and do not suffer adverse effects during the development process. This safeguard is not triggered by this project.

3.8.5 OP/BP 4.11 (Physical Cultural Resources)

The objective of this policy is to assist in preserving Physical Cultural Resources (PCR) and avoiding their destruction or damage. PCR includes archaeological, paleontological, architecturally significant, and religious sites including graveyards, burial sites, and sites of unique natural value.

Initial indications are that no observed physical or cultural resources will be affected by the project. Nevertheless, the Contractor is responsible for familiarizing themselves with the following "Chance Finds Procedures", in case culturally valuable materials are uncovered during excavation, including:

1. Stop work immediately following the discovery of any materials with possible archeological, historical, paleontological, or other cultural value, announce findings to Project manager and notify relevant authorities;
2. Protect artifacts as well as possible using plastic covers, and implement measures to stabilize the area, if necessary, to properly protect artifacts
3. Prevent and penalize any unauthorized access to the artifacts
4. Restart construction works only upon the authorization of the relevant authorities.

There are no known cultural resources as revealed during the ESIA study exercise. The proponent shall however ensure that all contracts under this Project include a Chance Finds Procedure clause.

3.8.6. Involuntary Resettlement (OP 4.12)

The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative Project designs, to avoid resettlement. This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Project appraisal of proposed projects. The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative Project designs, to avoid resettlement. This policy is triggered when a Project activity causes the involuntary taking of land and other assets resulting in: Relocation or loss of shelter, loss of assets or access to assets, loss of income sources or means of livelihood, whether or not the affected persons must move to another location, loss of land

This safeguard is not triggered by the project as the proposed project site is along the public road reserve

3.8.7 OP/BP 4.36 (Forests)

The policy on forest safeguards seeks to realize the potential of forests to reduce poverty in sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Among the principles is to screen as early as possible for potential impacts on forest health and quality and on the rights and welfare of the people who depend on them.

The safeguard is not triggered by this project as it does not pass through any forest area

3.8.8 Activities Triggering World Bank Safeguards

The matrix below presents the extent to which the World Bank safeguards apply to the implementation of the Maragua water supply project. The safeguards triggering matrix is presented in *table 3.2*

Table 3.2: World Bank Safeguards Triggering Matrix

Policy	Triggered	Status
1. Environmental Assessment (OP/BP 4.01)	Yes	The project components will trigger EA safeguards and is Category C due to the level (less) of impacts it poses to the surrounding
2. Involuntary Resettlement (OP4.12)	Yes	Even though the policy is triggered, there will be **no physical** displacement of people. The project would only result to **partial loss of land use rights** along the wayleave at the time of construction; however, day to day farming activities will go on after construction.
NOT TRIGGERED		
3. Forestry (OP4.36)	No	There are no significant forested areas around the project area.
4. OP/BP 4.04 (Natural Habitats)	No	There are no notable natural habitats as per the definition of the Bank
5. Physical Cultural Resources	No	Investigations during the ESIA showed that there are no known cultural resources along the pipeline route.

Policy	Triggered	Status
(OP/BP4.11)		However, sample Chance find Procedure and Plan shall be prepared and will be provided to the contractor.
6. OP/BP 4.09 (Pests Control Management)	No	The project will not entail use of pesticides
7. Indigenous Peoples Policy OP/BP 4.10	No	There are no indigenous people in the area

3.8.9. International Conventions

There exist several international conventions on environment that have social and/or environmental aspects tied to them. Kenya is a signatory to some of these conventions and applies them in environmental management. Some of the conventions that the State is signatory to or has acceded to are summarized in *table 3.4*

Table 3.3: List of International Convections relevant to environmental management

Convention	Date Ratified/Acceded to
1. African Convention for the Conservation of Nature and Natural Resources (2003)	Ratified (12 May 1969)
2. Convention on Biological Diversity (1992)	Ratified (26 July 1994)
3. Vienna Convention for the Protection of the Ozone Layer (1985)	Acceded to (9 November 1988)
4. UNESCO Convention for the Protection of the 5. World Cultural and Natural Heritage (1972)	Acceded to (1 May 1964)
6. Convention on the Conservation of Migratory Species of Wild Animals (1985) 7. The African-Eurasian Water-bird Agreement (AEWA). 8. The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA).	Acceded to (26 February 1999)
9. Convention on International Trade in 10. Endangered Species of Wild Fauna and Flora (1973)	Acceded to (13 December 1978)
11. Basel Convention on the Control of Trans-Boundary Movements of Hazardous Wastes and their Disposal (1995)	Acceded to (1 June 2000)

Convention	Date Ratified/Acceded to
12. Convention on Biological Diversity (2006)	Ratified (26 July 1994)
13. Convention on Climatic Change and the Kyoto Protocol (1997)	Ratified (25 February 2005)
14. Lusaka Agreement on the Cooperative Enforcement Operations Directed against Illegal trade in Fauna (1994)	Ratified (17 January 1997)

The above listed conventions present intentional best practices that can be adopted on Kenya for environmental management. They serve as complimentary guides to environmental protection regulations in development projects

CHAPTER 4: ENVIRONMENTAL AND SOCIAL BASELINE

4.1. Project Location and Demographics

Muranga County has a total area of 2,558.8 Square kilometers and is bordered to the North by Nyeri, to the South by Kiambu, to the West by Nyandarua and to the East by Kirinyaga, Embu and Machakos counties. It lies between latitudes 0° 34' South and 107' South and Longitudes 36° East and 37° 27' East.

The project area covers two sub-counties within Murang'a County namely **Kiharu** and **Murang'a South**. The map provided in figure 4.1. presents the general layout of the proposed supply pipeline across the two Sub-counties. According to the project's proposal, the target project beneficiaries are Maragua town and its environs.

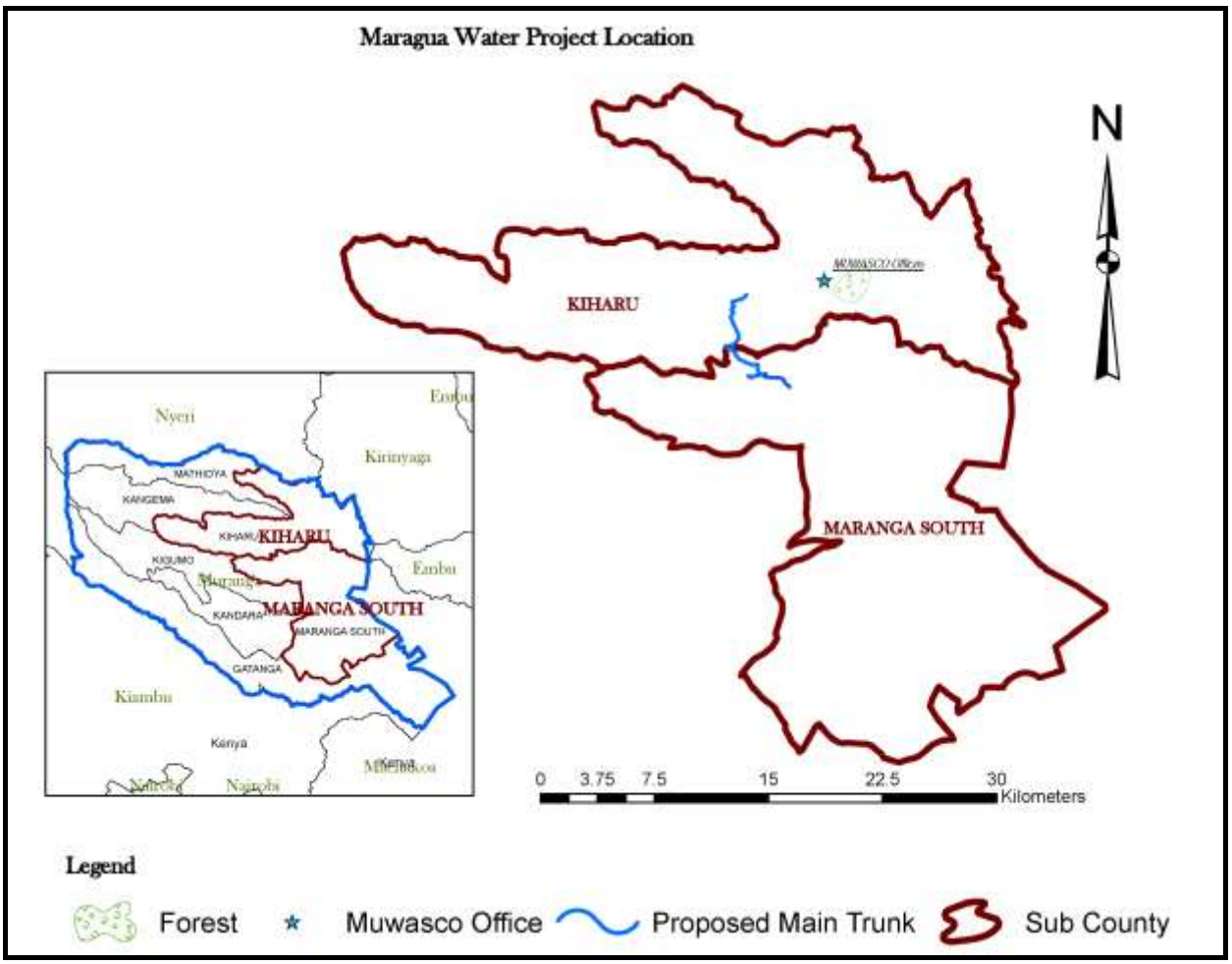

Figure 4.1: Map of the Project Location

4.2 Population

According to the 2009 population census, the two sub counties had a total of 94,043 and 98,036 people respectively (see the table next). The number of females were slightly higher than their male counterparts. Kiharu Sub-county had a total of 181,076 residents while Maragua South Sub-county had a population of 152,272. However, with the devolved system, of Government, there has been a general growth of the towns which has encouraged an influx of people from neighbouring areas consequently increasing the population. In addition, the two sub counties featured among the least households indicating that the sub county had relatively larger families. Demographic information of the subject Sub-counties is detailed in tables 4.1, 4.2 and 4.3. The tables also provide population projections for the year 2017 with reference to the 2009 census data.

Table 4.1: Demographic data of the project area

Sub County	Details	Year	
		1999 (Census)	2017 (projection)
Kiharu	**Area: (Sq. Km)**	**409.8**	
	Population: (Numbers)	181,076	186,964
	Population Density (No. per Sq. Km)	442	456
Muranga South	**Area: (Sq. Km)**	**547.2**	
	Population: (Numbers)	152,272	157,224
	Population Density: (No. per Sq. Km)	278	287

Source: 2009 Kenya population and Housing Census

Table 4.2: Demographic data of the areas surrounding the proposed project area.

Sub-County	Males	Females	Total	Households	Density
Kangema	36,906	40,082	76,988	21,814	443
Mathioya	42,126	46,093	88,219	24,755	251
Kiharu	**45,985**	**48,058**	**94,043**	**26,812**	**389**
Murang'a South	**48,326**	**49,710**	**98,036**	**25,562**	**292**
Kandara	75,836	80,827	156,663	41,234	664
Gatanga	80,987	82,610	163,597	43,417	273
Kigumo	39,246	41,515	80,761	21,968	467
Total	**369,412 (49%)**	**388,895 (51%)**	**506,491**	**137,390**	**2,255**

Source: 2009 Kenya population and Housing Census

Table 4.3: Population projection in the target unban center

Urban centre	2009 census			2012 (Projections)			2015 (Projections)			2017 (Projections)		
	M	F	T	M	F	T	M	F	T	M	F	T
Maragua Town	12,878	13,496	26,374	13,033	13,659	26,692	13,191	13,824	27,015	13,297	13,935	27,232

Source: County Development Planning Office, Murang'a, 2012

4.2. Biophysical Environment

The project area exhibits diverse biophysical characteristics that are of importance in the project design and implementation. This sub-section details the existing biophysical environment and includes data on Topography, land use, landscaping, soil cover and available infrastructure serving the local people

4.2.1. Topography

The project area's high altitude areas are at the foot of the Aberdare Ranges which starts at about 1800m asl and terminates at about 1350m asl as shown on *figure 4.2*. The land then slopes towards the east and is characterised by numerous hills and steep valleys. Streams and small rivers run through the valleys which even out at about 1500m asl.

The major physical features are the hills and valleys with few major rivers including Maragua and Irati. The rivers flow from the Aberdare ranges to the West, South Eastward to join Tana River. More than 95% of the land is generally mountainous landscape.

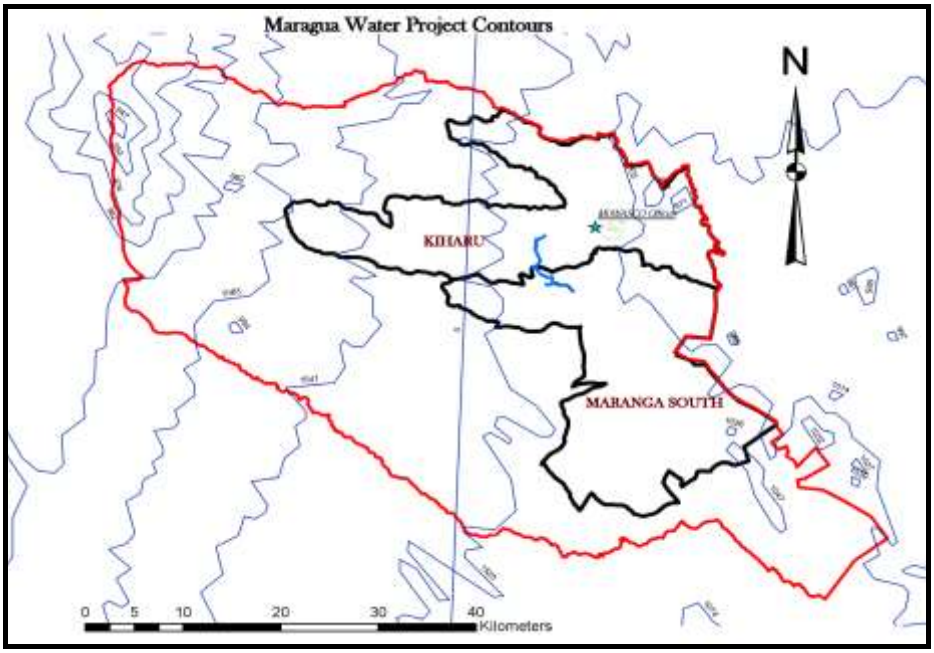

Figure 4.2: A contour map illustrating the topography of the project area

Source: compiled by Log Associates

4.2.2. Vegetation

Due to continuous expansion of the Farmlands within the project area, most of the natural vegetation is being replaced with crops. However, small portions, especially the riparian lands, still have natural vegetation. Some of the notable vegetation species are presented in *table 4.3*

Table 4.4: Species of natural vegetation within the project area

No.	Scientific name	Local name
1.	Podocarpus falcutus/latifolias	Muthengera
2.	Makaranga kilimadscharica	Mukuhakuha
3.	Markhamia lutea	Muu
4.	Prunus africanum	Muiri
5.	Tabernaemotanas stapfianas	Mwerere
6.	Croton macrostacheus	Mutundu
7.	Croton megalocarpus	Mukinduri
8.	Millettia dura	Muhatia
9.	Ocotea usambarensis	Muthaiti
10.	Teclea nobilis	Munderendu
11.	Ficus sycamores	Mukuyu
12.	Ficus natalensis	Mugumo
13.	Albizia gummifera	Mukurwe
14.	Bridelia micrantha	Mukoigo
15.	Syzygium guinense	Muriru
16.	Grevillea robusta	Mukima
17.	Eucalyptus spp	Mubau/Blue gum

Table 4.5: Species of domestic vegetation within the project area

No.	Scientific name	Local name
1.	Phaseolus vulgaris	French Beans
2.	Fabaceae	Beans
3.	Juglans cinerea	Butternut
4.	Zea mays	Maize
5.	Maranta arundinacea	Arrow Roots

4.2.3. Climate

Rainfall

The project area experiences two rainy seasons i.e. Long rains (March – May) and Short rains (October – November). The highest amount of rainfall is recorded in the month of April, and reliability of rainfall during this month is very high. The highest potential areas receive an average annual rainfall of between 2000mm and 2400mm. Low potential receive rainfall less than 1200mm per annum.

Rainfall in high and medium potential areas is reliable and well distributed throughout the year and is adequate for cultivation. However, on low potential areas rainfall is unevenly distributed and therefore unsuitable for cash crop production.

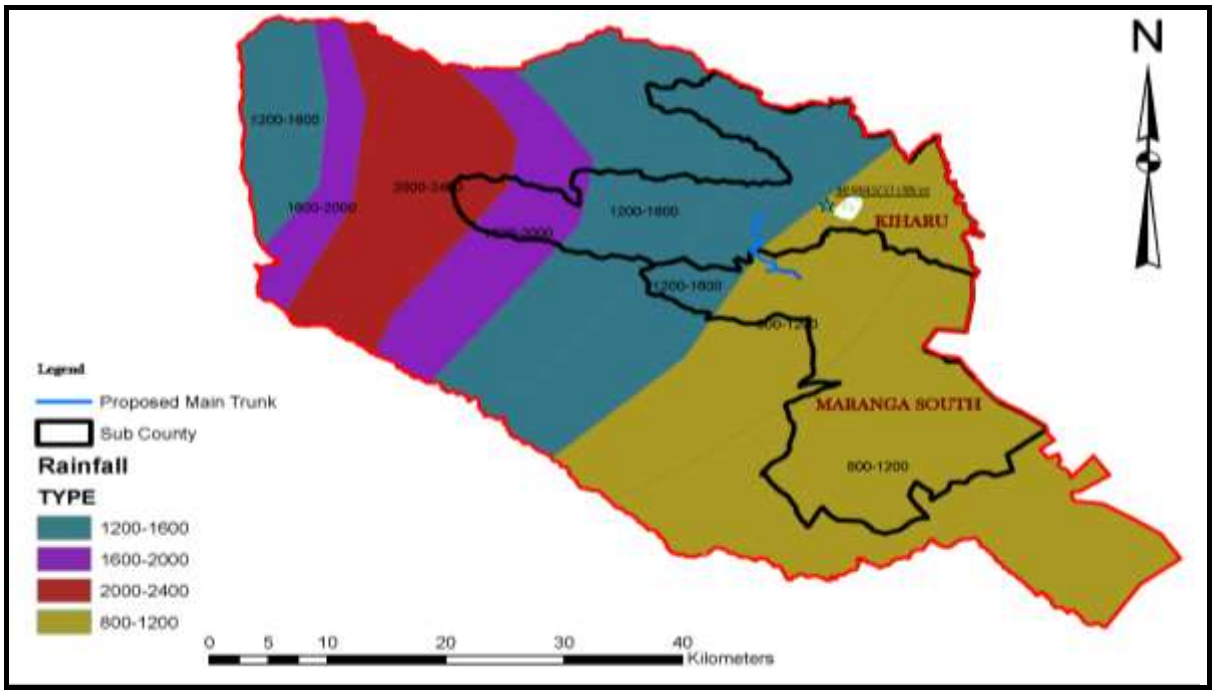

Figure 4.3: Map of rainfall distribution

Source: Compiled by author

<u>Temperatures</u>

Temperatures in the project area vary with altitude. In the Eastern lower areas, the maximum annual temperatures range between 26°C and 30°C while the minimum annual temperature range between 14°C and 18°C. In the western area, which is mostly high altitudes, the minimum temperatures can be as low as 6°C. Temperatures are moderate in the medium potential areas. The project area has three climatic zones as follows: -

- Equatorial covering the Western region;
- Sub-tropical type in the central region; and
- Semi-arid in the Eastern side.

The western region, Kangema, Gatanga, and higher parts of Kigumo and Kandara, is generally wet and humid due to the influence of the Aberdares and Mt. Kenya. The eastern region, lower parts of Kigumo, Kandara, Kiharu and Maragwa Constituencies receive less rain and crop production requires irrigation.

4.2.4. Soils

The predominant soils in the project area are the deep and well-drained red/brown soils. These soils are loose and combined with the hilly terrain are easily eroded and sometimes are responsible for landslides which are common in the area. Sometimes pockets of black soils are found around wetlands but these are more common in the lowlands where cotton is grown.

Table 4.6: Different soils and their characteristics within the project area

Type of soils	Characteristics
MV1	Imperfectly drained, shallow to moderately deep, dark greyish brown, very friable, acid humic to peaty, loam to clay loam, with rock. Out crops, and ice in the highest parts.
MV2	Well drained, very deep, dark reddish brown to dark brown, very friable and smeary, clay loam to clay, with thick acid humic top soil, in places shallow to moderately deep and rocky
HU1	Somewhat excessively drained, moderately deep, red, very friable, sandy clay loam to sand clay; in places rock.
HUC	Complex of; Excessively drained to well drained, shallow, dark red to brown, friable, sandy clay loam clay; in many places rocky, boulder and stony in places with acidic humic topsoil.
LB2	Well drained, very deep, dark reddish brown to dark brown, friable to firm, clay; in places with a humic topsoil.
RB1	Well drained, extremely deep, dark reddish brown to dark brown, friable and slightly smeary clay, with an acid humic topsoil.
RB2	Well drained, extremely deep, dusky red to dark reddish brown, friable clay, with an acidic topsoil.
RB3	Well drained, extremely deep, dusky red to dark reddish brown, friable clay; with inclusions of well drained, moderately deep, dark red to dark reddish brown, friable clay over rock, pisoferric or petroferric material.
UU1	Well drained, moderately to deep, dark red to yellowish red, friable, sandy clay loam to clay.

The area has characteristics acidic soils, predominantly ranging in an average of 5.6 in the PH scale.

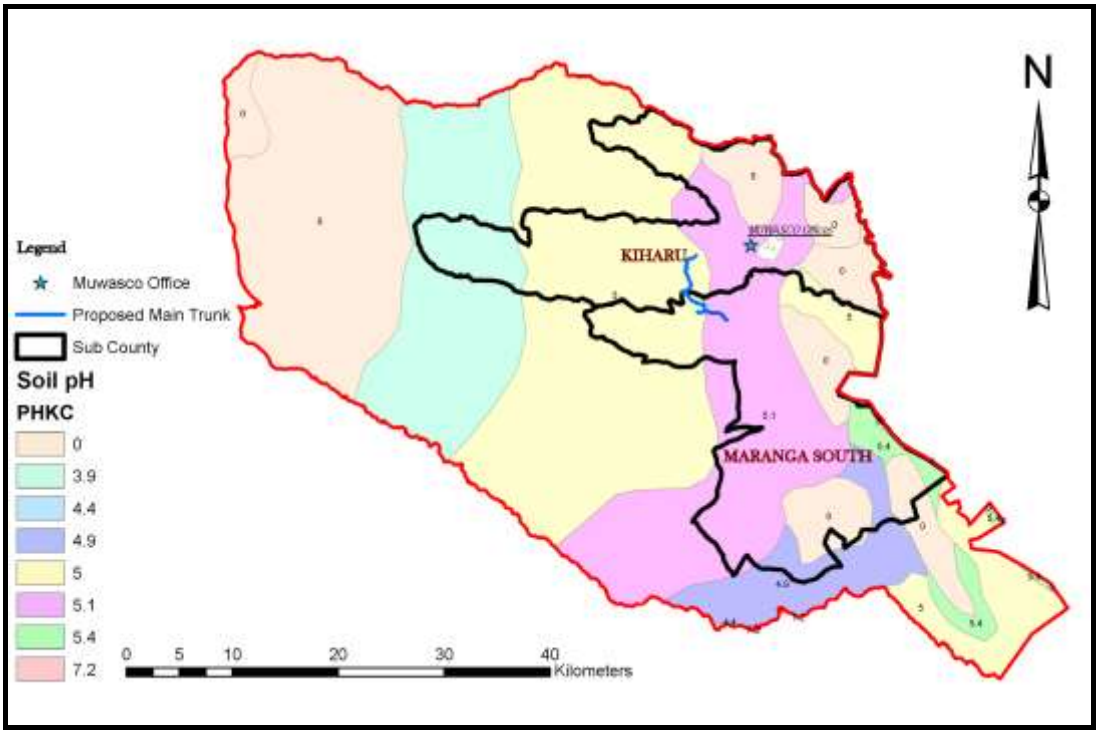

Figure 4.4: Soil acidity map for the project area

Source: compiled by author.

4.2.5. Geology

The geology of the County consists of volcanic rocks of the Pleistocene age and basement system rock of Achaean type. Volcanic rocks occupy the western part of the county bordering the Aberdares while rocks of the basement system are in the eastern part. Porous beds and disconformities within the volcanic rock system form important aquifers, collecting and moving ground water, thus regulating water supply from wells and boreholes. As a result, most parts of the area have a high-water table.

Murang'a County experiences landslides in the upper part of the project area. This is due to the high, mechanically unstable slopes of deeply weathered volcanic soil and a high sorption capacity of the surface soil layer. Plate 4.1 represents a recent landslide case that occurred away from the project area resulting in water supply disruption

Plate 4.1: Photograph shows a landslide that occurred away from the project site resulting in pipeline disconnection.

Source: Author.

Although the proposed project route has not experienced any cases of landslides to date, such occurrences would disrupt water supplied from project if they were to occur

4.2.6. Water resources

The proposed project study area is rich in water resources. However, much of it has not been harnessed to benefit the areas development. The key water sources in study area are:

- Surface water (rivers, swamps, wetlands etc);
- Boreholes
- Rainwater harvesting;
- Unsecured Springs; and
- Shallow wells.

Water is used for multiple purposes among them being domestic, agriculture and industry (coffee processing). The impacts of water use and demand have affected the water quality through pollution and siltation due to poor farming methods. There are cases of river pollution especially from domestic waste and sewer from the market centers. This is due to the lack of a proper sewer system in the project area. Swamps and wetlands have also been encroached on especially for growing food for domestic consumption during drought. This affects the volumes especially during drought.

4.3. Socioeconomics

This subsection comprises social and economic baseline data on the project area. This include infrastructure, land ownership data, land use, population income levels religion and access to sanitation within the project area.

4.3.1. Land ownership and settlement patterns

Most of the land in the project area is privately owned. Figure 4.6 below shows that the main land tenure system in the project area is private holding at 92.3%, public land at 7.3% and 0.4% being community land.

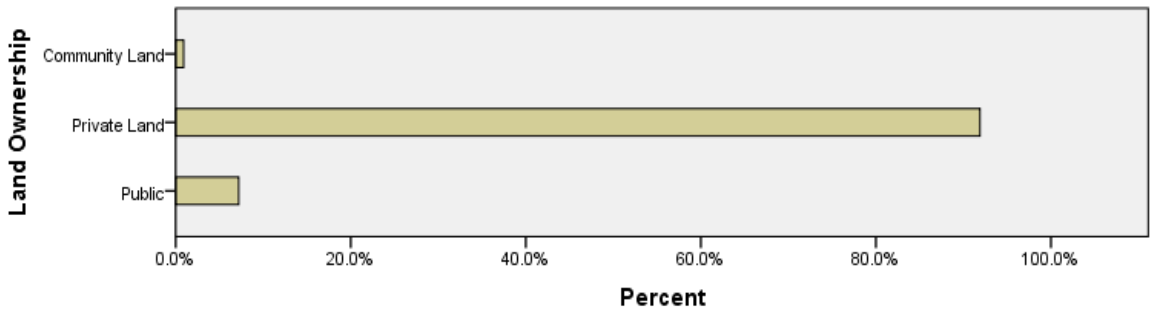

Figure 4.5: A graph of land ownership in the project area

4.3.2. Land use

Most part of the project area is comprised of agricultural land owing to its wide Agro Ecological Zone range; from Tropical Alpine Zone (TA). The forests occupy the highest grounds while cash crops like tea and coffee zones in that order. Horticultural crops and subsistence crops like bananas, maize and beans are found in the mid and lower zones of the project study area.

The people are predominantly farmers and apart from crops, they also practice animal husbandry. The animals reared include dairy animals, poultry, and pigs on a smaller scale.

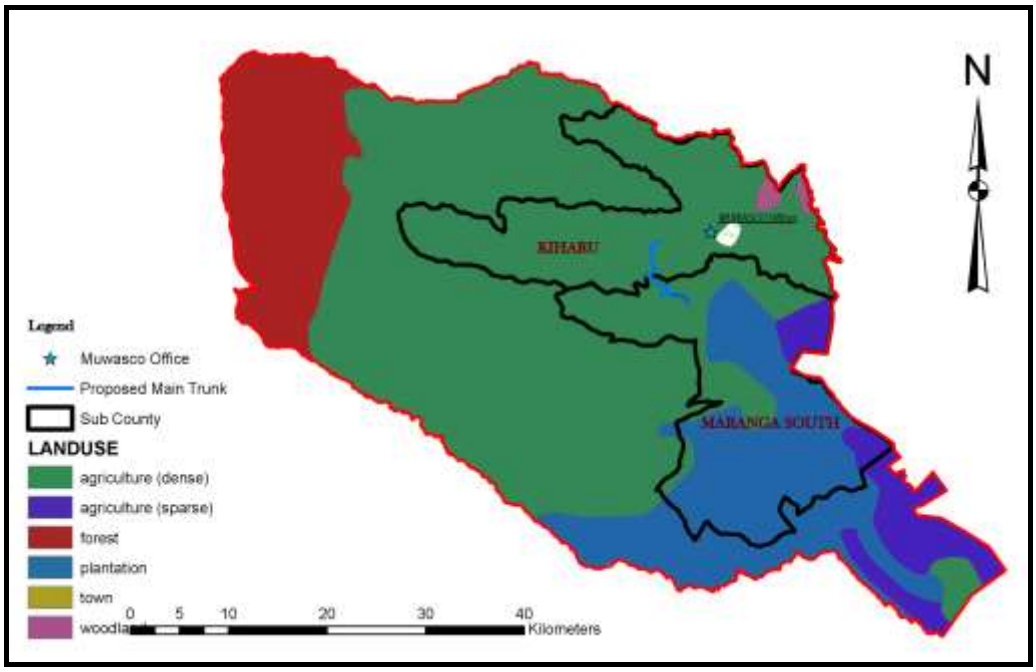

Figure 4.6: A map illustrating land use of Muranga county with a focus on the project area

4.3.3. Poverty and income levels

On average, an individual in the county spends 1 USD per day which indicates that people in the county are living on the poverty line. However, according to Murang'a County Integrated Development Plan 2013-2017, 36.3 per cent of the County's population lives in absolute poverty. About 36 per cent of the population live below the poverty line. The poor are not able to access the basic necessities of life such as food, shelter and education. The food poor constitute 36 per cent of the population with the vulnerable groups that is hardest hit by poverty being women, the unemployed youth, widows and orphans, neglected retired old people, the street children and those living in the marginal areas of the county.

Table 4.7: Number of Poor People in 2005/06 Poverty gap (2005/2006) Based on KIHBS

Number of People	Poverty Gap value
240,922	10.7

The summary of poverty level indictors in the project area as per Majidata is as presented in *table 4.8*

Table 4.8: Summary of poverty level indicators in the project area

Indicator	*Number*
1. Average household size (MajiData)	*3.9*
2. Population living in a planned low income area	*5 702*
3. Population living in an unplanned low income area	*3 693*
4. Dwellings that are paying for the water they use. (percentage)	*77.05*
5. Number of areas linked to the distribution network	*4*
6. Plots & blocks of flats with a water connection	*20.49*
7. Dwellings with a water connection (percentage)	*7.38*
8. Percentage of the urban population residing in a low-income area with access to safe water (WSTF definition)	*27.33*
9. Percentage of low income area residents that use an improved sanitation facility (JMP definition)	*25.85*

4.3.4. Religion

Most of the project area residents are mainstream Christians with the major denominations being the Roman Catholic and other protestant churches. The religion distribution in the project area is presented in *table 4.8*

Table 4.9: Distribution of Religious Groups in the Project area

Religion	Percentage of dwelling occupants (%)
No religion	2.46
Christian	88.52
Muslim	9.02

Source: Majidata (2016)

4.3.5. Sanitation

Approximately 99.78 per cent of the households in Murang'a County use toilet facilities. Out of these, 4.97 per cent use flush toilets, 3.97 per cent use VIP latrines and the rest use ordinary pit latrines. The majority of people living in the market and trading centres use ordinary pit latrines[1] However, according to expert sources on the ground, the latest figure is 98%. The figure is based on the coverage of sanitation facilities, specifically the latrines within the two target Sub-counties. Tables 4.9, 4.10 and 4.11 summarizes the sanitation data for the subject area.

[1] Muranga county First integrated development plan 2013-2017 (Jan 2014)

Table 4.10: Dwellings that use an improved sanitation facility (JMP definition)

Number of dwellings	Percentage of dwellings
895	29.51

Table 4.11: Number and percentage of dwellings having their own rubbish pit

Percentage of dwellings	15.57
Number of dwellings	472

Table 4.12: Distribution of Sanitation Facilities

Facility	Percentage	Number
Traditional pit latrine	69.67	2 112
Improved pit latrine (air vent, proper superstructure)	22.95	696
Toilet linked to septic tank	5.74	174
Other sanitation facility	0.82	25
Pour flush toilets	0.82	25

Source: Majidata

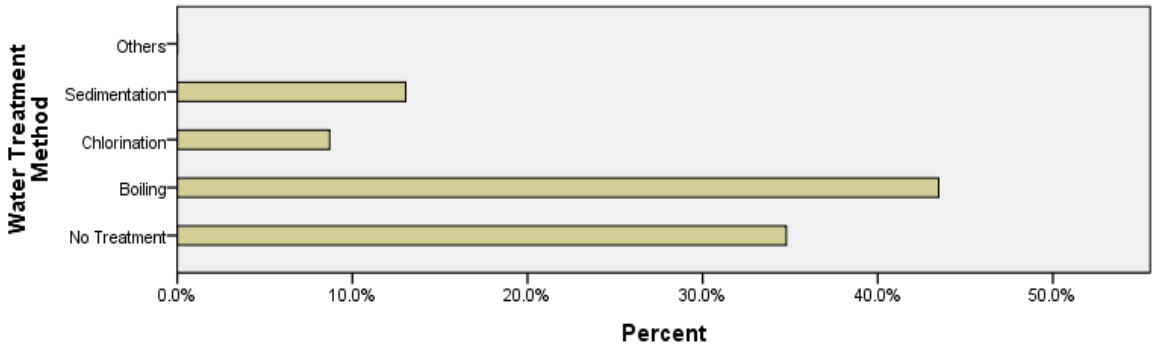

Figure 4.7: Graph showing a summary of water treatment methods used by locals

Source: compiled by author.

According to the public health offices, Perhaps the greatest concern is the lack of a sewer system for the area. A sewer system is considered critical owing to the high-water table and the possibility of increased waste water from the project. There are no formally declared open defecation zones. Even so, it was indicated that there have been cases of households that lacked sanitation facilities. According to the Humandata.org, the levels of open defecation in the County in general is 0.3%

4.3.6. Access to Water

According to the various stakeholders, including the public administration and public health departments, water accessibility within the project area still remains a challenge. The locals experience cases of rationing or, in some cases, prolonged water shortages/ non-flow. Most

of the residents, including the social amenities in the area use boreholes to supplement their water needs.

The project area is said to have various water projects which are currently facing operational challenges hence largely insufficient. For instance, the Irati-Ngida water project which was meant to supply water to Maragua town is not operating to its capacity. Also, the existing boreholes, most of which are community owned, face management challenges. Generally, the water supply varies from areas with sufficient water supply, to areas with lack, especially Maragua town.

Plate 4.2: A dilapidated water pipeline from the Irate – Nginda scheme which is prone to damages, bursts and leaks in the rough terrain

4.3.7. HIV/AIDS

HIV and AIDS is considered a threat to the development of Kenya. The prevalence rate stands at 3.7per cent. AIDS related deaths are common and those mainly affected are within the productive age group of 15-49 years of age. It was also noted that the number of HIV/AIDS orphans is on the increase. Poverty is viewed as a major cause of HIV/AIDS. Poverty increases vulnerability of people with HIV, hence there is need to redirect resources towards support services to poor households.

The situation is further aggravated by the fact that HIV/AIDS mostly affects people in the productive age leaving minors and the elderly people to take care of households. Progressive gains on poverty reduction may be reversed if concerted efforts are not urgently put in place to bring the HIV/AIDS pandemic under control. Implementation of the project thus needs to create comprehensive HIV/AIDS awareness among the workers along the project area

4.3.8 Infrastructure, Housing and Industry

In 2013, Murang'a County had 2,934.95 km of road. Of these, 387.5 km are bituminized, 1313.1 km are graveled and 1234.3 km is earth surface. The county has 65km of railway line which is underutilized.

About 40 per cent of the households live in stone/brick walled houses, 24.3 per cent in mud/wood walled houses while 2.19per cent live in grass straw/tin walled houses. Most housing units in the county are roofed with corrugated iron sheets (94.38 percent), while makuti and grass roof constitute 0.18per cent of the households. Most of these housing units have earth floor (60.04 per cent), followed by cement floor at 38.85per cent. The county has 1,924 Low Grade, 232 Middle Grade, and 184 High Grade government housing units which are not adequate for the government officers deployed in the county.

Generally, the county does not have big manufacturing industries. However, it has several agro processing factories and many more are cropping up as a result of the increased developments triggered by the devolution system. The factories within the project area are as presented in *table 4.13*

Table 4.13: Summary of industries/Factories within the project area

Sub- County	Industry/ factory by Type						
	Tea	Coffee	Milk	Fruits	Nuts	Animal Feeds	Cottages
Murang'a South	0	8	1	1	1	3	*5*
Kiharu	1	23					
Total	**1**	**31**	**1**	**1**	**1**	**3**	*5*

Source: Muranga County govt (2015)

4.3.9 Gender Inequality Index

It reflects gender-based disadvantage in three dimensions—reproductive health, empowerment and the labour market. The index shows the loss in potential human development due to inequality between female and male achievements in these dimensions. It varies between 0 when women and men fare equally and 1, where one gender fares as poorly as possible in all measured dimensions.

Kenya has an overall Gender Inequality Index (GII) of 0.651. However, Murang'a County has a GII of 0.57[2] indicating that even though women are considerably given extra opportunities compared to men nationally, the county still lags behind in managing the issue of inequality.

2 https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0ahUKEwj06om4hYjTAhXJDcAKHV60BPgQFggiMAE&url=https%3A%2F%2Fdata.humdata.org%2Fdataset%2Fc446a07c-5afc-4a90-a47b-7c9810a44a3d%2Fresource%2Fd984332e-4d72-4d67-9eac-31814a863efe%2Fdownload%2Fkenya-gender-inequality-index-per-county.xlsx&usg=AFQjCNHkqwLgkUL3bhbuqXVrRkG9jKmOig&sig2=NSfpy8uTQOEXGVOM-ChEIQ

CHAPTER 5: ANALYSIS OF THE PROJECT ALTERNATIVES

Environmental Impact Assessment study should identify and assess alternatives to the proposed project and identify the project with least adverse impacts. The feasibility and preconstruction design identified and analyzed to ensure the most convenient and feasible option is reached and adopted by the proponent.

The proposed supply pipeline will be fed by the Kiawambeu - Kiharu mainline (450mm dia) that conveys water from the Kiawembeu water treatment works. It will then conveyed the water through a distance of 9.2km transmission main 280mm outside diameter (OD) water pipeline of UPVC material from Shimo (near Kiawembeu water treatment works) to Gakoigo (Chief's Camp), construction of 1No. Reinforced Concrete storage tank (1250m^3), laying 27.8km of distribution lines from OD 225 mm to OD 63 mm and associated ancillary works. The proposed project will receive water from the 450mm dia Kiawambeu - Kiharu mainline supply and will be constructed along the existing public road reserve and traverse some few parcels of land. Some of the alternatives for this project that were considered include the following

5.1 Supply Pipeline Alternatives

There exists a five (5) inch pipeline which has been reduced from a 250mm dia – 160mm dia mainline that is tapped from a 280mm dia mainlin that draws water from Kigumo water supply The Pipeline is majorly made of UPVC material and located along the road reserve.

The proponent assessed the option of rehabilitating this line and extending it to serve Maragua town. However, the pipeline is old, dilapidated and made of a pipeline whose size is obsolete. This leads to high maintenance costs as the proponent has to source for the pipe size over a longer period of time. Moreover, the 5 inch pipeline would not provide adequate flows to the town

5.2. Source Alternatives

5.2.1. Irate – Nginda Mainline

This mainline serves the Maragua town at the moment intermittently. The 110mm diameter pipeline receives its water from the Irate – Ngida Intake located near the abandoned Irate coffee factory near the bridge to Gachocho at 0278412N, 9913541E. The mainline is located approximately 13km from Maragua Town thus a good offtake option for installing a new pipeline to serve the town.

This option would however have adverse social and environmental impacts as it would have had to pass through private land. Moreover, the resettlement and compensation claims from those affected would escalate the project cost resulting to a financial burden on the proponent and lenders. The intake works is also shared with the neighbouring Murang'a

South Water and Sanitation Company and such would lead to water sharing conflicts between the two companies.

The mains is also constructed of pipelines whose diameter is highly reduced (from 280mm dia – 110m dia) The mainline experiences water hammers leading to frequent burst that result in adverse impacts on the private lands and also cause no flow in the areas served. The rough rocky terrain exposes the pipeline to damages further alleviates this problem as shown in *Plate 5.1*

Plate 5.1: Dilapidated Irate Line Exposed Section

These shortcomings withstanding, the pipeline will not suitable for solving the water shortage problem in Maragua town through increased supply.

5.2.1. Borehole Water Source

The original water supply scheme for Maragua town was borehole (No BH C3385) that is located at the police station. The borehole is however low yielding, reportedly producing $3m^3$/hr. The water is thereafter pumped to an elevated tank adjacent to the borehole.

Water received from the borehole is untreated and reportedly salty leading to damages to the borehole components. The supply is thus inadequate and can only serve as complimentary water source to the town

5.3. Project Design Alternative

5.3.1. Layout Alternatives

The proposed pipeline route is mainly covered with grass and a few short bushed. It is evident that the project will have minimal impact on this vegetation. Moreover, the construction of the supply pipeline will involve laying of the pipeline underground at an approximate depth of sixteen (16) inches. Compared to trenching, laying the pipelines above ground would have ensured minimum disturbance of the top soil matter. However,

this presents a big risk of damage to the pipeline and consequently limiting the success of the project. This EIA report thus recommends shallow trenching for the pipe layout

5.3.2. Alternative construction materials and technology

The supply pipeline will be constructed of both high-density poly-ethylene (HDPE) and galvanized iron (GI) at road crossings and carriage way areas. The proposed project will therefore be constructed using modern, locally and internationally accepted materials to enhance public health, safety security and environment. Moreover, the material used for backfilling of the pipeline trenches will be the same soil that was earlier excavated. Use of timber as casts during constriction of washout chambers and valves will be discouraged where need arises. The contractor will be encouraged to make use of steel scaffolds and molds

5.4 Project Resettlement Issues

The proposed project will mainly utilize the public road reserve that spans 30 feet with a provision of 20 feet carriage way development. The remaining 10 feet is reserved for other public utilities which included water infrastructure.

There are no observable encroachments into the public road reserve through which the pipeline will be constructed. It was however observed that a small section of the pipeline will have to traverse private land to avoid the quarry and a high mountainous region just after the swamp in Mbiri location. Compensation would therefore be effected to provide an easement for the pipeline wayleave. This would be at a comparatively low cost compared to pumping the water uphill. Resettlement issues will therefore be minimal arise as only a few private lands are affected.

However, the pipeline will require permits from the public works office to enable the proponent trench through the road crossings in cases of road reserves.

5.5. Project Option Alternative

The Maragua Water Supply Project shall directly result to realization of the following benefits;

i. Improved supply of water to Maragua towards achieving goal 6 of the sustainable development goals. The goal focuses more on investment in adequate infrastructure in water sanitation, hygiene, water quality, water management, water scarcity and use efficiency, integrated water resource management and protection of water related ecosystem
ii. Improved living standards for residents of Maragua and its environs
iii. Reduced financial resulting from high maintenance costs of dilapidated pipeline
iv. Increased revenue collection by the project proponent

v. Increased economic activities in the town spurred by the reliable and clean water supply

5.6. No Project Alternative

This alternative means that the project should not proceed. The No Project Alternative in respect to the subject project implies that the water deficient Maragua town and its environs maintain a status quo. From an extreme environmental point of view, this looks like the most suitable alternative as there will be no interference with the existing environmental conditions. However, if this option is taken, the community members living in Maragua town and its environs as well as those within the project area will continue to face the following challenges

- Water shortage degrading their quality of health and sanitation
- Stunted economic growth within the urban areas as a result of water shortage and poor sanitation
- Poor economic stimulation as a result of unemployment
- Skills of the locals will remain under utilized
- Increased time wastage as a result of travelling long distances to fetch water
- Increased risk of water related conflicts
- Increased risk of ground water exploitation this interfering with ground water sources
- The proponent will not increase distribution in the service area

From the above analysis, it becomes apparent that the No Project Option is not a viable alternative as the proposed water supply project will relieve the people of Maragua and its environs of the water problem

CHAPTER 6: CONSULTATION AND PUBLIC PARTICIPATION

6.1 Preamble

Consultation and public participation is a key component of the ESIA process that helps in gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting Project alternatives and designing viable and sustainable impact enhancement and mitigation measures. During the project life cycle, CPP is undertaken in the conceptualisation, design, construction and initial operation phases.

6.2 Objectives of Consultations and Public Participation

The consultant conducted consultations to:

i). Disclose the planned project to the public and other stakeholders
ii). Collect baseline information related to socio-economics and the environment
iii). Solicit for feedback on the pertinent environmental and social issues expected from the project
iv). Identify likely positive and negative impacts of the planned project
v). Collect stakeholder opinions on suggested mitigation and remediation measures that should be undertaken to manage the impacts

6.3 Stakeholders Consulted

The consultant conducted key informant interviews and public *barazas* with various stakeholders and the public with a view of gathering their views on various aspects regarding the proposed project. These stakeholders included:

Table 6.1: Stakeholders Consulted

Category of stakeholder	Stakeholder consulted
County Government of Murang'a	• Deputy governor • CECM Environment and Natural Resources • Administrative Officer, Office of the County Secretary • Director, Economic Planning • Public Health Officer, Murang'a South Sub-County • Water Officer, Murang'a South Sub-County • Public Health Officer, Kigumo Sub-County • Works Officer, Murang'a South Sub-County • Works Officer, Kigumo Sub-County
Office of the President	• Deputy County Commissioner, Kigumo Sub-County • Assistant County Commissioner, Kigumo Sub-County

Category of stakeholder	Stakeholder consulted
	• Deputy County Commissioner, Murang'a South Sub-County • Assistant County Commissioner, Murang'a Sub-County • Chiefs (Mbiri, Nginda Gakira, Itaga, Kaharo)
National Lead Agencies	• Water Resource Management Authority (WRMA) • National Environment Management Authority (NEMA) – Murang'a Office
Project Proponent	• Technical Manager, MUWASCO • Customer Relations Officer, MUWASCO • Scheme Liaison Officers, MUWASCO
General public	• Community Members from Kiharu, Kigumo and Murang'a South Sub-Counties

The complete lists containing the stakeholders consulted are provided in Appendix two and three;

Plate 6.1: Public Baraza at Iregi Nursery School

Plate 6.2: Public Baraza at Ndikwe Primary School

Plate 6.3: Public Baraza at Gakira Shopping Centre

Plate 6.4: Public Baraza at Kaharo Shopping Centre

Plate 6.5: Key Informant Interview Deputy County Commissioner, Murang'a South Sub-County

6.4 Issues arising from Key Informant Interviews

STAKEHOLDER	PERSONS INTERVIEWED & DESIGNATION	OBJECTIVE	RESPONSE
Murang'a County Government	Nahashon King'ori –Administrative Officer 1 Elijah O. Kinaro – County Director of Economic Planning Mr. Githirwa– CEC Environment	To introduce the project to Murang'a County Government	The County Government supports the project The county government is pleased with the decision by the proponent to locate the pipeline along the public road reserve The county government sees the need for the proponent to look into developing a sewerage system to cater for the anticipated increase in waste water The county government emphasizes the need for equitable supply of water by the proponent to avoid water related conflicts The officers welcome the proponent to work closely with the county to ensure success of the project
Marang'a South Sub-County – National Government Representatives	S. K. Njora - DCC Fidelis Kihukia - ACC Vincent Nyangoka – Works Officer	To introduce the project to Maragua Sub-county	The Sub County is in support of the project The County commissioner and his team proposes an articulate water supply and distribution all over the jurisdiction of MUWASCO and expressed confidence that the project is in the right direction towards achieving this vision The office promises to provide coordination whenever needed
Kigumo Sub-County – National Government Representatives	Moses N. Mbaruku - DCC	To introduce the project to Maragua Sub-county	The Sub-County is in support of the project The office noted that although not most part of the pipeline traverses the sub-county, it will be prudent for the proponent to ensure better

STAKEHOLDER	PERSONS INTERVIEWED & DESIGNATION	OBJECTIVE	RESPONSE
			supply of water within Kigumo The office expresses the need for creative and well consulted community social responsibility activities that may arise from the project The office has offered to provide support to the project to ensure its success
Ministry of Environment and Public Health	Mr. John Kibe – SPHO Murang'a South Titus K. Chege – CPHO Murang'a South Elias K. Gachau – SPHO Kigumo Sub-County	To introduce the project and find out about the public health and sanitation situation	The office acknowledges that the project is justified as access to water within the project area is a big challenge They informed the consultants sanitation within the project area is also a challenge. Although the sanitation coverage is high (estimated at 92.4%) with few cases of open defecation, residents in the project area are exposed to the risk of underground water contamination and unsafe disposal of human waste from the pit latrines. Moreover, some areas such as Maragua town require that residents provide septic tanks which are unaffordable to many of the residents. Moreover, disposal of waste collected by private exhausters in undesignated areas enhances the risk of water contamination Water borne diseases such as amoeba, worms, and to a lesser extent cholera, result from poor sanitation and consumption contaminated water. They note that the project will go a long way in reducing water borne diseases through provision of clean water The office anticipates that the project will spur economic activities within the target area thus enhancing the quality of life of the residents. They however expressed concerns over the increased production of

STAKEHOLDER	PERSONS INTERVIEWED & DESIGNATION	OBJECTIVE	RESPONSE
			waste water since there is no drainage existing within Maragua town. Moreover, there is no sewerage facility in the project area The key informants also noted that the time saved from traveling long distances to fetch clean water will be used for other economic activities
Water Resources Management Authority (WRMA)	Jacqueline Mbokoki	To introduce the project to WRMA, Murang'a Sub region and obtain views and suggestions on the project	The Authority supports implementation of the proposed project The Authority was informed that the proposed project will draw water from an existing mainline and would not abstract from the water sources. In response to this information, WRMA advised that the WSP rechecks the provisions in its license for the water source to avoid non-compliance. WRMA notes that the project will increase the volumes of water abstracted from water sources within the area and urged the proponent to ascertain that the proposed project will have enough flows. WRMA also notes that there has been increased number of abstractors ranging from private individuals and firms conducting irrigation The office further notes that the proposed project would improve the living standards of the target populations through safe drinking water, job creation and improved business environment for Maragua town However, WRMA has raised concerns on the project's negative impacts such as increased waste water and urged the proponent to manage such impacts appropriately

STAKEHOLDER	PERSONS INTERVIEWED & DESIGNATION	OBJECTIVE	RESPONSE
Water Office – Murang'a South Sub-County	Mr Kariuki Muchemi Mr. Benson Kimotho – Line Technician	To receive views and suggestions on the impacts of the proposed project	The office reiterates that Maragua town is one of the areas that experiences challenges in receiving clean water and thus supports the project The office notes that the project will bring about positive impacts such as reliable water supply in the target area The office added that the existing pipeline within the project area is dilapidated and old thus leading to high maintenance costs; a problem that will be reduced by the new pipeline The office however expresses concerns on the adequacy of water received by the anticipated source mainline and hoped that the Ichichi mainline will have sufficient water to supply the target area The office further notes that the proponent should ensure that the community members upstream of the pipe have water supply to avoid water related conflicts
National Environment Management Authority (NEMA)	Mr. James Kamande	To inform the Authority of the project	The authority supports the decision to locate the pipeline along the road reserve noting that this will have minimal impacts on the environment and the community. NEMA urged the proponent to ensure adequate public knowledge on the proposed project

6.5. Summary of Key Suggestions and Opinions Arising from Consultation Forums

1. Water is a cross-cutting subject handled under three (3) different departments of the County: Health and Sanitation; Environment and Natural Resources; Energy, Transport and Infrastructure
2. The project is expected to have the following impacts:
    - It will reduce conflicts between members of the community due to increased volume of the resource. Water related conflicts are commonly experienced in Maragua Ridge and Kambiti
    - Incidences of water-borne diseases will be reduced since an alternative source of potable water will be available
    - There will be an increase in the hygiene practices of the community since water will be made available
    - The time spent by members of the community – more so women - in fetching water from long distances will be reduced. The time saved will in-turn be invested in other beneficial socio-economic activities
    - Job opportunities will be created for the residents along the pipeline route during the construction phase of the project. This will in-turn improve the socio-economic situation of the areas
    - There will be increased road traffic resulting from transportation of construction material to construction sites
    - There will be an increased risk of accidents during construction since the pipeline will be constructed along existing roads
    - The construction phase will see the destruction of existing infrastructure (i.e. excavation of tarmacked sections at road crossings as well as existing water connections)
    - Reduce dependency on borehole and shallow well water sources which are considered unsafe
    - Construction activities will lead to dust emission
    - Maragua town does not have a sewerage system in-place. Increased water supply is expected to also increase the amount of waste water in the town thereby presenting a sanitation challenge and the possibility of water contamination
    - Any leakages from the water supply pipeline might overflow to neighbouring farm holding s thus leading to destruction of crops
    - Poor disposal of construction wastes will lead to pollution of the environment
    - Trenching activities will lead to soil erosion within the road drains thus the risk of siltation into the existing water ways
3. Surface Water Resources: the area falls within the Maragua River Basin which has two (2) tributaries (i.e. Gakira and Irate) that converge at the Abadares Forest

4. Ground-water Resources: the water table in the areas around Kigumo is high. However, there are few boreholes around Maragua town with low yield and with high bacterial load
5. Illegal abstraction of water from surface water resources for irrigation purposes is widespread
6. Common ailments related to sanitation and hygiene in the area include: Typhoid, diarrhea, amoeba, cholera (in rare cases) and worms.
7. The Maragua town community uses pit latrines for sanitation. A few residents utilize WC systems connected to septic tanks. Open Defecation (OD) is challenge to sanitation in the area. This is despite county efforts to market sanitation and hygiene through CLTS and hand-washing campaigns; sanitation and hygiene awareness level is over 80 per cent but the community doesn't apply the knowledge learnt
8. Solid and liquid wastes are collected by the county government. There aren't any licensed private waste collectors
9. The community utilizes shallow wells, unprotected springs and roof catchments as sources of water. The pit latrines are not properly dug/ designed thereby leading to the contamination of groundwater and thus water-borne diseases
10. The road reserve along the pipeline route is about 30ft wide; the carriage way and roadside drainage take 20ft of the reserve. There are no buildings along the route; only farmland and live-fences have encroached on the reserve
11. The pipeline will pass through a railway reserve. The railway line is no-longer operational. There is also electricity infrastructure within the road reserve

6.6 Suggestions and Recommendation

During the consultative stakeholder meeting, participants raised the following suggestions and recommendations:

1. The ESMP should include measures to mitigate against degradation of water quality and quantity
2. The proponent should implement CSR interventions to support livelihoods, mitigation of climate change and flood management within the Maragua River Basin. Suggested interventions are provided in the SCAMP.
3. The proponent and the contactor should involve local administration during the construction phase of the project. Liaison with the community should also continue during construction work and initial operation of the pipeline
4. Jobs opportunities that will arise during the construction of the pipeline should be reserved for the residents of the project areas
5. The proponent should apply for a permit from the relevant road infrastructure authority (KeRRA or KURA) to allow trenching of tarmacked road sections along the pipeline routes
6. Construction work should strictly observe standards of Occupational Health and Safety including the following;
    - Usage of safety gear and equipment by construction workers

- Erection of safety signage along the construction route
- Provision of sanitation facilities, clean water and food to construction workers

7. The proponent should also consider to construct and operate a sewerage handling system in Maragua town to manage the increased liquid waste expected due to increased water supply to the town
8. Community members expressed a desire to be trained on rainwater harvesting methods for irrigation purposes
9. The contractor should have a holding/ launching yard for materials and equipment to control environmental pollution. The contractor should also strive to use high quality construction materials as detailed in the design

CHAPTER 7: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND MITIGATION MEASURES

7.1 Preamble

This chapter presents the assessment of the issues likely to arise as a result of implementation of the proposed project. The impacts are presented in-regard to their likelihood of occurrence on the physical, biological, occupational and socio-economic environments.

7.2 Positive Impacts

The anticipated positive impacts include the following;

1. **Improved and reliable water supply for the residents of Maragua Town and its environs**

   Residents of Maragua Town and its environs will benefit from an improved source of water. Incidence of diseases that occur as a result of using raw water from shallow wells, streams and unprotected springs will reduce. The stabilized water supply will also result in improved hygiene and sanitation practices.

2. **Increased reliability of water supply to the residents of Kiharu Sub-County** The local communities in Mbiri and Nginda locations of both Kiharu and Murang'a South Sub-County complained of low discharge from the MUWASCO's old mainline. Cases of water rationing around Ndikwe Primary School were also observed. During construction of the new pipeline, the residents of Kiharu Sub-County will benefit from improved discharge from the old line.

3. **Creation of employment opportunities for residents of the project area**

   The proposed project will provide short term and long term employment opportunities to the local community. The construction phase will provide short-term opportunities for casual work and semi-skilled labour. During the operational phase, long term employment opportunities will also be created which will generate income and improve the living standards of the local population and its environs.

4. **Improved Service Delivery by the County Government**

   The revenues generated from water supply fees by MUWASCO will provide capital to the company to improve existing water supply infrastructure and develop new infrastructure. This will enable the company to expand its areas of coverage, reduce Non-Revenue Water (NRW) and improve its customer experience. This will contribute to improvement in the level of satisfaction of citizens to the service delivery by their County Government.

5. **Increased Revenue Generation by the National Government**

   The project will contribute to the national kitty. The contractor will pay Value Added Tax (V.A.T) on purchasing materials for the project. Construction workers will also pay income tax from their earnings while working on the project. The proponent will pay fees to KURA and KeRRA to be allowed to construct the pipeline across the local roads.

6. **Injection of Money to the Local Economy**

   There will be a short-term increase in economic activity around the project areas. The construction labour force will require food and other items that bought from the retail shop outlets. The stabilised supply of water will spur the sprouting of local businesses such as eateries; additionally, the time saved from fetching water will be used for other productive economic activities.

7. **Benefits from Capacity Building**

   The knowledge of members of the community on various issues will be improved during the course of the project. Occupational health, safety and environmental training and awareness will be extended to workers both during the construction and operational phases of the projects (including site labourers, skilled, semi-skilled and casual, site management and maintenance teams). This will be of great benefit to all workers.

8. **Benefits from MUWASCO's CSR activities**

   The community will benefit from CSR activities implemented by the company. MUWASCO will conduct a CSR survey to identify the areas of priority for the local community in-line with their CSR policies. This will improve the living standards and the socio-economic status of the local communities.

7.3 Negative Impacts

The Project will involve the following activities:

Table 7.1: Activities to be undertaken under the project

Phase	Activities
Construction	• Delivery of construction pipes and fittings to the construction site • Manual and mechanical excavation of trenches • Cutting of trenches across road sections or micro-tunnelling of the road sections • Temporary stockpiling of soils, sub-soils and stones along the trenches • Delivery of material for bedding of concrete joints and associated valve chambers (e.g. sand, cement, and concrete) • Delivering pipeline sections and culverts to the construction sites if need be • Jointing of the pipeline sections • Backfilling of the trenches • Rehabilitation of the project site
Operation	• Repair and maintenance of sections of the pipeline • Connection of new customers to the pipeline
Decommissioning	• Excavation works • Cutting/ sawing of pipe sections • Temporary stockpiling of soils, sub-soils and stones along the trenches • Demolition of concrete joints and other civil works • Transportation of pipe sections and fittings from the pipeline sites • Removal of solid wastes (i.e. earth material and civil wastes) from the pipeline sites • Rehabilitation of the project site

The following negative impacts are associated with the construction, operation and decommissioning phases of the project.

7.3.1 Negative Impacts during the Construction Phase

1. **Partial loss of land use**

   During construction phase, it will be impossible to grow crops along the wayleave before the actual laying of pipeline. It should however be noted that the project does **not lead to physical displacement of persons** and the process of construction will take a very short time; say one season of crop growing.

2. **Slope stability**

   Cases of landslides, mainly triggered by rainfall and human activities have been reported in the past and of recent in Murang'a County. Moreover, the areas along the pipeline route, especially in Kiharu Sub-County near the quarry are characterized by highly mountainous landscapes with ragged terrain. Trenching activities during construction phase might interfere with dormant shear zones there thus leading to land damages where volumes of soil being transported downhill where proper care is not taken.

3. **Soil erosion and siltation of Surface Water Resources**

   The proposed project will involve activities that will require vegetation clearance which may loosen the soil hence making it vulnerable to erosion due to wind and surface water run-off. Excavated soils could be swept into surface water bodies by storm water floods during rains. This will increase the turbidity and sediment loads of the water bodies thereby increasing the cost of water treatment.

4. **Air Quality Degradation**

   Potential air quality degradation will occur as a result of vehicular and equipment emissions/ exhaust gases. Generation of dusts from trucks and vehicles accessing the construction areas and camp sites as well as piling of material is expected to degrade the local air quality.

5. **Interruption of Existing Infrastructure and Services**

   The pipeline route traverses an existing road reserve but some sections will cross tarmacked and feeder roads. Construction work will interfere with existing supply and distribution pipeline networks thereby interrupting water supply services. These services are critical and have implications with spill-over effects on the social and economic performance.

6. **Effect on Socio-Economic Activities**

   During the construction phase, any crops in the farmlands that encroached on the road reserve will be cleared to make way during the construction of the pipeline. Visits to the project area revealed minimal encroachment by way of farmlands and live fences to the

road reserve. This impact will therefore have minimal adverse effect to the local communities.

7. **Loss of Flora and Fauna**

   There are no trees established within the road reserve; there are also no habitats for rare/ extinct faunal species. The reserve harbours scattered shrubs and grasses. Construction activities will therefore have minimal impact on flora and fauna characteristic of the area.

8. **Increased Vehicular and Human Traffic**

   During the construction phase of the project, there will be an influx of construction workers to the project sites. This might contribute to the disruption of social order within the local communities. Increased vehicular traffic during the transportation of construction materials might result in the destruction of light traffic roads and increase the risk of transportation accidents.

9. **Generation of solid wastes**

   Project construction activities will generate various solid wastes ranging from earth material, pipe and fitting debris, wrappings, equipment oils and greases, waste asphalt concrete, human wastes to food wastes. Poor handling and disposal of such waste will lead to environmental pollution. Such wastes have the potential to enter and clog the local drainage channels thereby causing flooding.

10. **Health and Safety Hazards**

    Construction workers and the local community will be susceptible to health and safety hazards during the construction phase of the project. Inherent occupational risks include muscular-skeletal injuries, falls into un-marked/ uncovered trenches and accidents from construction vehicles. The influx of construction workers may put pressure on existing local resources, cause social conflicts, promiscuity and the related sexually transmitted diseases. During the operation phase of the project, pipe bursts and movements during pipeline maintenance activities may trigger land damages that might cause destruction of private property and loss of lives.

11. **Water quality degradation**

    The construction phase will be undertaken with limited usage of heavy machinery and extensive application of manual labor. However, small hand equipment will used to assist in the manual labor. The leakage of oils and greases and spillage of fuel, however at a lesser degree, will pollute the local surface water resources. This will consequently reduce the utility/ desirability of the water.

7.3.2 Negative Impacts during the Operation Phase

1. **Slope stability**

   Muranga'a is susceptible to landslides. The operation phase of the project will be characterised by periodic excavation to repair the pipeline to connect new distribution networks. Excavation along existing shear zones within Murang'a may trigger landslides. Furthermore, pipe bursts and water leakages from the pipeline system within Murang'a may also cause soil liquefaction and slope instability leading to lands damages.

2. **Soil erosion and Siltation of Surface Water Resources**

   Earth material excavated during repair and maintenance of the pipeline may be carried away by wind and surface water run-off. Excavated soils could be swept into surface water bodies by storm water floods during rains. This will increase the turbidity and sediment loads of the water bodies thereby increasing the cost of water treatment.

3. **Risk of illegal connection to the new pipeline**

   Illegal connections are common in low income areas where residents connect to water supply pipes illegally to avoid paying connection fees and monthly service levies. This practise will lead to Non-Revenue Water (NRW) and loss of revenue to MUWASCO. Loss of revenue will impact on the cash-flow of the company. An increased percentage of NRW will lead to an unfavourable rating of MUWASCO in WASREB impact reports. Illegal connections will reduce the volume of water reaching Maragua town thereby reducing the reliability of the project.

4. **Generation of liquid and solid wastes**

   The increased supply of water to Maragua Town and its environs will lead to increased generation of waste water from the town. Maragua Town doesn't have a sewerage system in-place; this will present a public health challenge to the residents of the town. Pipeline repair and maintenance activities will generate various solid wastes ranging from earth material, pipe and fitting debris, and wrappings that if poorly disposed will pollute the local environment.

5. **Health and Safety Hazards**

   During the operation phase of the project, pipe bursts and movements during pipeline maintenance activities may result in land damages (both on land and crops) that might cause destruction of private property and loss of lives. During repair and maintenance activities, the project proponents' staff will also face various OHS risks that include muscular-skeletal injuries and accidents.

7.3.3 Negative Impacts during the Decommissioning Phase

1. **Reduced availability of potable water to beneficiaries**

   The termination of the project at the end-of-project life will reduce the amount of potable water available to the established beneficiaries. This will cause increased competition for the water resources available at the time. Consequently, water-related conflicts and utilisation of contaminated sources will occur.

2. **Slope stability**

   The decommissioning phase will involve excavation of the pipeline to remove pipe sections and fittings. Excavation activities might interfere with dormant shear zones thereby triggering water land inflicted damages

3. **Soil erosion and Siltation of Surface Water Resources**

   Excavation activities during decommissioning will loosen soil thereby making it vulnerable to erosion due to wind and surface water run-off. Excavated soils could be swept into surface water bodies by storm water floods during rains. This will increase the turbidity and sediment loads of the water bodies thereby increasing the cost of water treatment.

4. **Air Quality Degradation**

   Potential air quality degradation will occur as a result of vehicular and equipment emissions/ exhaust gases. Generation of dusts from trucks and vehicles accessing the project site and camp sites as well as piling of excavated material is expected to degrade the local air quality.

5. **Interruption of Existing Infrastructure and Services**

   The pipeline route traverses an existing road reserve but some sections will cross tarmacked and feeder roads. Construction work will interfere will existing supply and distribution pipeline networks thereby interrupting water supply services. These services are critical and have implications with spill-over effects on the social and economic performance.

6. **Effect on Socio-Economic Activities**

   During the decommissioning phase, any crops in the farmlands that encroached on the road reserve will be cleared to make way for decommissioning activities. Visits to the project area revealed minimal encroachment by way of farmlands and live fences to the road reserve. This impact will therefore have minimal adverse effect to the local communities.

7. **Loss of Flora and Fauna**

   There will be no trees established within the road reserve during the operational phase of the project other than shrubs and grasses. Decommissioning activities will therefore have minimal impact on flora and fauna.

8. **Increased Vehicular and Human Traffic**

   An influx of workers to the project sites will be experienced during the decommissioning phase of the project. This might contribute to the disruption of social order within the local communities. Increased vehicular traffic during the transportation of decommissioning wastes and salvaged materials might result in the destruction of light traffic roads and increase the risk of transportation accidents.

9. **Generation of solid wastes**

   Decommissioning activities will generate various solid wastes ranging from earth material, pipe and fitting debris, wrappings, equipment oils and greases, waste asphalt concrete, human wastes to food wastes. Poor handling and disposal of such waste will lead to environmental pollution. Such wastes have the potential to enter and clog the local drainage channels thereby causing flooding.

10. **Health and Safety Hazards**

    Workers and the local community will be susceptible to health and safety hazards during the decommissioning phase of the project. Inherent occupational risks include muscular-skeletal injuries, falls into un-marked/ uncovered trenches and accidents from construction vehicles. The influx of construction workers may put pressure on existing local resources, cause social conflicts, promiscuity and related sexually transmitted diseases

Table 7.2: Impacts Assessment Matrix

Impact	Nature of Impact				Occurrence			
	Positive/ Negative	Direct/ In-direct	Temporary/ Permanent	Significance level (High, Moderate, Low)	Pre-construction	Construction	Operation	Decommissioning
1. Improved and reliable water supply for the residents of Maragua Town and its environs	Positive	Direct	Permanent	High				
2. Increased reliability of water supply to the residents of Kiharu Sub-County	Positive	Direct	Permanent	High				
3. Creation of employment opportunities for residents of the project area	Positive	Direct	Temporary	Moderate				
4. Improved Service Delivery by the County Government	Positive	In-direct	Permanent	Moderate				
5. Increased revenue generation by National Government	Positive	In-direct	Permanent	Moderate				
6. Injection of Money to the Local Economy	Positive	In-direct	Temporary	High				
7. Benefits from Capacity Building	Positive	Direct	Permanent	High				
8. Benefits from MUWASCO's CSR activities	Positive	Direct	Permanent	Low				

Impact	Nature of Impact				Occurrence			
	Positive/ Negative	Direct/ In-direct	Temporary/ Permanent	Significance level (High, Moderate, Low)	Pre-construction	Construction	Operation	Decommissioning
9. Partial loss of land use	Negative	Direct	Temporary	Low		■		
10. Slope in-stability	Negative	Direct	Permanent	Moderate	■	■	■	■
11. Soil erosion and Siltation of Surface Water Resources	Negative	Direct	Temporary	Moderate		■	■	■
12. Air Quality Degradation	Negative	Direct	Temporary	Moderate		■		■
13. Risk of illegal connection to the new pipeline	Negative	Direct	Permanent	Low			■	
14. Interruption of Existing Infrastructure	Negative	Direct	Temporary	Moderate		■		
15. Effect on Socio-Economic Activities	Negative	Direct	Temporary	Low		■		
16. Loss of Flora and Fauna	Negative	Direct	Temporary	Low		■	■	■
17. Increased Vehicular and Human Traffic	Negative	Direct	Temporary	Moderate		■	■	■
18. Generation of liquid and solid wastes	Negative	Both	Both	High		■	■	■
19. Health and Safety Hazards	Negative	Direct	Both	Moderate		■	■	■
20. Degradation of water quality	Negative	Direct	Temporary	Moderate		■		■

7.4: Impact Enhancement and Mitigation Measures

7.4.1. Preamble

In the context of sustainable development, projects should be implemented in a manner to enhance the living standards of the targeted beneficiaries and the resident communities. The consultant was guided by the principles of sustainability in the formulation of practical mitigation measures for potential impacts identified through stakeholder engagement, public consultation and expert knowledge. The main objective was to maximize social, environmental and economic benefits of the project and to minimize any associated adverse impacts. This chapter presents the proposed enhancement and mitigation measures of potential impacts for the project.

7.4.2. Enhancement Measures for Positive Impacts

Enhancement refers to the deliberate attempts taken in the design and subsequent phases of the project to ensure the success of a wider range of direct and indirect positive outcomes to communities and/or the biophysical environment. This can be in the form of opportunities for social and community development, improved health and wellbeing, improved biodiversity, restored ecosystems and landscape character, and protected and respected cultural heritage[3].

The project will strive to enhance the positive impacts envisaged. The proponent will support the implementation of the ESMP at construction and operation phases of the project. Any impacts not envisaged under the ESMP will be identified through structured monitoring and evaluation under the project. The proponent will improve the experience its customers through better water supply services and expansion of coverage area. The contractor will maximise the utilisation of local labour for construction activities to enhance the socio-economic status of the local communities.

7.4.3. Mitigation Measures for Negative Impacts

1. **Partial loss of land use**

   MOWASCO shall fully compensate the farmers where the proposed wayleave traverses their private farms. The compensation shall cover for all the revenue that the farmer would have made after harvesting. A contingency allowance of 15% will

[3] João , E., Vanclay, F., & Broeder, L. (2011) Emphasising enhancement in all forms of impact assessment: introduction to a special issue, Impact Assessment and Project Appraisal, 29:3, 170-180, DOI: 10.3152/146155111X12959673796326

be added to the total compensation to ensure a stable livelihood is maintained. Easement allowance has also been factored since compensation of land at the rate of KSh 300/m^2 at the wayleave has also been considered.

2. **Slope stability**

The contractor shall avoid the usage of heavy excavation machinery along the pipeline route. Manual labour shall be used for trenching and backfilling during construction. During the operation phase of the project, repair and maintenance staff shall drain the pipeline sections to be worked on to avoid spillage of water. Any pipeline leakages or bursts shall be swiftly repaired to avoid triggering land-damages on steep slope

3. **Soil erosion and Siltation of Surface Water Resources**

The project contractor shall ensure that excavated earth materials are used for backfilling the pipeline trenches. The backfilled soil will also be sprinkled with water and compacted to a similar density to the existing ground. The cleared sites will be re-vegetated to improve ground cover and minimize soil erosion and also improve on aesthetics of the project area.

The contactor will also ensure proper channelling of surface water runoff away from the pipeline route and where necessary install silt traps to reduce the volume of sediments directly entering drainage channels.

4. **Air Quality Degradation**

The following measures will be observed during the construction and decommissioning phases of the project to mitigate against the degradation of local air quality;

- Supply and construction vehicles will only use the designated transport routes. The drivers will also be advised to stick to prescribed speed limits
- The contractor will ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases
- The contractor shall ensure appropriate vehicle speeds road sections that will be used by construction vehicles on a needs basis to eliminate the creation of dusts
- Construction workers will be provided with dust masks to mitigate against occupational health risks of inhaling exhaust gases and dust

5. **Water Quality Degradation**

   The contractor will maintain all site vehicles and equipment is a serviceable state. Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels. Water from cleaning of equipment will be utilised within the project site and will not be discharged into water courses.

6. **Risk of illegal connection to the new pipeline**

   The project proponent will ensure that communities living along the pipeline route are adequately served with piped water to reduce the urge for illegal connections. The proponent will also conduct water balance studies and NRW audits to identify and plug points of water loss along the pipeline.

7. **Interruption of Existing Infrastructure**

   The project proponent will apply for authorisation from relevant national authorities to interfere with existing infrastructure. The proponent will liaise with KURA and KeRRA for authorisation to cut through main roads and feeder roads that fall under their jurisdiction. The contractor will immediately restore the damaged sections of roads and water supply networks to pre-construction conditions.

8. **Effect on Socio-Economic Activities**

   The local community members whose farms have encroached on the reserve will be notified of pending construction activities in advance and asked to harvest any crops and salvage any useful fence materials there-in.

9. **Loss of Flora and Fauna**

   The proponent shall ensure that clearing of any vegetation is limited to the pipeline trench area (i.e. 0.5 meters width) within the road reserve and that transportation of construction materials is done through the existing local roads. The areas to be cleared for the pipeline trench, camp-site and materials holding yard shall be identified and marked out prior the start of construction activities. In addition, clearance of vegetation on riparian land will be avoided.

   The construction work-force will be sensitized on the importance of environmental conservation and ecological protection to prevent the exploitation of natural resources around the project area and destruction of ecosystems. On completion of the construction work, the trenched pipeline areas will be allowed to re-vegetate with fibrous rooted vegetation species.

10. Increased Vehicular and Human Traffic

Transportation of construction material to specific sites will be done through the existing local roads where possible. The contractor will rehabilitate the local roads that will be damaged during construction activities. Any detours and diversions that will be necessary during construction will be done in-consultation with the local communities. Vehicular and human traffic shall be restricted to the road reserve as much as possible. Drivers/ operators of vehicles will be advised to comply with prescribed speed limits to reduce the risk of road accidents.

11. Generation of liquid and solid wastes

The project proponent should strive to construct a functional sewerage system for Maragua town as a long-term mitigation measure against increased volume of waste-water due to increased water supply and population. As a short-term intervention, Sub-county public health officers should enforce the construction and usage of septic-tanks for disposal of waste water by the residents of the town.

The project contractor will provide solid waste collection facilities (waste bins) for the temporary storage of wastes prior to disposal at an appropriate and designated location. The contractor will also liaise with the County government and the local NEMA office for direction on licensed waste collectors and suitable dumping sites for generated wastes. The contractor will also sensitize construction workers on proper disposal of wastes.

12. Health and Safety Hazards

The following measures will be observed/ implemented to reduce/ eliminate potential health and safety risks;

- The contractor shall erect an appropriate project signboard as directed by the proponent. The signboard shall include information on the project proponent, funding organization, project contractor, project manager, civil and structural engineer among other relevant information that will be required by the proponent

- The contractor will erect the appropriate safety signage along the construction route cautioning against various health and safety risks and prescribing particular mandatory actions. Road signs will also be erected to warn pedestrians and motorists of construction activities and diversions at road sections where the pipeline will cross.

- The contractor and the proponent will provide adequate first-aid facilities in

the project sites to handle medical emergencies during construction. A standby vehicle will also be provided to swiftly transport ill/ injured staff and members of community to the nearest medical facility.

- The contractor will comply with national and international labour laws in recruiting construction staff. All workers will be required to produce their national identification cards, NHIF and NSSF registration numbers. Child labour will not be used in construction work.
- All construction workers will be required to wear Personal Protective Equipment (PPE) i.e. helmets, gloves and safety boots during the construction phase. The workers will also be sensitized on health and safety standards they should observe. During the operation phase of the project, repair and maintenance staff will also be required to use PPEs.
- A comprehensive HIV/AIDs sensitization programme will be formulated to create awareness among construction workers and the local community. The programme will be supported by a qualified community health practitioner who will also offer testing and counselling services. Information fliers and protection will also be made freely available during the construction phase.
- The contractor shall provide an isolated material holding yard that is well secured, aerated, lit and with serviceable materials handling equipment.
- During the operation phase of the project, repair and maintenance staff shall drain the pipeline sections to be worked on to avoid spillage of water. Any pipeline leakages or bursts shall be swiftly repaired to avoid triggering land-slides.

CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

8.1 Preamble

The purpose of the ESMP is to ensure that environmental and social impacts and risks identified during the ESIA are effectively managed during the construction, operation and decommissioning of the proposed project. The ESMP specifies the mitigation and management measures for each impact/ risk, party allocated responsibility, means of monitoring and frequency, objective verifiable indicators and an indicative budget. The ESMP also establishes a monitoring plan, capacity building plan and institutional arrangements to support its implementation.

The project proponent shall avail this ESMP to the successful contractor awarded the tender for construction work for this project. The contractor will be required to formulate a more specific ESMP and work methods that will ensure construction of the project in compliance with established standards and legislation. The contractor will factor the costs of implementing the ESMP into their budget. The project proponent will take the necessary steps to ensure that the ESMP is fully implemented.

8.2 Environmental and Social Management Plan

Table 8.1: Environmental and Social Management Plan

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
Construction Phase					
Partial loss of land use rights	• Community sensitization and awareness creation regarding the project	MUWASCO	• Periodically, prior to project implementation	• No. and minutes of consultative meetings held • No. of complaints from the local community	500,000
	• Conduct a Resettlement Action Plan (RAP) along the proposed pipeline and compensate the PAPs	MUWASCO/ Consultant	• Periodically, prior to project implementation	• RAP Compensation Matrix	5,435,166.29
Employment opportunities for local community	The contractor shall reserve opportunities for semi-skilled and casual work for interested members of the local communities	Contractor	Throughout the construction phase	• No. of local workers employed as a percentage of total workforce	Contractor's cost
Injection of money to the local economy	The contractor's staff shall strive to purchase basic items that may be required while construction is in progress from the local shopping centres (e.g. airtime, snacks, etc.)	Contractor	Throughout the construction phase	• Increased economic activity around the project site	No direct costs anticipated

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
Capacity Building	• Sensitize local community on issues on environment, health and safety • Conduct HSE trainings to construction workers	Contractor MUWASCO	Throughout the construction phase	• No. of sensitization drives completed • No. of HSE trainings conducted	100,000.00
Slope Instability	• Use of manual labour for trenching and backfilling • Avoid utilisation of heavy machinery near steep landscapes • Construction activities to be conducted during dry season	Contractor	Throughout the construction phase	• Type of technique utilised for trenching and backfilling	No direct costs (integrated in the works costs)
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Sprinkling of backfilled trenches with water • Compaction of backfilled trenches • Re-vegetation of excavated areas • Channelling of surface water runoff away from the pipeline route	Contractor	Daily Inspection	• Presence/ absence of stockpiled excavated earth material • No. of silt traps installed • No. of surface drains constructed	No direct costs (integrated in the works costs)
Air Quality Degradation	• Supply and construction vehicles will only use the designated transport routes. The drivers will also be advised to stick to prescribed speed limits	Contractor	Daily Monitoring	• Records of speed limits signs erected • Records of machine	Contractors cost

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
	• The contractor will ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases • The contractor shall ensure the appropriate speed limits are observed at along all road sections that will be used by construction vehicles on a needs basis to eliminate the creation of dusts • Construction workers will be provided with dust masks to mitigate			and vehicle service • Evidence of use of dust masks by workers on site	
Interruption of Existing Infrastructure	• The proponent will liaise with KeRRA for authorisation to cut through main roads and feeder roads that fall under their jurisdiction. • The contractor will immediately restore the damaged sections of roads and water supply networks to pre-construction conditions.	MUWASCO Contractor	Before and during the construction phase	• Permit from KeRRA • Engineer's inspection of repaired road sections • Complaints from the local community	100,000.00
Impact on Socio-Economic Activities	• Notification to local community members whose farms have encroached on the reserve will be notified of pending construction	MUWASCO	Before the construction phase	• Complaints from the local community during construction activities	No direct costs anticipated

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
	activities				
Loss of Flora and Fauna	• The proponent shall ensure that clearing of vegetation clearing is limited to the pipeline trench area (i.e. 0.5 meters width) within the road reserve • Transportation of construction materials to be done through the existing local roads • Avoidance of vegetation clearing along riparian land • Sensitization of construction work-force on environmental conservation and ecological protection • Re-vegetation of completed pipeline route with fibrous rooted indigenous vegetation species	MUWASCO Contractor	Routine inspections	• No. and type of vegetation cleared • No. and type of indigenous species re-planted • Size of area cleared • Size of area re-vegetated	Contractor's best management practise
Increased Vehicular and Human Traffic	• Transportation of construction material to specific sites will be done through the existing local roads • The contractor will rehabilitate the local roads that will be damaged during construction activities • Consultation with the local	Contractor	Routine inspections	• No. of accidents involving project vehicles • Transportation control logs • No. of road spots rehabilitated	Routine project activity

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
	communities on planned road diversions if any • Restriction of Vehicular and Human Traffic to the road reserve where possible • Sensitization of drivers to comply with prescribed speed limits			• Community complaints	
Generation of solid wastes	• Provision of solid waste collection facilities (waste bins) • Contracting licensed solid waste handlers • Sensitization of construction workers on proper disposal of solid wastes	Contractor	Daily Inspection	• Presence/ absence of scattered solid wastes at sites • Availability of waste receptors • No. of sensitization meetings held with workers	50,000.00
Health and Safety Hazards	• Continuous supervision of occupational, health and safety management to ensure compliance	MUWASCO	Routine Inspection	• HSE inspection reports	50,000.00
	• Occupational Safety and Health Training for contractor's staff	Contractor	Throughout construction phase	• Training reports • Training attendance sheets	20,000.00
	• Conduct orientation talks and visits	Contractor	At employment of new staff	• Orientation report	No direct costs anticipated
	• Conduct toolbox talks	Contractor	On a daily basis	• No. of toolbox talks	No direct costs

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
				conducted	anticipated
Water quality degradation	• The contractor will maintain all site vehicles and equipment is a serviceable state. • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels • Water from cleaning of equipment will be utilised within the project site and will not be discharged into water courses.	Contractor	Throughout construction phase	• Evidence of oil leaks and greases on site • Evidence of waste water flowing through local drainage channels	Contractor's cost
Sub-Total of Cost Estimates for the Construction Phase					*6,255,166.29*
Operation Phase					
Improved and reliable water supply for the residents of Maragua Town and its environs	• Improve customer experience through better water supply services • Reduction of water outages/ rationing • Expansion of coverage area	MUWASCO	Throughout operation phase	• No. of new connections per month • Customer satisfaction survey	Proponent's cost
Increased reliability of water supply to the	• Improve customer experience through better water supply services	MUWASCO	Throughout operation phase	• No. of new connections per	Proponent's cost

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
residents of Kiharu Sub-County	• Reduction of water outages/ rationing • Expansion of coverage area			month • Customer satisfaction survey	
Improved Service Delivery by the County Government	• Improve customer experience through better water supply services • Reduction of water outages/ rationing • Improve customer relations	MUWASCO	Throughout operation phase	• Results of customer satisfaction survey	Proponent's cost
Benefits from MUWASCO's CSR activities	• Consultation with the local communities to identify priorities for intervention	MUWASCO	Throughout operation phase	• No. of CSR projects implemented • Value of the implemented CSR projects	Proponent's CSR kitty
Slope-instability	• Repair and maintenance staff shall drain the pipeline sections to be worked on to avoid spillage of water • Pipeline leakages or bursts shall be swiftly attended to	MUWASCO	On a needs-basis	• No. of water inflicted lad damages attributable to the project	Proponent's cost
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Sprinkling of backfilled trenches with water • Compaction of backfilled trenches • Re-vegetation of excavated areas	MUWASCO	On a needs-basis	• Presence/ absence of stockpiled excavated earth material • No. of silt traps installed • No. of surface drains constructed	Proponent's cost

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
	• Channelling of surface water runoff away from the pipeline route				
Illegal connection to the new pipeline	• The project proponent will ensure that communities living along the pipeline route are adequately served with piped water • The proponent will also conduct water balance studies and NRW audits to identify and plug points of water loss	MUWASCO	Routine inspection	• No. of NRW assessments conducted • Percentage of NRW • WASREB Impact reports • No. of illegal connection terminated	Proponent's cost
Generation of liquid and solid wastes	• The proponent shall raise funds for construction a functional sewerage system for Maragua town as a long-term mitigation measure against increased volume of waste-water due to increased water supply and population • As a short-term intervention, Sub-county public health officers should enforce the construction and usage of septic-tanks for disposal of waste water by the residents of the town • Solid wastes generated during repair and maintenance activities will be	MUWASCO	Throughout the life of the project	• Sewerage system for Maragua town in-place • Absence/ presence of waste water in storm-water drains • Absence/ presence of solid waste in repair and maintenance sites	Proponent's cost

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
	collected and disposed-off in designated manner				
Health and Safety Hazards	• Train all workers on Health, Safety and Environment (HSE) with an aim of improving awareness • The proponent will erect appropriate safety signage during repair and maintenance activities • The proponent shall provide first-aid facilities for R&M staff • Proponent's staff will be required to use PPEs during R&M work	MUWASCO	On a needs-basis	• Training on HSE conducted • Prominently erected safety signage during R&M work • Availability of first-aid kit during R&M work	Proponent's cost
Decommissioning Phase					
Employment opportunities for local community	• The contractor shall reserve opportunities for semi-skilled and casual work for interested members of the local communities	Contractor	Throughout the construction phase	• No. of local workers employed as a percentage of total workforce	Contractor's cost
Reduced availability of potable water to beneficiaries	• The proponent shall provide an alternative source of potable water to the beneficiaries of the project	MUWASCO	During and after the decommissioning phase	• Customer complaints • Alternative sources of water provided	Proponent's cost
Slope Instability	• Use of manual labour for excavation and backfilling • Avoid utilisation of heavy machinery	Contractor	Throughout the decommissioning phase	• Type of technique utilised for trenching and backfilling	No direct costs (integrated in the works

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
	near steep landscapes • Decommissioning activities to be conducted during dry season			• No. of water inflicted land damages that occur during the decommissioning phase	costs)
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Sprinkling of backfilled trenches with water • Compaction of backfilled trenches • Re-vegetation of excavated areas • Channelling of surface water runoff away from the pipeline route	Contractor	Daily Inspection	• Presence/ absence of stockpiled excavated earth material • No. of silt traps installed • No. of surface drains constructed	No direct costs (integrated in the works costs)

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
Air Quality Degradation	• Evacuation vehicles will only use the designated transport routes. The drivers will also be advised to stick to prescribed speed limits • The contractor will ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases • The contractor shall ensure recommended speeds on road sections that will be used by construction vehicles are adhered to on a needs basis to reduce the creation of dusts • Construction workers will be provided with dust masks to mitigate	Contractor	Daily Monitoring	• Records of water sprinkling • Number of speed limit signs erected • Evidence of use of dust masks by workers on site	Contractors cost
Interruption of Existing Infrastructure and Socio-Economic Activities	• The proponent will liaise with KURA and KeRRA for authorisation to cut through main roads and feeder roads that fall under their jurisdiction. • The contractor will immediately restore the damaged sections of roads and water supply networks to pre-construction conditions	MUWASCO Contractor	Before and during the decommissioning phase	• Permit from KURA/ KeRRA • Engineer's inspection of repaired road sections • Complaints from the local community	Proponent's cost
Impact on Socio-	• Notification to local community	MUWASCO	Before the	• Complaints from the	No direct costs

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
Economic Activities	members whose farms have encroached on the reserve will be notified of pending decommissioning activities		decommissioning phase	local community during decommissioning activities	anticipated
Loss of Flora and Fauna	• The proponent shall ensure minimal clearing of vegetation • Transportation of decommissioning wastes to be done through the existing local roads • Sensitization of decommissioning work-force on environmental conservation and ecological protection • Re-vegetation of cleared areas with indigenous vegetation species	MUWASCO Contractor	Routine inspections	• No. and type of vegetation cleared • No. and type of indigenous species re-planted • Size of area cleared • Size of area re-vegetated	Routine project activity
Increased Vehicular and Human Traffic	• Transportation of decommissioning wastes to specific sites will be done through the existing local roads • The contractor will rehabilitate the local roads that will be damaged during decommissioning activities • Consultation with the local communities on planned road diversions • Restriction of Vehicular and Human	Contractor	Routine inspections	• No. of accidents involving project vehicles • Transportation control logs • No. of road spots rehabilitated • Community complaints	Routine project activity

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
	Traffic to the road reserve where possible • Sensitization of drivers to comply with prescribed speed limits				
Generation of solid wastes	• Provision of solid waste collection facilities (waste bins) • Contracting licensed solid waste handlers • Sensitization of construction workers on proper disposal of solid wastes	Contractor	Daily Inspection	• Presence/ absence of scattered solid wastes at sites • Availability of waste receptors • No. of sensitization meetings held with workers	50,000.00
Health and Safety Hazards	• Continuous supervision of occupational, health and safety management to ensure compliance	MUWASCO	Routine Inspection	• HSE inspection reports	50,000.00
	• Occupational Safety and Health Training for contractor's staff	Contractor	Throughout decommissioning phase	• Training reports • Training attendance sheets	20,000.00
	• Orientation talks and visits	Contractor	At employment of new staff	• Orientation report	No direct costs anticipated
	• Toolbox talks	Contractor	On a daily basis	• No. of toolbox talks conducted	No direct costs anticipated
Water quality degradation	• The contractor will maintain all site vehicles and equipment is a serviceable	Contractor	Throughout decommissioning	• Evidence of oil leaks and greases on site	Contractor's cost

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (KSh.)
	state. • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels • Water from cleaning of equipment will be utilised within the project site and will not be discharged into water courses.		phase	• Evidence of waste water flowing through local drainage channels	
Sub-Total of Cost Estimates for Decommissioning Phases					*120,000.00*
Grand-Total of Cost Estimates					*6,375,166.29*

Budget Notes:

1. The costs provided are estimates of the costs to be incurred during the life of the project. Some of the costs are too dynamic to estimate; responsibility for the same has been appropriately allocated either to the proponent or to the contractor in-relation to the phase of the project
2. KSh. 120,000 has been estimated for the decommissioning phase. This figure will be adjusted for inflation and prevailing interest rate

8.3 Monitoring and Evaluation

Monitoring and Evaluation (M&E) is a process that helps improve performance and achieve results. The overall purpose of M&E is the measurement and assessment of performance in order to more effectively manage the impacts of a project. The overall objective of environmental and social monitoring is to ensure that mitigation measures are effectively being implemented. Environmental and social monitoring will also enable response to new and developing issues of concern. The activities and indicators that have been recommended for monitoring are presented in the ESMP.

8.3.1 Internal Monitoring

The project proponent will take the responsibility of conducting regular internal monitoring of the project to verify the results of the Contractor and to audit direct implementation of environmental mitigation measures contained in the ESMP and construction contract clauses for the Project. The proponent will also initiate periodic environmental audits; the audit shall check that mechanisms are in-place to ensure that:

- The ESMMP being used is the up to date version;
- Variations to the ESMMP and non-compliance and corrective action are documented;
- Appropriate environmental training of personnel is undertaken;
- Emergency procedures are in place and effectively communicated to personnel;
- A register of major incidents (injuries, complaints) is in place and other documentation related to the ESMMP; and
- Appropriate corrective and preventive action is taken by the Contractor once instructions have been issued

The Construction consultant's and the Contractor' project teams will include environmental and social experts who will direct ESMP activities directly at the site. Monitoring will be a systematic assessment of the activities in relation to the specified criteria of the condition of approval. Internal monitoring will follow the following key criteria;

1. **Air quality monitoring:** the contractor shall monitor the site dust levels and emission levels from vehicles and construction equipment. In the cases where suspended dust levels are high, the contractor will take appropriate measures to mitigate the same. Results of regular monitoring of emission levels will inform the servicing of affected vehicles and equipment.

2. **Soil erosion and Siltation monitoring:** the project environmentalists will monitor the implementation of soil and Siltation control measures. This will include sediment load and turbidity measurements on the nearby surface water resources.

3. **Monitoring of vegetation clearing activities**: On-site monitoring will be conducted to ensure that vegetation clearing activities are conducted within the extent of the pipeline trench. Monitoring will also help in the conservation of indigenous vegetation species within the project areas.

4. **Monitoring of Health and Safety:** The contractor's environmentalist will ensure that appropriate safety signage is prominently displayed at appropriate locations/positions to mitigate against accidents. Additionally, measures to create awareness regarding sexually transmitted diseases, primarily HIV/AIDS will be taken and the local community sensitized on the same. The contractor will also monitor the compliance to the site's occupational health and safety policy; where occupational health and safety requirements are not being met; the concerned workers shall immediately be trained and instructed to implement these requirements.

5. **Waste Management Monitoring**: the contractor's environmentalist will monitor the management of wastes in the construction sites. This will ensure that all solid and organic wastes are dumped in designated waste receptors and taken to approved landfills; clean sanitary facilities such as mobile toilets are available to construction staff at all times.

8.3.2 External Monitoring

The project proponent will hire an independent consultant to carry out the Initial Environmental Audit and the subsequent Annual Environmental Audits in line with EMCA regulations. NEMA holds the overall responsibility licensing the project and conducting periodic visits to ensure that environmental guidelines are being observed during implementation of the project. NEMA will therefore review environmental monitoring and environmental compliance documentation submitted by the project proponent.

8.4 Capacity Building

Capacity building during the project will be conducted for project staff/ construction workers and the local community. The contractor is responsible for ensuring that workers are provided HSE training as stipulated in legislation. A training register should be kept on site for all training conducted as proof for auditing purposes. Training of the construction work-force will include the following content as a minimum;

- The significance of the site HSE policy
- The pertinent HSE issues of the project activities;

- Roles and responsibilities towards conforming with the ESMMP and the HSE policy and procedures
- Potential consequences of departure from specified operating procedures
- Corrective measures to be undertaken as a consequence of non-compliance

The contractor in-collaboration with the proponent will conduct community sensitization on various social issues that include;

- HIV/ AIDS awareness (i.e. transmission, prevention, counseling, treatment)
- Prevention and treatment of other sexually transmitted infections
- Environmental conservation and ecosystem protection
- Access and safety around the project construction site

8.5 Implementation of the ESMP

The ESMP will be administered be administered by the four (4) different institutions (i.e. MUWASCO, NEMA, Construction consultant and the Contractor). The role of NEMA will be to conduct audit visits to ensure that the impacts envisaged under the ESMP are being managed effectively. Figure 8.1 shows the administrative arrangement for the implementation of the ESMP under the project.

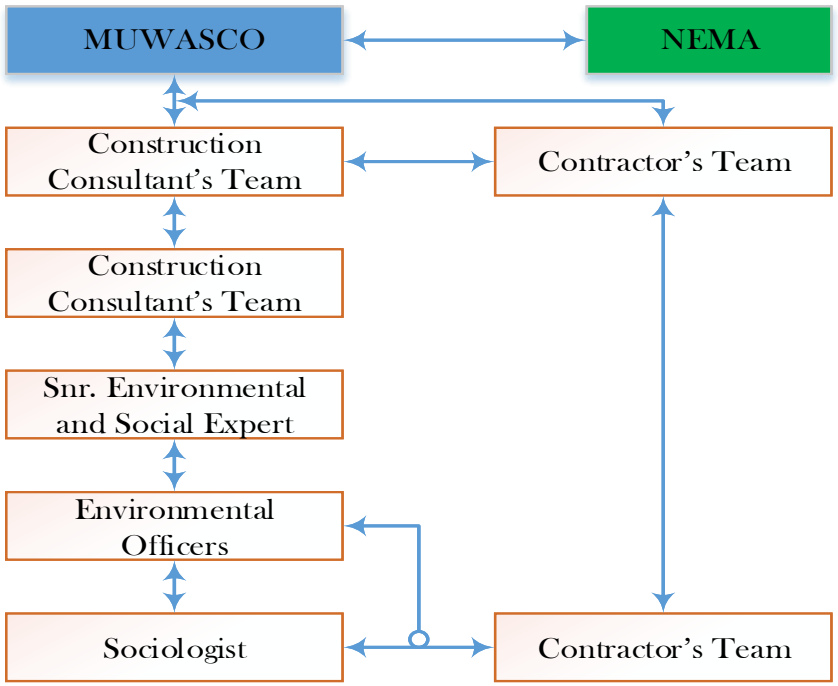

Figure 8.1: Administrative arrangement for the ESMP

In order to guarantee the effective implementation of the ESMMP, the responsibilities and authority of the various persons/ institutions which will be involved in the project need to be clearly defined. The roles of and responsibilities of each party in administering the ESMMP are provided in Table 8.2;

Table 8.2: Roles and Responsibilities of key stakeholders

Party	Roles and Responsibilities
NEMA	• Exercise general supervision and co-ordination over all matters relating to the environment • Conduct periodic visits to ensure that the terms of the project license are being observed
MUWASCO	• Drafting of comprehensive tender that documents that include environmental specifications in the tender specifications • Selection of qualified, environmentally conscious contractors • Supervision to ensure that objectives of this ESMMP are met
Construction Consultant	• Ensure that the proposed ESMMP is up to date and is being used by the contractor • Conduct periodic audits of the ESMMP to ensure that its performance is as expected
Construction Contractor	• Ensure compliance environmental specifications of the ESMMP

CHAPTER 9: RESETTLEMENT ACTION PLAN

9.1 Overview

Murang'a Water & Sanitation Company (MUWASCO), herein referred to as the Proponent, has proposed to implement the **Maragua Water Supply Project** (herein referred to as the project) to improve and increase water supply to Maragua Town. A small portion of the land passes through private land. Even though no structures are affected to trigger displacement of people, imminent **loss of land use** is envisaged during construction. The loss of land use would only occur at the pipeline wayleave therefore leading to partial loss of use during construction. Even though not many farms were traversed by the proposed pipeline, these issues have necessitated the client through the consultant to carry out a resettlement action plan (RAP) which is included in this ESIA project report.

The main objective of Resettlement Action Plan (RAP) is to provide a plan for resettlement and rehabilitation of the Project Affected Persons (PAPs) so that their losses are adequately compensated and their standard of living improved or at least restored to the pre- project status. The study entailed carrying out census of all the affected persons along the proposed route for Maragua water.

The crops affected will be paid in full by the client to cover for the produce that would have been harvested and sold during the construction period. The crops found on the field were maize, beans, arrow roots, french beans and butter nuts.

9.2 Grievance Redress

9.2.1 Introduction

Regardless of scale and level of planning, involuntary resettlement/ acquisition of wayleave inevitably gives rise to grievances among affected population. Timely redress of such grievance is vital to the satisfactory implementation of resettlement and the completion of the project in schedule.

Grievance redress mechanisms are essential tools for allowing affected people to voice their concerns regarding resettlement and compensation process as they arise and, if necessary, for corrective action to be taken in a timely manner. Such mechanisms are fundamental to achieving transparency in the resettlement process.

9.2.2 Potential Resettlement Grievances

Potential grievances and disputes that may arise in the course of implementation of the RAP may be related to the following:

i. Valuation process;
ii. Inventory mistakes;
iii. Mistakes related to identification and disagreements on boundaries between the PAPs;
iv. Disagreements on crop compensation values;
v. Divorces, successors and the family issues resulting into ownership disputes;
vi. Disputed ownership of land;

9.2.3 Proposed Grievance Management and Redress Mechanism

During implementation of RAP, any of the above-mentioned grievances may occur. The same shall be resolved using the proponent's grievance redress mechanism.

MUWASCO will put in place a standard operating procedure that seeks to manage complains in a planned and systematic manner through the local chiefs. This is meant to facilitate speedy resolution of disputes and grievances and also to provide trust and build a positive rapport with the PAPs. The steps for grievance redress are as follows:

i. First Order Mechanism: First order mechanism involves registration of the grievances with the MUWASCO officials and local chiefs who will be working as Resettlement Working Group (RWG). The RWG will then seek to eliminate nuisance claims and satisfy legitimate claimants by attempting to reconcile the aggrieved PAP(s) and MUWASCO. The RWG will respond within a month.

ii. Second Order Mechanism: Where the complaint and grievance cannot be resolved by the RWG, the complained is referred to Tribunal Public committee (PCC)offices for further explanation.

iii. Third Order Mechanism: In instances where the PCC is unable to resolve the matter especially land will be referred to the county ministry of land offices, if it further fail then the same will be referred to the Courts for settlement. Kenyan citizens and legal entities have access to court recourse in conformance with applicable laws. The aggrieved PAP(s) have the right to pursue the matter up to the Supreme Court if necessary.

iv. Fourth Order Mechanism: Expropriation of land will be used as a last resort when all of the above procedures have either failed or extensive delays to the project are foreseen. Expropriation means taking away of private land and landed property for public purpose

by the Government with or without the owner's consent subject to laws of eminent domain, which stipulates prompt and adequate compensation among other things.

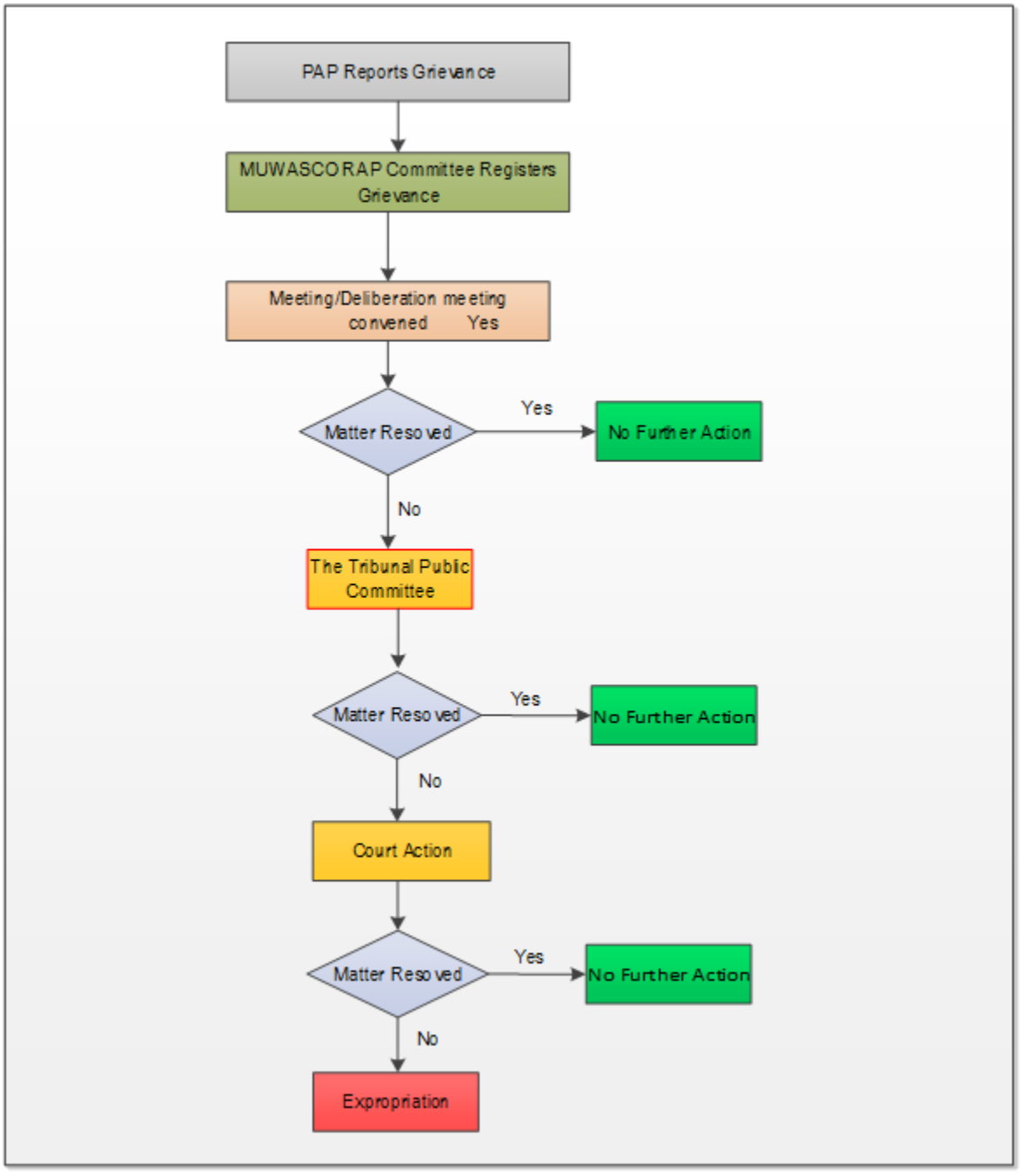

Figure 9.1: Grievance Redress Procedure

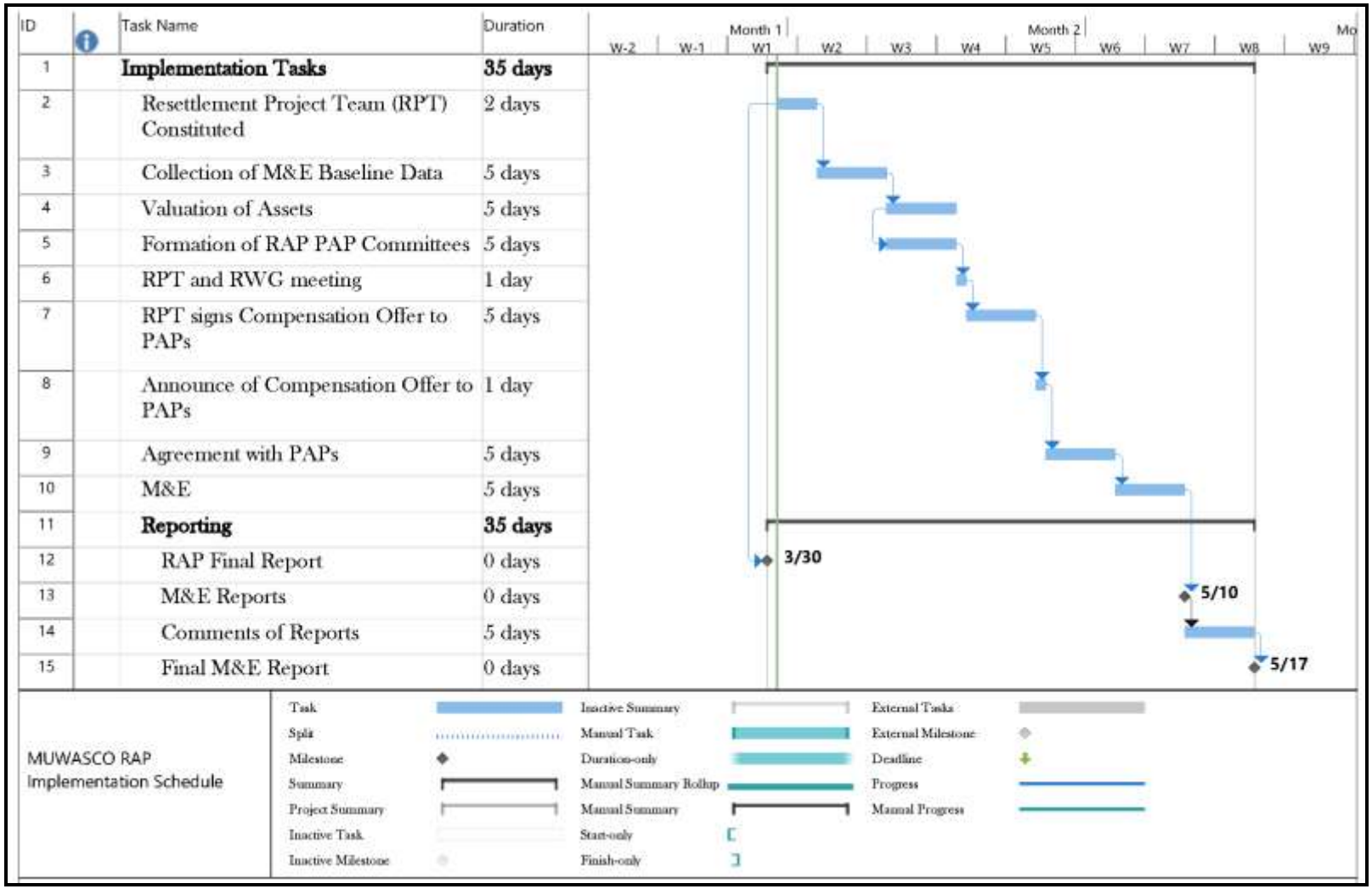

Figure 9.2: RAP implementation Schedule

9.2.4 RAP Implementation Plan Matrix

Table 9.1: RAP Implementation Matrix

Type of Loss	*Specification*	*Entitled Person*	*Category*	*Compensation Entitlements*
Land	• Private land	• Owners	• All categories of land	• Provide easement allowance for the piece of land used for pipe laying. Open market value of land is KSh 300 per square plot.
Crops	• Crops damaged as a result of the wayleave acquisition and construction activities.	• Owners	• All crops	• Crop damage compensation rates will be at market rates

9.2.5 Summary of Affected Plots

Thirty-three (33) plots for the affected persons were found along the wayleave. One (1) of the plot is a quarry but the remaining thirty-two (32) are farm lands used for planting variety of crops.

The size of the plot of land ranges between 72.5 to 1131 square metres with majority of land owners being men. Plots owned by men are 27 which accounts for 81.81% and 6 by women accounting for only 18.18% of the total.

The sum compensation on the piece of land owned is KSh 3,561,960.00, that for crops is KShs 1,164,271.56, with 15% contingencies amounting to KSh708,934.73. The final cost of RAP was found to be KSh5,435,166.29. Table 9.2 below shows the summarised data of RAP.

Table 9.2: Summary table of RAP

Gender		Cost of Land (KSh)	Cost of crops (KSh)	Contingencies (KSh)	Total cost (KSh)
Male	Female				
26	6	3,561,960.00	1,164,271.56	708,934.73	5,435,166.29

CHAPTER 10: CONCLUSIONS AND RECOMMENDATION

10.1 Conclusion

The assessment and evaluation of the environmental and social impacts of the proposed Maragua Water Supply project by MUWASCO has revealed that the project will bring a net environmental, social, health and economic benefits to all living within the Project area and its environs. Additionally, the project has also been found to have adverse impacts that need to be mitigated to make the project environmentally, socially and economically viable throughout its lifespan. Based on the assessment of impacts, the following conclusions can be made;

i). The proposed project is long overdue considering the increasing population and rising demand for water within the project areas

ii). The County Government and the communities living within the project area have fully embraced the project. However, part of the community feels that the proponent needs to increase reliability of supply from existing schemes

iii). The EMSP has allocated the responsibility for costs to offset the negative impacts and enhance the positive impacts of the project on the social and environmental condition of the project area.

10.2 Recommendations

From the synthesis of the findings of the study, the following recommendations have been made;

i). While the quality and reliability of water supply to Maragua town will improve with the project, the project proponent needs to plan for a sewerage system for the town. Improved water supply will increase the generation of waste water; without a functioning sewerage system, this will present a public health challenge to authorities and residents

ii). With low or no connectivity for the communities living to the pipeline, the communities will not have a sense of ownership of the project. Such a scenario will promote illegal connection to the new pipeline. The proponent should ensure good coverage

iii). To enhance social integration, the local communities and all the stakeholders involved will be sensitized on the benefits and risks of the project. The proponent will continuously conduct public participation and stakeholder consultation to better handle issues that emerge during the life of the project

iv). There is need to undertake capacity building for the local communities so as to enable them to competitively exploit opportunities that arise from construction of the project (employment, supplies, etc.) as well as utilization of their resources. Public sensitization on matters of environmental conservation, public health and economic activities will also help improve the living standards of the communities

v). The proponent, construction consultant and the contractor should work together to ensure full implementation of the ESMP for proper enhancement and mitigation of impacts emanating from the project

CHAPTER 11: REFERENCES

1. João , E., Vanclay, F., & Broeder, L. (2011) Emphasising enhancement in all forms of impact assessment: introduction to a special issue, Impact Assessment and Project Appraisal, 29:3, 170-180, DOI: 10.3152/146155111X12959673796326

2. Kenya National Bureau of Statistics, (KNBS). (2015). Statistical Abstract 2015. Nairobi: Government Printer

3. Murang'a County Government. (2013). Murang'a County Integrated Development Plan, 2013-2017

4. Tana Water Services Board (2010). Detailed Design and Supervision Report for Murang'a North and Murang'a South Bulk Water Supply Project

5. Ministry of Water and Irrigation (2008). Feasibility Study for Water Supply and Sanitation in Seven Towns in Kenya: Maragua Town – Assessment of Existing Water Supply and Sanitation Facilities Report

CHAPTER 12: APPENDICES

- Appendix 1: List of Stakeholders Consulted
- Appendix 2: Minutes of Public Consultations
- Appendix 3: Resettlement Action Plan Compensation Matrix

Appendix 1: List of Stakeholders Consulted

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Key Informant Interviews List

S.No.	NAME	ORGANISATION	DESIGNATION	CONTACTS	SIGNATURE
1.	S K NJORA	NATIONAL GOVERNMENT	DCC	0722396670	[signature]
2.	FIDELIS K. KAHUGA	"	ACC 1	0715656355	[signature]
3.	NAHASHON KINGORI	MURANGA COUNTY GOVT	ADMINISTRATIVE OFF. 1.	0728-808775	[signature]
4.	ELIJAH O. KINARO	ECONOMIC PLANNING MURANGA	COUNTY DIRECTOR ECON. PLANNING	0727936301	[signature]
5.	GITHIRSA A.M	CEC ENV	Murang'a Cty	072 ~~272~~ 0721352924	[signature]
6.	JACQUELINE N. MBURUGU	WRMA	ATCM	0724405237	[signature]
7.	James M. K.	NEMA	EO	0725046681	[signature]
8.	JOHN M KIBE	M. OF ENVIRONMENT	S.P.H.O	0711571857	[signature]
9.	Vincent N. Nyanguka	MURANGA COUNTY MARAGUA S/COUNTY	WORKS OFFICER	0723629449	[signature]
10.	KARIUKI MUCHEMI	M/SOUTH WATER OFFICE	SSGW	0720104169	[signature]
11.	BENSON P.N. KIMOTHO	WATER OFFICE	SAT	0722922289	[signature]
12.					

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Key Informant Interviews List

S.No.	NAME	ORGANISATION	DESIGNATION	CONTACTS	SIGNATURE
1.	ELIAS K. GACHAU	M.OH	S.P.H.O	0720307966	
2.	MOSES N. MBARUKU	DCC OFFICE	DCC	0722783372	
3.	Titus K. Chege	M.O.H	C.P.H.O.	0722890375	
4.					
5.					
6.					
7.					
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9.					
10.					
11.					
12.					

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Key Informant Interviews List

S.No.	NAME	ORGANISATION	DESIGNATION	CONTACTS	SIGNATURE
1.	Joseph Karuri	County Government	CD/officer	0724588721	[signature]
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Key Informant Interviews List

Venue: **Date:** **Time:**

S.NO.	NAME	ORGANISATION	DESIGNATION	CONTACTS	SIGNATURE
1.	Ephantus Mama	MUWASCO	T.M	0724291248	
2.	AARON MUCHINA	MUWASCO	G.I.S. TECH.	0728110465	
3.	JASON M. HUHU	CHIEF	KIAWAMBIRU	0721673891	
4.	ESTHER K. RUURI	NDIKWE	TEACHER	0723810932	
5.	MICHAEL N. NDUATI	OOP	SNR ASST CHIEF	0725725801	
6.	DIANA 'W. MWANIKI	OOP	CHIEF	0721563427	
7.	PATRICK KIAWERU	TAUWASCO	WATER OPERATOR	0726729050	
8.					
9.					
10.					

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Appendix 2: Minutes of Public Consultation Meetings

MINUTES OF THE PUBLIC MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF MARAGUA WATER SUPPLY PROJECT BY MURANG'A WATER AND SANITATION COMPANY

Date: 14 March 2017

Time: 11 am

Venue: Ndikwe Pri. School

Attendance

As attached

Agenda:

1. Introduction
2. Question and Answer Session
3. Closing Remarks

Min 1/2017: Introduction

The meeting was called to order at 11 am by the area chief Mr. Jason M.Hiuhu, after which one of the attendants started off with a word of prayer. Mr. Hiuhu then welcomed all the attendants and thanked them for creating time to attend the meeting. He encouraged them to contribute towards the discussions noting that their views and comments will go a long way towards the success of project. He then invited MUWASCO staff Mr. Aaron Muchina (GIS Technician) to introduce the project. Mr. Muchina then welcomed the consulting staff.

Mr. Orwa introduced the consultant's team and thanked them for availing themselves for the meeting despite the hot scotching sun. The consultant then briefed the meeting about the Maragua water supply project by informing them that Murang'a Water and Sanitation Company (MUWASCO) intends to install a new water supply pipeline traversing the area through Ndikwe all the way to proposed storage in Maragua chiefs compound. He further informed the meeting that the pipeline shall be of ten inches (10") diameter and shall be installed parallel to an existing pipeline along the road reserve while some parts encroaching their land hence compensated. The attendants were also informed that according to the laws of Kenya, Legal Notice 150 of the EMCA 1999 (amended 2015) the project is listed as one that should go through an environmental and Social Impact Assessment Study prior to its implementation. He explained that as part of the study, public consultation is key and that the meeting was organized for the community to give their views on the project. He then welcomed the attendants to give their views, comments and suggestions on the project

Plate A 1: Public Baraza at Ndikwe Primary School

Min 2/2017: Question and Answer

Mr. Hiuhu

Q – He wanted clarification on the issue of compensation. The resent title owners should be considered.

A - The consultant assured the members that when the time come, due process will be followed in compensation.

Mr. Kariuki

Q – He urged when excavation has been done, the land should be filled back to prevent accidents.

A – The consultant assured that the issue will be considered while the report is done.

Mr. Mike

Q – He sought to know what will be the importance of the project to the larger community. (community social responsibility).

A – MUWASCO staff told the members that community water point will be put in place for the people who the service pipes will not reach their homes.

Min 3/2017: Closing Remarks

The consultant's team thanked the attendants for their active engagement in the meeting and reminded them that their views and comments will be incorporated in the ESIA report after which a copy will be made available to them for review through the Kenya gazette and daily newspapers. The participants signed the attendance sheet and requested to share all they have learned about the project with other residents. The area chief then closed the meeting by requesting one of the members to pray.

There being no other business the meeting ended at 1.30 pm

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

Venue: Ndiakwe pri. school **Date:** **Time:**

S.NO.	NAME	WARD/LOCATION	CONTACTS	SIGNATURE
1.	JASON M. HIUHU	GIKANDU	0721673591	
2.	FESTUS MWANGI NYOIKE	GIKANDU	0721318848	
3.	Simon Mwangi Mwenia	GIKANDU	0714093491	
4.	THUKU KARANJA	GIKANDU	0703585964	
5.	CHARLES MAINA	GIKANDU	0796507345	
6.	JOHANN CHESE	GIKANDU	0727958553	
7.	PAUL MUTHUTHU	GOKANDU	0718626858	
8.	STANLEY MUIYURO	GIKANDU	0715402131	
9.	James Mbaki nyaitare	GIKANDU	0791848646	
10.	Mike Mwangi	Kakunduri	0723816562	

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

Venue: Date: Time:

S.NO.	NAME	WARD/LOCATION	CONTACTS	SIGNATURE
11	PETER GIKONYO	GIKANDU	0723548527	[signature]
12	HARRISON NDUNGU	GIKANDU	0718804920	[signature]
13	JACOB KIMANI	GIKANDU	0725 753461	[signature]
14	NANCY MUTHONI MUNGA	"		[signature]
15	SIMON KANGETHE M.	—	0722390990	[signature]
16	MONICAH WAMAITHA	"		
17	PETER KAHGETHE	"	0706899577	
18	Vincent Ng'eno	Agr. assistant	0714593483	[signature]
19				
20				

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MINUTES OF THE PUBLIC MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF MARAGUA WATER SUPPLY PROJECT BY MURANG'A WATER AND SANITATION COMPANY

Date: 15 March 2017

Time: 10 AM

Venue: Iregi Nursery

Attendance

As attached

Agenda:

1. Introduction
2. Question and Answer Session
3. Closing Remarks

Min 1/2017: Introduction

The meeting was called to order at 10 AM by the area assistant chief Mr. Michael N. Nduati, after which one of the attendants started off with a word of prayer. Mr. Nduati then welcomed the area chief Mrs. Diana W. Mwaniki who welcomed all the attendants and thanked them for creating time to attend the meeting. She encouraged them to contribute towards the discussions of the proposed project, she noted that their views will help in development of the ESIA report. She then invited MUWASCO staff Mr. Aaron Muchina (GIS Technician) to introduce the described the project. Mr. Muchina then welcomed the consulting staff.

Mr. Orwa introduced the consultant's team and thanked them for availing themselves for the meeting despite the hot scotching sun. The consultant further described the project and then briefed the meeting about the Maragua water supply project by informing them that Murang'a Water and Sanitation Company (MUWASCO) intends to install a new water supply pipeline traversing the area through Ndikwe all the way to proposed storage in Maragua chiefs compound. He further informed the meeting that the main pipeline shall be of ten inches (10" or 250mm) in diameter and shall be installed parallel to an existing pipeline along the road reserve while some parts encroaching their lands hence compensated. The attendants were also informed that according to the laws of Kenya, Legal Notice 150 of the EMCA 1999 (amended 2015) the project is listed as one that should go through an environmental and Social Impact Assessment Study prior to its implementation hence the reason of the meeting. He explained that as part of the study, public consultation is key and that the meeting was organized for the community to give their views on the project. He then welcomed the attendants to give their views, comments and suggestions on the project

Plate A 2: Public Baraza at Iregi Nursery

Min 2/2017: Question and Answer

Mr. Mwangi

Q – He sought to know what will be the importance of the project to the larger community. (community social responsibility).

A – MUWASCO staff told the members that community water point will be put in place for the people who the service pipes will not reach their homes.

Mr. David

Q – He was concerned on whether the proposed project will interfere with their installed distribution infrastructure and whether the proponent will repair such damages

A.- The consultant informed the meeting that due care shall be taken in constructing the new line and that all damages that would occur to the existing distribution network will be taken care off by the proponent

Mr. Thuku

Q – He raised the issue of whether the new pipeline shall distribute water to the area residents.

A.- The consultant informed him that the existing line shall eventually have more water to be supplied to the area residents once a service line has been constructed.

Min 3/2017: Closing Remarks

The consultant's team thanked the attendants for their active engagement in the meeting and reminded them that their views and comments will be incorporated in the ESIA report after which a copy will be made available to them for review through the Kenya gazette and daily newspapers. The participants signed the attendance sheet and requested to share all they have learned about the project with other residents. The area assistant chief then closed the meeting by requesting one of the members to pray.

There being no other business the meeting ended at 1.00 PM

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

Venue: Iregi Nursery **Date:** **Time:**

S.NO.	NAME	WARD/LOCATION	CONTACTS	SIGNATURE
1.	Stephen Njoroge Mwangi	Nginda	0723553727	
2.	Mary Wangui Njuguna	Nginda	0702549008	
3.	Joyce Nderi Ndogu	Nginda	0717684933	
4.	Lucy Wanjiku	Nginda	0722169978	
5.	Rose Kabura	Nginda	0715293172	
6.	Liliam Nderi	Nginda	0715660886	
7.	Ephraina Wanjiku Wawera	Nginda	07296(7207	Wanjiku
8.	Teresah Wanjiku Romano	Nginda	0724656729	Wanjiku
9.	Simon Muchiri	Nginda	0722970743	
10.	Romano Njuke Na Kamuiki	NGINDA	0729387922	

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DIANA W. MWANIKI
CHIEF NGINDA LOC.
SIGN.....

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

Venue: **Date:** **Time:**

S.NO.	NAME	WARD/LOCATION	CONTACTS	SIGNATURE
11	PETER GITARI CHOMBA	NGINDA	0720917624	
12	JANE WAMBUI MWANGI	NGINDA	0715567206	
13	TIMOTHY KAMANDE NDUNGU	NGINDA	0728339593	
14	SAMWEL NJUGUNA KAMERU	NGINDA	0722307536	
15	EMMAH wambui maruti	Nginda	0724732282	
16	Yuma Kariuki	NGINDA	0727155376	
17	HENRY GICHOYA MWANGI	NGINDA	0724499118	
18	PETER KAMAU GITAU	NGINDA	0722114296	
19				
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DIANA W. MWANIKI
CHIEF NGINDA LOC.
SIGN.....

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

Venue: Iregi Nursery **Date:** **Time:**

S.NO.	NAME	WARD/LOCATION	CONTACTS	SIGNATURE
1.	Patrick Kamande	Nganda	0707160749	[signature]
2.	James Irungu	Nginda	071139601	[signature]
3.	Anthony Gitau	Nginda	0721105490	[signature]
4.	Wycliff Fungo	NGANDA	0796508424	[signature]
5.	Benson Njomo	NGINDA	0728471499	[signature]
6.	Joseph Mwangi Gathuchi	NGINDA	0722418978	J.M
7.	Daniel Njuguna Wangui	NGINDA	0726853706	[signature]
8.	William - Gitau	NGINDA	0710625690	[signature]
9.	Charles Mburu	NGINDA	0723487988	[signature]
10.	DAVID WAWERU NJUGUNA	NGINDA	0715660856	[signature]

DIANA W. MWANIKI
CHIEF NGINDA LOC.
SIGN [signature]

LOG Associates

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

Venue: **Date:** **Time:**

S.NO.	NAME	WARD/LOCATION	CONTACTS	SIGNATURE
11	PETER KIMANI NGANGA	NGINDA		PETER
12	ISAAC NGANGA NDEGWA	NGINDA	0715 295 180	
13	FRANCISE KARANJA MUCOKI	NGINDA	0710822106	
14	MICHAEL KARIUKI MWANI	NGINDA	0723703944	
15	JOSEPH NJUGUNA	NGINDA	0725827905	
16	JOHN MURIGE	NGINDA	0700503299	
17	ASTON KIMANI	NGINDA		
18				
19				
20				

LOG Associates

DIANA W. MWANIKI
CHIEF NGINDA LOC.
SIGN.

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

Venue: Iregi Nursery **Date:** **Time:**

S.NO.	NAME	WARD/LOCATION	CONTACTS	SIGNATURE
1.	MICHAEL N. NDUATI	NGINDA	0725725801	
2.	DIANA W. MWANIKI	NGINDA	0727563427	
3.	Oscar M. Ndundu	NGINDA	0723973176	
4.	Modest Gitau	Nginda	0700550262	
5.	PETER MUTHUI	Nginda	0700885686	
6.	SAMUEL MBAU	Nginda	0713841142	
7.	KIRARI MWANGI	NGINDA	0718336731	
8.	Peter muoki K.			
9.	Mariaha			
10.	JULIUS MUNGAI KAMAU	NGINDA	071X904342	

LOG Associates

DIANA W. MWANIKI
CHIEF NGINDA LOC.
SIGN.

MINUTES OF THE PUBLIC MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF MARAGUA WATER SUPPLY PROJECT BY MURANG'A WATER AND SANITATION COMPANY

Date: 16 November 2016

Time: 2:20 PM

Venue: Gakira Market Centre

Attendance

As attached

Agenda:

4. Introduction
5. Question and Answer Session
6. Closing Remarks

Min 1/2016: Introduction

The meeting was called to order at 2:00 PM by the area assistant chief Mr. Patrick Njihi, after which one of the attendants started off with a word of prayer. Mr. Patrick then welcomed all the attendants and thanked them for creating time to attend the meeting. He encouraged them to contribute towards the discussions noting that their views and comments will go a long way towards the success of project. He then invited the consultant's team to address the meeting.

Mr. John then introduced the consultant's team and thanked them for availing themselves for the meeting despite the cold weather. The consultant then briefed the meeting about the Maragua water supply project by informing them that Murang'a Water and Sanitation Company (MUWASCO) intends to install a new water supply pipeline traversing the area from Gakira to Maragua town. The meeting was informed that the project will be funded by World Bank through the Water Services Trust Fund as a result based funding programme He further informed the meeting that the pipeline shall be of ten inches (10") diameter and shall be installed parallel to an existing pipeline along the road reserve. The attendants were also informed that according to the laws of Kenya, Legal Notice 150 of the EMCA 1999 (amended 2015) the project is listed as one that should go through an environmental and Social Impact Assessment Study prior to its implementation. He explained that as part of the study, public consultation is key and that the meeting was organized for the community to give their views on the project. He then welcomed the attendants to give their views, comments and suggestions on the project

Plate A 3: Public Baraza at Gakira Shopping Centre

Min 2/2016: Question and Answer

Mr. Nyaga

Q - He sought to know whether the project will deliver water for domestic as well as for irrigation uses

A - The consultant clarified that Murang'a Water and Sanitation Company is only mandated to provide water for domestic uses

Mr. Macharia

Q - He explained that at the moment, Gakira and Mareira areas were facing water shortage; he wondered why a new pipeline was being constructed to take water to Maragua town

A - The consultant elaborated that the old existing pipeline would be end-capped at Kaharo; this will have the effect of stabilizing water supply and improving reliability for the residents of Gakira and Mareira

Mr. Kinyanjui

Q - He proposed that the project considers putting-up a water kiosk at Gakira Shopping centre for the benefit of the residents who lack private connections. Futher, he proposed that MUWASCO should consider connecting the community for free and subsidizing the levies charged monthly for usage of water

A - The consultant assured the attendees that such a kiosk will be put under consideration by MUWASCO among other CSR projects the company would like to implement in the area

Mr. Kinuthia
Q – He wondered why there were so many and frequent water leaks from the existing 5" pipeline

A – Mr. Macharia replied that MUWASCO has been facing a myriad of challenges due to the old 5" pipeline. He noted that the pipeline had lived beyond its design life and needed replacement. In-particular, the 5" pipes are currently out of production and therefore MUWASCO has been improvising 4" and 6" pipes to repair the old pipeline.

Min 3/2016: Closing Remarks

The consultant's team thanked the attendants for their active engagement in the meeting and reminded them that their views and comments will be incorporated in the ESIA report after which a copy will be made available to them for review. The participants were then asked by the consultant to sign the attendance sheet and requested to share all they have learned about the project with other residents. The area sub-chief then closed the meeting by requesting one of the members to pray

There being no other business the meeting ended at 5:10pm

GAKIRA SHOPPING CENTRE MEETING

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	GAKIRA S. C	Date	16/NOV/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	Samwel Mutitika	Maragua	0729456112	
2.	Gerald Mwangi	Maragua	0723693636	
3.	Frances Karanja	Maragua	0712348790	
4.	Peter K. Mwangi	Maragua	0714702313	
5.	Mechack Magita	Maragua	0725125274	
6.	Dominic Nyaga	Maragua		
7.	Samwel Mwangi Chege	Gakira	0716 368565	
8.	Peter Kimani Kinuthia	Gakira	0728433083	PETER KIMANI
9.	J. Mwangi Godfrey	Gakira	0719128823	
10.	Stephane Kimani Maguta	Maragua	0729213147	
11.	Macharia Gachanga	Maragua		
12.	BONFACE MAINA	Maragua		

LOG Associates

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	GAKIRA SC	GAKIRA SHOPPING CENTRE	Date	16/NOV/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	PAUL MAINA M.	MARIRA	0725 443 693 0759 379 444	
2.	FRANCIS M MACHARIA	MARIRA	0716 [illegible]	
3.	Stephen Kinyanjui	Mariira	0721 762 250	
4.				
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MINUTES OF THE PUBLIC MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF MARAGUA WATER SUPPLY PROJECT BY MURANG'A WATER AND SANITATION COMPANY

Date: 17 November 2016

Time: 2:00 PM

Venue: Itaaga Market Centre

Attendance

As attached

Agenda:

1. Introduction
2. Question and Answer Session
3. Closing Remarks

Min 1/2016: Introduction

The meeting was called to order at 2:00 PM by the area assistant chief Mr. Patrick Njihi, after which one of the attendants started off with a word of prayer. Mr. Patrick then welcomed all the attendants to the meeting and thanked them for creating time to attend the meeting. He further asked them to contribute freely towards the discussions noting that their views and comments will go a long way towards the success of project. He then invited the consultant's team to address the meeting

Mr. John then introduced the consultant's team and thanked them for availing themselves for the meeting despite the cold weather. The consultant then briefed the meeting on the Maragua water supply project by informing them that Murang'a Water and Sanitation Company (MUWASCO) intends to install a new water supply pipeline traversing the area from Gakira to Maragua town. The meeting was informed that the project will be funded by World Bank through the Water Services Trust Fund as a result based funding programme He further informed the meeting that the pipeline shall be of ten inches (10") diameter and shall be installed parallel to an existing pipeline along the road reserve. The attendants were also informed that according to the laws of Kenya, Legal Notice 150 of the EMCA 1999 (amended 2015) the project is listed as one that should go through an environmental and Social Impact Assessment Study prior to its implementation. He explained that as part of the study, public consultation is key and that the meeting was organized for the community to give their views on the project. He then welcomed the attendants to give their views, comments and suggestions on the project

Plate A 4: Public Baraza at Itaaga Shopping Centre

Min 2/2016: Question and Answer

Mr. Kanywiri

Q – He raised the issue of whether the new pipeline shall distribute water to the area residents. He added that the locality did not have a single water kiosk and asked whether the client can provide a water kiosk as part of the project

A.- The consultant informed him that the existing line shall eventually have more water to be supplied to the area residents once it is end-capped at Kaharo. The suggested water Kiosk can be part of the impact mitigation measures to be adopted by the client

Mr. Charles

Q – He wondered if the new water project can provide them with water for irrigation

A - The consultant noted that the proposed project will be for the purpose of providing portable water for human consumption rather than water for irrigation. He added that providing water for irrigation will be beyond the company's mandate and that the water will have been treated by chemicals which may not be suitable for their crops

Mr. Fausto

Q – He wanted to know whether the proposed project shall pass through private land and if that's is the case, when they will be officially notified

A.- The consultant informed the meeting that the proposed pipeline shall pass through the existing public road reserve and thus will not affect their private land

Mr. Francis

Q – He noted that his land and homestead are located on the opposite side of the road from where the existing and new pipeline shall pass. He wanted to know how he can be connected to the water supply in such a situation

A.- Mr. Francis was informed that there were culverts along the existing road and that in such a case, the water distribution pipes can go through the culvert. Where this is not feasible, appropriate applications will be made to the concerned road authority to have the pipeline pass across the existing roads

Mr. Samuel

Q – He wished to know whether the trenching will be done using machines of local labour. He suggested that the local residents should be considered for manual works to enable them earn an income from the project

A.- The consultant reiterated that the trenching will involve both manual and mechanical methods and that where manual method is used, the area residents will be given priority in trenching where the pipeline passes through their boundaries

Mr. David

Q – He was concerned on whether the proposed project will interfere with their installed distribution infrastructure and whether the proponent will repair such damages

A.- The consultant informed the meeting that due care shall be taken in constructing the new line and that all damages that would occur to the existing distribution network will be taken care off by the proponent

Mr. Charles

Q – He wished to know of the proposed project was under the Northern collector tunnel project

A.- Mr. Charles was informed that the project is totally different from the northern collector tunnel project

Mr. Mwangi

Q – She suggested that MUWASCO should consider putting in place appropriate community social responsibility initiatives as part of the project

A.- The consultant replied by assuring her that community social responsibilities have been part or MUWASCO and that there shall be recommendations for the same to emanate from the project. He added that the community should think and propose possible CSR initiatives before the project is launched

Min 3/2016: Closing Remarks

The consultant's team thanked the attendants for coming to the meeting and reminded them that their views and comments will be incorporated in the ESIA report after which a copy will be made available to them for review. The participants were then asked by the consultant to sign the attendance sheet and requested to share all they have learned about the project with other community members who may not have attended the meeting. Mr. Njiri then closed the meeting by requesting one of the members to pray

There being no other business the meeting ended at 4:20 pm

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	ITAARA	Date	17/NOV/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	MARTIN NJOROGE MURIGI	KARURUMO	0733269377	M
2.	HENERY N.G.G. M.	KARURUMO	0702563235	
3.	JAMES MUNGAI NJUGUNA	KARURUMO		
4.	JOHN NDEGWA	KARURUMO	0726045952	
5.	DAVID NGANGA	KARURUMO	0708571554	
6.	SUSAN MWANGI	KARURUMO	0724860182	
7.	SYLUS MAINA	KARURUMO	0716602299	
8.	STEPHEN NJOROGE	KARURUMO	0717645239	
9.	AGNES WANGUI	KARURUMO	0729991530	
10.	MARY MUTHONI K.	KARURUMO	0701191264	
11.	CHARLES MWANGI MW.	KARURUMO	0722224946	
12.	~~PATRICK~~ FRANCIS NDWATI	KARURUMO	0725721823	

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	ITAAGA	Date	17/12/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	PATRICK N. NJITHI	KARURUMO	0726112028	
2.	George Nguji	KARURUMO	0702409250	
3.	FRANCIS MUNGAI	KARURUMO	0728918487	
4.	LAWRENCE M. KARIUKI	KARURUMO	0714897143	
5.	IRUNGU WA KAMAU	KARURUMO		
6.	MUNGAI MWANGI	KARURUMO	0725829427	
7.	COSMUS WAWERU	KARURUMO	0729150114	
8.	PETER NJUGUNA	KARURUMO	0703547710	
9.	JOHN GICHIMU	KARURUMO		
10.	DANIEL IRUNGU	KARURUMO	0725164469	
11.	LUISE MWANGI CH.	KARURUMO	0712997631	
12.	BENARD NDIRANGU	KARURUMO	0711780679	

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	ITAAGA	Date	17/12/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	SAMUEL IRUNGU	KARURUMO	0724381171 0711381171	
2.	NDUNGU NDWATI	KARURUMO		Ndungu
3.	JAMES KINANI	KARURUMO	0715239170	
4.	PETER IRUNGU	KARURUMO	0713680677	
5.	CHARLES MBUGUA	KARURUMO	0725785702 0727805025	
6.	KINUTHIA MWANGI	KARURUMO	0725396748	
7.	ELIUS CHOMBA	KARURUMO	0713010141	
8.	SAMUEL NDWATI	KARURUMO	0711493409	
9.	STEPHEN MACHARIA N.	KARURUMO	0727086960	Kiganga
10.	JOHN MWANGI CHOMBA	KARURUMO	0720812988	
11.	ELIDGER GATHUITA	KARURUMO	0725285164	
12.	TERESIA GATHONI IR.	KARURUMO	0716135739	T'gathoni

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	ITAAGA	Date	17/NOV/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	JAMES KANYUIRI	KARURUMO	0723429230	
2.	~~JAM~~ JOSEPH KAMANAE WAWERU	KARURUMO		
3.	CHARLES KUNG'U MWANGI	KARURUMO	0711813244	
4.	JOSEPH M. KAMUNYU	KARURUMO	0722584439	
5.	PATRICK NDUNGU M.	KARURUMO	0704679522	
6.	FRANCIS NDUNGU M.	KARURUMO	—	—
7.	SAMUEL KIBE MWANGI	KARURUMO	0715568687	
8.	DAVID MWANGI	KARURUMO	0713450433	
9.	JOSPHINE MUTHONI	KARURUMO	07	
10.	FAUSTO MWANGI	KARURUMO	0716838231	
11.	NDWATI MWANGI	KARURUMO	0710776217	
12.	PETER KANGEERE	KARURUMO	0714912512	

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	ITHAGA	Date	17/NOV/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	HELLEN WANGARI	KARURUMO	0729242837	
2.	DORCUS MUMBI	KARURUMO	0724386261 0726261	D.M.
3.	FROLENCE WANJEC	KARURUMO	0711968951	
4.	CHRISTOPHER IRUNGU	KARURUMO	0700114131	
5.	FRANCIS IRUNGU	KARURUMO	07	
6.	JOSEPH MBURU KINGU	KARURUMO	0714910336	
7.	SIMON MWANGI	KARURUMO	0718509870	
8.	PETER NJOROGE	KARURUMO	0701097559	
9.	MONICAH NJOKI	KARURUMO		MN.
10.	SAMUEL IRUNGU	KARURUMO	0729945148	
11.	PAUL IRUNGU	KARURUMO	0721766427	
12.	JAMES NGUGI NJOROGE	KARURUMO	0707417324	

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	ITARA	Date	

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	PETER MWANGI	KARURUMO	0701859288	
2.	JOSEPH KAMANDE	KARURUMO	0726289304	
3.	SAUERINA MSERI	KARURUMA		
4.	SIMEON Mwaura	KARURUMO	0725353739	
5.				
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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	ITHAGA	Date	17/NOV/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	MBUGWA MUTANGI	KARURUMO	———	
2.	MBURU MACHARIA	KARURUMO	0724456338	
3.	WAIRIMU BEJEMEN	KARURUMO	———	—
4.	GRACE MUTHONI	KARURUMO	0718684444	Muthoni
5.	STEPHEN MUNGAI	KARURUMO	07 ———	
6.	JULIUS MUTURI NJOROGE	KARURUMO	———	
7.	MURIGI MWANGI MUTURI	KARURUMO	0729695223	
8.	MARY WANJIRU	KARURUMO	07	
9.	FESTUS MUCHOKI	KARURUMO	0716491573 0702027575	
10.	GLADYCE WAMBUI	KARURUMO	07	
11.	JOSEPH KAMAU	KARURUMO	0701810420	
12.	JOSEPH MWANGI K.	KARURUMO	0716721699	
	PETER KARIUKI NJUHUNYA	KARURUMO	0702089353	

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MINUTES OF THE PUBLIC MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF MARAGUA WATER SUPPLY PROJECT BY MURANG'A WATER AND SANITATION COMPANY

Date: 18 November 2016

Time: 2:30 PM

Venue: Kaharo Market Centre

Attendance

As attached

Agenda:

1. Introduction
2. Question and Answer Session
3. Closing Remarks

Min 1/2016: Introduction

The meeting was called to order at 2:30 PM by the area Assistant chief Mr. Boniface Mwangi, after which one of the attendants started off with a word of prayer. Mr. Mwangi then welcomed all the attendants and thanked them for creating time to attend the meeting. He further asked them to contribute freely towards the discussions noting that their views and comments will go a long way towards the success of project. He then invited the consultant's team to address the meeting

Mr. Mogoi then introduced the consultant's team and thanked them for availing themselves for the meeting despite the cold weather. The consultant then briefed the meeting about the Maragua water supply project by informing them that Murang'a Water and Sanitation Company (MUWASCO) intends to install a new water supply pipeline traversing the area from Gakira to Maragua town. The meeting was informed that the project will be funded by World Bank through the Water Services Trust Fund as a result based funding programme He further informed the meeting that the pipeline shall be of ten inches (10") diameter and shall be installed parallel to an existing pipeline along the road reserve. The attendants were also informed that according to the laws of Kenya, Legal Notice 150 of the EMCA 1999 (amended 2015) the project is listed as one that should go through an environmental and Social Impact Assessment Study prior to its implementation. He explained that as part of the study, public consultation is key and that is the reason as to why the meeting was organized for the community to give their views on the project. He then welcomed the attendants to give their views, comments and suggestions on the project

Plate A 5: Public Baraza at Kaharo Shopping Centre

Min 2/2016: Question and Answer

Mr. Ngugi

Q – He asked whether the new pipeline shall use the same reserve as the existing water supply and distribution pipelines and whether there is an outlined plan for mitigation of incidences where existing pipelines are destroyed

A.- The consultant said that the existing road reserve measure 30 feet with an allowance of 20 feet for carriage way and drainage infrastructure. The remaining 10 feet is reserved for utilities including water supply works and thus there is sufficient allowance for installation of the project pipeline, Moreover, care will be taken not to disrupt the existing water infrastructure and that the water company and the contractor shall repair any destroyed pipes

Mr. Muchoki

Q – He wished to know whether the project is rehabilitating the existing line and if not, where the new pipeline shall acquire its water from considering the area does not get adequate flow

A - The proposed project is independent and it shall run parallel to the existing line. Moreover, the pipeline shall be tapping from an existing mainline with sufficient water after which the existing line shall be end tapped at Kaharo to improve the flow within the existing line, This way, the area residents will receive improved water flows as the new line supplies Maragua town

Mr. Kamau

Q – He asked whether the new project will be designed with a better quality to reduce water leakage from bursts was is common with the existing line. He noted that such water bursts have previously led to environmental impacts such as soil erosion and destruction of crops in their farms

A – The consultant noted that the new pipeline is undergoing technical design which shall ensure that the pipe design is adequate enough to withstand high pressures. He was also informed that the existing pipeline is of 5" diameter pipe whose manufacture has since seized thus the challenge in prompt repairs

Mr. Joseph

Q – He was curious on whether there will be social impacts of the project such as displacement of people. He cited that some government institutions such as Kaharo Primary may have constructed their fence close to the road reserve and wondered what would happen in such a case. Moreover, he intended to know about the project duration

A – Mr Joseph was informed that the proposed pipeline route would go through the road reserve and thus no people will be displaced. Moreover, there were no observable encroachments that would necessitate resettlement within the project area. The meeting was also told that the a anticipated kick off date is February 2017 and that the contract duration will depend on the Contractor's work plan

Mrs Mbau

A – She wanted to know whether the community will benefit economically in terms of work contracts during the construction phase and operation. In addition, she intended to know how the community will benefit from the new pipeline

Q – The consultant informed the meeting that both mechanical and manual trenching would be used in trenching works. The community within the project area will be employed to dig and backfilling the pipeline trench. Moreover, those with businesses along the project route would benefit by selling consumables to the site workers after being receiving their wages. The consultant also noted that increased water supply in the areas will spur the development of other social facilities and businesses

The consultant further noted that the area will receive increased water supply since the existing line will store water at the Kahiro Primary water tank

Mrs Jane

Q -- She wanted to know whether the water to be supplied could also be used for agricultural benefit. She also wanted to know whether the project proponent could extend to them trainings on water harvesting techniques for the purpose of obtaining water for irrigation

A – The consultant note that the projects shall supply treated portable water which will not be ideal for agriculture. Moreover, he reiterated that MUWASCO is a water service provider charged with providing safe drinking water to the residents and thus may not be able to provide irrigation water.

On her second question, the consultant noted that the idea was worth noting as a possible Community Social Responsibility activity that can be up taken by MUWASCO. The attendants were also encouraged to think of other possible community social responsibility activities over time that can be submitted directly to MUWASCO

Mr Mwiruri

Q – The resident was concerned that the high pressure within the pipes has been the course of water bursts in the area posing health challenges to the residents. Moreover, he was concerned on how the negative impact of traffic disruption during the construction phase shall be addressed. He concluded by proposing that the water company should install several break pressure facilities along the new water supply infrastructure

A – The consultant agreed that it is important for water supply systems to consider the adequate operating pressures so as to reduce the risks associated with pipeline bursts. The attendants were reminded that the project shall have adequate technical designs that will address this problem

Mrs. Mwiruri

Q – She lamented that women in the project area have to walk long trips to the rivers to fetch water in areas that are not served by piped water thus wasting a lot of productive time and sought to know whether the proposed project will provide enough water to be distributed to the residents

A – The consultant agreed with the attendant that fetching water from far places wastes a lot of time and degrades the quality of life for the affected residents. However, the increased supply within the area will also increase the opportunity of most residents to be connected to the water network. This would then lead to better productivity of the residents

Min 3/2016: Closing Remarks

The consultant's team thanked the attendants for their active engagement in the meeting and reminded them that their views and comments will be incorporated in the ESIA report after which

a copy will be made available to them for review. The participants were then asked by the consultant to sign the attendance sheet and requested to share all they have learned about the project with other residents. The area sub-chief then closed the meeting by requesting one of the members to pray

There being no other business the meeting ended at 5:10pm

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	KAHARO SHOPPING CENTRE	Date	18/NOV/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	George Maina Kariuki	Karurumo	0710511201	[signature]
2.	ONESMUS K. MAINA	KIRIMAINI	0720343197	[signature]
3.	Obadiah Kariuki	Karurumo	0728533226	[signature]
4.	J. M. Mirinri	Karurumo	0711118617	[signature]
5.	Esther Wambui	Karurumo		
6.	Richard Maina	Karurumo	0724968901	[signature]
7.	David Mirinri	"	0711306188	[signature]
8.	Samuel Karanja.	"	0719130311	Skaranja.
9.	Simon Karanja	"	0729029388	[signature]
10.	WILSON WANANGA	MURURI-GAKUI	0723805391	[signature]
11.	Chomba Gichema	Kirimaini		[signature]
12.	George Gikuru	KIRIMAINI		[signature]

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	KAHARO SHOPPING CENTER	Date	18/NOV/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	Mwangi Kinuthia	Karurumo	0717613870	Mkinuthia
2.	Samuel mwangi	—	0721874516	[signature]
3.	John Leck Ngigi	"		[signature]
4.	Hezekiah Ngugi	"	0726331594	
5.	Joseph Ngigi	"		
6.	Pale must	"		
7.	GRACE MBAU	LOWER KARURUMO	0723942522	Gradembi
8.	JANE MUTHONI	LOWER KARURUMO	—	Jane.
9.	KAMAU MUCHOKI	KARURUMO	—	Kamau Muchoki
10.	BENARD WARUGWA	KARURUMO	—	Benard
11.	BONIFACE MWANGI	KARURUMO	0711692171	[signature]
12.				

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	KAHARO SHOPPING CENTRE	Date	18/11/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	MARY NJERI	KARURUMO	0724770853	
2.	DAVID MUIRURI	"	—	
3.	MOSES KAMAU	MUTHARAITO	0724452661	
4.	Lucy Wangui	KARURUMO	—	Lucy
5.	MARY WAIRIMŪ	KIRUNDU	0718637251	
6.	Tabitha Wangiri	Kirundu	0713304101	
7.	Amos Muiruri M	Kirundu	0726752998	
8.	Julius Njoki	KAIGIO	0711796910	
9.	Joseph Kamande	KAIGIO		
10.	Erastus Gitau	Kirimaini	0727396070	
11.	Joseph Ndungii	Karurumo	0719802892	
12.	PHYLIS NJERI	Kirimaini	0725773705	

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	KAHARO CENTRE	Date	18/11/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	[illegible] WANJIKU MUGURO	Kaewira	0725046501	[signature]
2.	PETERSON KIMANI	KARURUMO	0724013303	[signature]
3.	Julius Muriuki	Kiongwei	0723025446	[signature]
4.	G. W. MUKIGI	Kirunda	0791324818	[signature]
5.	Joseph Macharia	Kariba		[signature]
6.	JAMES Giathi	KIRIMAINI	0714615071	[signature]
7.	ELIJAH MWATURA	KIRIMAINI	0725523008	[signature]
8.	Charles Maingi	Kiamb[illegible]	0723350[illegible]	[signature]
9.	Mwangi Ngunjiri	" "	0723497545	Mwangi
10.	Gabriel Mbu[illegible]	Nginda	0790761639	[signature]
11.	JOSEPH MBUNGU	KARURUMO		[signature]
12.	Silvester Kamande	KARURUMO	0717018998	[signature]

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	KAHARO MARKET CENTRE	Date	18/NOV/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	FRANCIS N. MWANGI	KARURUMO	0715314163	[signature]
2.	Ambigael Mjori	Karurumo	—	Ambigael
3.	MARY LIVINGSTONE	KARURUMO	0727516915	[signature]
4.	FREDRICK MBUM	KARURUMO	0716660582	[signature]
5.	Francis Chege N	KARURUMO	0711685137	[signature]
6.	ALICE WANJIRU	KARURUMO	—	
7.	JANE WANJIRA	KARURUMO	—	
8.	JOHN KAMAU GITAU	KARURUMO	0724885863	[signature]
9.	Julius MUIRURI	KARURUMO		[signature]
10.	ERASTUS GITAU	KARURUMO	0716892055	[signature]
11.	margaret wangui	KARURUMO	0791324999	[signature]
12.	Micah Ngugi Mbugua	KIEMBU	0728-496921	[signature]

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MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	Kahoro Centre	Date	18/11/2016

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	SEBASTIAN MUTHEE	KARURUMO	0708182121	
2.	MILKAH NJOKI	KARURUMO	0716651641	milkah
3.	RUTH WANJIRU	KARURUMO	0726029785	Ruth
4.	Jemima Kavutha	Kaigio	0710734552	
5.	Jane Wanjiku	Kaigio	0724526826	
6.	JAMES NJANE	KARURUMO	0715742805	
7.	GRACE WANGARI	KARURUMO	—	—
8.	MARGARET MUNTA	KARURUMO	—	—
9.	JOSEPH MURIGI	KARURUMO	0724542582	
10.	Kamande J. B	KARURUMO	0733902	
11.				
12.				

MINUTES OF THE PUBLIC MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF MARAGUA WATER SUPPLY PROJECT BY MURANG'A WATER AND SANITATION COMPANY

Date: 22 November 2016

Time: 2:45 PM

Venue: Maragua Market

Attendance

As attached

Agenda:

1. Introduction
2. Question and Answer Session
3. Closing Remarks

Min 1/2016: Introduction

The meeting was called to order by Mr. Stephen at 2:45 PM with a word of prayer from one of the attendants. The consultant then welcomed all the attendants and thanked them for creating time to attend the meeting. He further asked them to introduce themselves briefly and contribute freely towards the discussions noting that their views and comments will go a long way towards the success of project. After all the attendants had introduced themselves, the consultant introduced his team

The consultant then briefed the meeting about the Maragua water supply project by informing them that Murang'a Water and Sanitation Company (MUWASCO) intends to install a new water supply pipeline traversing the area from Gakira to Maragua town. The meeting was informed that the project will be funded by World Bank through the Water Services Trust Fund as a result based funding programme He further informed the meeting that the pipeline shall be of ten inches (10") diameter and shall be installed parallel to an existing pipeline along the road reserve. The attendants were also informed that according to the laws of Kenya, Legal Notice 150 of the EMCA 1999 (amended 2015) the project is listed as one that should go through an environmental and Social Impact Assessment Study prior to its implementation. He explained that as part of the study, public consultation is key and that the meeting was organized for the community to give their views on the project. He then welcomed the attendants to give their views, comments and suggestions on the project

Plate A 6: Public Baraza at Maragua Town

Min 2/2016: Question and Answer

Mr. Gichiri.

Q – He noted that there were other existing pipelines intended to serve the township such as the Ichagaki - Maragua line, Kaharati – Kegumo line and the Nginda storage tank. He was concerned as to whether the new line will have enough water considering the existing lines do not have adequate supplies. He suggested that rehabilitation of the existing pipelines and provision of sewerage facility would be more beneficial

A – The consultant indicated that the infrastructure stated is considered dilapidated and has gone beyond the design life thus the inability to provide adequate water to the Maragua town. Moreover, the proposed pipeline intends to supply enough water from the bulk main line and envisaged to have adequate supply. Additionally, the old dilapidated lines are costly to maintain and thus the new line will significantly reduce the maintenance costs. However, where possible, the existing infrastructure will be used as complimentary sources

Mr. James.

Q – He informed the meeting that having been a resident of the area for the past 46 years, he has continued to experience water shortage. He questioned why the residents cannot be given water directly from Maragua river. Secondly, he wanted to know if the existing Irate water works can be used to supply the water to them and whether they can be given a water supply company under the name Maragua water supply company

A – The consultant informed the meeting that the water abstraction in Kenya is regulated by Water Resources Management Authority (WMA) and they have provided specific permits to the various WSPs for abstraction. Any further abstraction from Maragua River would require consent from authority after a proper feasibility study has been conducted.

On his second question, Mr. James was made aware that the Irate water works are under the community and has not been handed over to MUWASCO thus the inability to abstract water from this source. Moreover, the township is under MUWASCOs jurisdiction and thus creating another water company would be in contravention of the statutory provisions. However, the residents can apply for private water provider permits

Mr. Wariuki

Q – He wished to know if the water abstracted from boreholes is being used by MUWASCO. He noted there were 8 community boreholes whose water was salty and sought to know why MUWASCO would not use clean non-salty water from the rivers

A – Mr Wairuki was informed that the said boreholes were handed over from community projects and are not used as frequently. The water received in Maragua town mainly comes from the treatment works

Mr. John

Q – He noted that the intended storage tank is small and the town is growing. He emphasized on the need to also expand the storage tank

A – The consultant noted that improvement of water supply is an ongoing process that will start with the pipeline and such initiatives shall come inline thereafter

Mrs Elizabeth

Q – She lamented that the water office in Maragua has to enhance their relationship with customers for the success of the project. For instance, she was received an exaggerated bill for water that she received for two days in a month. She raised the issue with the office and the matter has not been sorted but rather, the water was disconnected. Such incidences would drive the residents to use shallow wells and thus not benefit from the project

A – The client's representative indicated that that issue had been noted and requested Mrs. Elizabeth to contact him after the meeting in order to get the customer details for action. He emphasized that the Company is committed to resolving all customer complaints within the shortest time possible and encouraged the community to work closely with them to achieve this

Mr Wamaitha

Q – He wanted to know if there were other project alternatives considered before reaching the Gakira – Maragua route. He proposed that the Irate pipeline should have been considered instead of the Gakira – Maragua Line. He noted that this would reduce the social impact on the pipeline as the people on the upper sides of the pipeline would also demand to be given the same water. He concluded by saying that the Irate expansion should be of priority in the bid to enhance Maragua water supply

A – The meeting was made aware that the feasibility study identified the Gakira – Maragua line as the best suites. Moreover, the Irate line expansion has been proposed through a proposal and once funds are available, it shall be implemented. Moreover, the Irate water works are shared between MUWASCO and MUWASCO hence consultations have to be done between the two Companies.

On the issue of the Social aspect of the residents along the upper part of the pipeline, the meeting was made aware that the existing pipeline shall be end-capped at Kaharo to ensure sufficient supply to those residents

Mr. Julius

Q – He proposed that the new pipeline should be mainly constructed of galvanized cast iron (GCI) to reduce puncturing and illegal abstraction along the pipe route. He indicated that regardless of the presumed high cost, this would be a lasting solution to the residents

A – The consultant informed that there is a technical design study underway that would propose the most appropriate pipeline along the different sections

Mr. Joseph

Q – He commented that the community welcomes the project and proposed that it be fast tracked to solve Maragua's residents' water problem. The sewerage project should also follow the project as the increase water supply would have a negative impact on the area as a result of non-existent sewerage infrastructure

A – The consultant indicated that the suggestion has been noted and that appropriate recommendations will be made to the Client

Min 3/2016: Closing Remarks

The consultant's team thanked the attendants for their active engagement in the meeting and reminded them that their views and comments will be incorporated in the ESIA report after which a copy will be made available to them for review. The participants were then asked by the consultant to sign the attendance sheet and requested to share all they have learned about the project with other residents. The area scheme Liaison officer then requested the attendants to remain behind shortly and present their complaints that need follow up at the office.

There being no other business the public consultation meeting ended at 6:05 pm

MURANG'A WATER AND SANITATION COMPANY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF MARAGUA WATER SUPPLY PROJECT

Public Participation List

VENUE	Maragua Town Market Centre	Date	

S.No.	NAME	WARD/ LOCATION	CONTACTS	SIGNATURE
1.	John Ngiciri	Nyinda	0722352418	[signature]
2.	James Kamande	Nginda	0710902351	[signature]
3.	James Mairi	Nginda	0724208166	[signature]
4.	Elizabeth Wanjiru	Nginda	0725962448	[signature]
5.	Samuel Mutua	Ichagaki	0722690519	[signature]
6.	John W. Njoroge	Ichagaki	0722891877	[signature]
7.	Joyce Mnjoki Mwangi	Ichagaki	0717755227	Joyce [signature]
8.	David Wamatu Kariuki	Nginda	0721216688 0735034077	[signature]
9.	Julius Mwangi	Nginda	0728175560	[signature]
10.	Joseph Kibugi	Nginda	0712121720	[signature]
11.	Julius Mbiuki Muchiri	Mbinda	0726404293	[signature]
12.				

LOG Associates

Appendix 3: Resettlement Action Plan Compensation Matrix

Table A 1: Resettlement Action Plan Compensation Matrix for LR No/ LOC11/ MUCHUNGUCHA REGISTRATION SECTION

S/No	LR No/ LOC11	Title Holders Name	Type of Land ownership	ID No.	Cell Phone No.	Area under wayleave (m^2)	Cost of Land (KSh)	Crop yield for two seasons in kg	Compensation for crops (KSh)	15% Contingencies	Total Compensation
1	1770	NELSON IRUNGU JOHN	PRIVATE	DECEASED	0729899134	248.2	74,460.00	368	25,759.23	15,032.88	115,252.12
2	2190	JOHN PETERSON NGA'NGA'	PRIVATE	0994984	0729941419	240.5	72,150.00	357	24,960.09	14,566.51	111,676.61
3	2191	CHARLES GIKONYO MWANGI	PRIVATE	8043083	0720233423	225.4	67,620.00	334	23,392.95	13,651.94	104,664.89
4	2192	SAMWEL NJOROGE MWANGI	PRIVATE	22406731	0729941419	190.6	57,180.00	283	19,781.26	11,544.19	88,505.45
5	637	IRUNGU MWANGI	PRIVATE	1664004	0710921421	474.6	142,380.00	704	49,255.97	28,745.39	220,381.36
6	279	KINUTHIA WAMWEA	PRIVATE	Not available	0712542859	732	219,600.00	1085	75,970.01	44,335.50	339,905.51
7	267	MIRUGO MUIRU	PRIVATE	DECEASED	0729326207	504	151,200.00	747	52,307.22	30,526.08	234,033.30
8	1132	RUIBE MUHIU	PRIVATE	Not available	0722643832	176.7	53,010.00	262	18,338.66	10,702.30	82,050.96
9	1131	DAMARIS KABURA MWANGI	PRIVATE	Not available	0712542859	163.8	49,140.00	243	16,999.85	9,920.98	76,060.82
10	643	LUCY MWIHAKI MAINA	PRIVATE	2244225	0714336691	437.5	131,250.00	649	45,405.57	26,498.34	203,153.91
11	584	NJOROGE KIHAMBATI	PRIVATE	620351	0714967036	254.7	76,410.00	378	26,433.83	15,426.57	118,270.40
12	2015	BEN WANDII	PRIVATE	DECEASED	Not available	963	288,900.00	1428	99,944.15	58,326.62	447,170.78
13	2528	JOSEPH CHIOKA KAIREGI	PRIVATE	Not available	0722617452	1131	339,300.00	1677	117,379.89	68,501.98	525,181.88
14	2529	JOSEPH CHIOKA KAIREGI	PRIVATE	Not available	0722617452	266.5	79,950.00	395	27,658.48	16,141.27	123,749.75
15	1450	CHELINA WANJIKU GIKURU	PRIVATE	6695640	0720408497	551	165,300.00	817	57,185.08	33,372.76	255,857.84
16	1451	NAOMI WAITHERA MWANGI	PRIVATE	0619469	0700503623	320.2	96,060.00	475	33,231.69	19,393.75	148,685.44
17	609	MICHAEL MUHUTHU MWANGI	PRIVATE	3464778	0708335023	667	200,100.00	989	69,224.04	40,398.61	309,722.65
18	610	MWANGI NGARA	PRIVATE	0815225	0710660274	315	94,500.00	467	32,692.01	19,078.80	146,270.82
19	608	JOSEPH MWANGI NJOROGE	PRIVATE	3576287	0723558680	420.3	126,090.00	623	43,620.49	25,456.57	195,167.06
20	2390	NAOMI WAITHERA MWANGI	PRIVATE	0619469	0700503623	217.3	65,190.00	322	22,552.30	13,161.34	100,903.64
21	2391	CHARLES GATAMA EVANS	PRIVATE	7183974	0716347202	159.1	47,730.00	236	16,512.06	9,636.31	73,878.37
22	2392	STEPHEN RUHIU MWANGI	PRIVATE	10489692	0700503623	65.2	19,560.00	97	6,766.73	3,949.01	30,275.74
23	2393	PETER IRUNGU MWANGI	PRIVATE	0619305	0720564041	224	67,200.00	332	23,247.65	13,567.15	104,014.80
24	2394	JOHN KARANJA MUNGAI	PRIVATE	3584784	0726890003	54.6	16,380.00	81	5,666.62	3,306.99	25,353.61
25	2395	BERETTA MUTHONI KAMAU	PRIVATE	11370607	0722248144	110.3	33,090.00	164	11,447.39	6,680.61	51,218.00
26	605	WAIREGI MURUIGA	PRIVATE	1361453	0721555040	177.9	53,370.00	264	18,463.20	10,774.98	82,608.18
27	1701	PETER MUCHOKI NJOROGE	PRIVATE	Not available	0727857104	72.5	21,750.00	107	7,524.35	4,391.15	33,665.51
28	322	WAMAITHA GIKURU	PRIVATE	Not available	0726664825	102.3	30,690.00	152	10,617.12	6,196.07	47,503.19
29	Quarry/ 345	KAMWARO MUNYAKA	PRIVATE	062718/63	0726489554	655	196,500.00			29,475.00	225,975.00
30	237	GEOFRAY GACHUGU GACHATHI	PRIVATE	3357683	0720223886	564	169,200.00	836	58,534.27	34,160.14	261,894.41
31	1552	HERMAN MAHIRA	PRIVATE	Not available	0715766692	378	113,400.00	560	39,230.42	22,894.56	175,524.98
32	1551	HERMAN MAHIRA	PRIVATE	Not available	0715766692	397.5	119,250.00	589	41,254.21	24,075.63	184,579.84
33	1482	MUGETHA MUGO	PRIVATE	3356075	0724976429	413.5	124,050.00	613	42,914.75	25,044.71	192,009.47
							3,561,960.00		1,164,271.56	708,934.73	5,435,166.29