ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

COMPREHENSIVE PROJECT REPORT FOR

THE PROPOSED CONSTRUCTION OF THE SEDIMENTATION BASIN,

INTAKE WING WALLS, MAINLINE (4.3KM) AND LATERAL LINES OF 0.3 KM FOR MARAGIMA/TAGWA IRRIGATION WATER PROJECT LOCATED WITHIN THEGU RIVER WARD, KIENI-EAST SUB-COUNTY, NYERI COUNTY

Approximate GPS Coordinates (Decimal Degrees)

Latitude: 0.33877°S to 0.29988°S Longitude: 37.07679° E

Proponent	**Prepared By**
Maragima/Tagwa Water Project P.O Box 67-10102, Kiganjo Nyeri	Dickson Kimathi, NEMA EIA/EA Lead Expert Reg. No 6235 P.O. Box 2269 - 60200, Meru

Updated 2026

PROJECT FACT SHEET

Proponent	Maragima/Tagwa Water Project	
Project Name	Proposed sedimentation basin, excavation and laying of mainline and lateral lines of 4.3 km and 0.3 km respectively, intake wing wall expansion and catchment conservation for the Maragima/Tagwa Water Project.	
Task	Environment and Social Impact Assessment Study	
Location	Administrative: Maragima Sub-Location, Maragima Tagwa Location, Thegu River Ward, Kieni-East Sub-County, Nyeri County Geographical: Latitude: 0.33877°S to 0.29988°S Longitude: 37.07679° E	
Project Objective	The proposed Maragima / Tagwa Water Project aims to increase the area under irrigation to 125 acres and extend the water distribution network by 4.6 km, to serve approximately 500 farmers. This intervention will enhance sustainable agricultural productivity and climate resilience through improved irrigation infrastructure and water management.	
Project Components	Key project components include: - Excavation of 4.6km pipeline - Construction of a sedimentation basin 11.2m x 4.6m x 2.8m - Laying of mainline and lateral pipelines - Construction of chambers -washout, air valve and off takes - 6m road crossings -1 murram road, there exist a culvert 300mm thus the pipeline will pass through the culvert. No excavation will be done crossing the road. - Pressure testing for all lines - Implementation of control measures such as booster stations to maintain adequate pressure across varying elevations - Catchment conservation measures	
Address of the Proponent	Maragima/Tagwa Water Project P.O Box 67-10102, Kiganjo	
Contact person	Simon Kinyua (Chairperson)	0721931613
	Stephen Macharia (Secretary)	0723523203
Funding Agency	World Bank (NAVCDP): Main funder. County Government of Nyeri: Provides counterpart funding Maragima / Tagwa Water Project: Contribute labour, materials, and maintenance support.	

Total project cost	Twenty-one million, nine hundred twenty-six thousand, eight hundred thirty-three Kenya Shillings (KES 21,926,833)
Target Direct Beneficiaries	Maragima / Tagwa Water Project goal to increase direct beneficiaries to 500. The project currently serves 413 registered land parcel owners.
Date	November 2025

CERTIFICATION

This Environmental and Social Impact Assessment (ESIA) Comprehensive Project Report (CPR) for the Maragima / Tagwa Water Project has been prepared as required in accordance with the Environmental Management and Coordination Act (EMCA), Cap 387, the Environmental Impact Assessment and Audit Regulations, 2003 (LN 101/2003; amended by LN 32/2019), and the relevant provisions of the World Bank Environmental and Social Framework (ESF, 2018).

The project is classified as a Medium Risk Project under EMCA and as Category B (Moderate Risk) under the World Bank ESF.

We, the undersigned, hereby certify that, to the best of our knowledge, the information contained in this report is true, accurate, and complete.

Lead ESIA/ EA expert:
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Signature:  **Date:** 27/5/2025

Proponent Representative
Name: Simon Kinyua
Designation: Chairperson

For and on behalf of;
Maragima/Tagwa Water Project

Signature and Stamp:  **Date**: 28/5/2025

DETAILED SUMMARY OF THE PROPONENT

The proponent of the proposed irrigation sub-project is the Maragima/Tagwa Water Project. The project has been in existence for over 20 years having been established and sustained through the collective efforts of 413 registered members. Over the years, the initiative successfully implemented key infrastructure including the construction of two water intakes, a 225 m³ masonry distribution tank, and a project office. These achievements made possible through member contributions and support from development partners. As the only water project serving the Maragima Sub-Location, it has been a vital source of domestic and community water supply.

Maragima/Tagwa Water Project obtained registration as Maragima Tagwa Water Users under Section 10 of the Kenya's Societies Act, Cap. 108, in January 2025. The project holds a water permit that allows abstraction of 230m^3 per day from Rukurwa Stream, that was issued by the Water Resources Authority on 29th November 2021. However, the newly registered association lacks sufficient documented organizational capacity and will require structured capacity building to align with NAVCDP's operational requirements. This includes the establishment of essential governance structures such as key committees and sub-committees, including a Grievance Management Committee, to enhance transparency, accountability, and inclusivity during project implementation.

EIA/EA EXPERTS' FACT SHEET

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Designation	ESIA Study Team Leader

DISCLAIMER

This Environmental and Social Impact Assessment (ESIA) Report has been prepared by an Environmental and Impact Assessment and Audit (EIA/EA) Lead Expert on behalf of Maragima/Tagwa Water project for the purposes of assessing the potential environmental and social impacts of the project. The interpretations, and conclusions expressed herein are based on the information available at the time of preparation, including site visits, stakeholder consultations, publicly available data, and materials provided by the client and relevant authorities.

This report is intended solely for use by the proponent, relevant regulatory bodies, and other stakeholders involved in the project's review and decision-making processes. It may not be relied upon or used by any third party without the prior written consent of EIA/EA Lead Expert.

EXECUTIVE SUMMARY

Introduction

This ESIA Comprehensive Project Report (CPR) has been prepared for the proposed Maragima / Tagwa Water Project, located in Nyeri County, Kieni East Sub-County, Thegu River Ward, Maragima Tagwa Location, Maragima Sub-Location. The project is being implemented under the Farmer-Led Irrigation Development (FLID) subcomponent of of the National Agricultural Value Chain Development Project (NAVCDP), executed by the Ministry of Agriculture and Livestock Development (MoALD), with joint financing from the World Bank and the Government of Kenya.

The ESIA study has been undertaken in accordance with the requirements of the Environmental Management and Coordination Act (EMCA), Cap 387, the Environmental Management and Co-ordination (Environmental Impact Assessment and Audit) Regulations, 2003 (LN 101/2003), as amended by the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019 (LN 32/2019), and the World Bank Environmental and Social Framework (ESF, 2018), including the relevant Environmental and Social Standards (ESSs). The assessment identifies, predicts, and evaluates potential environmental and social risks and impacts associated with the project during its planning, construction, operation, and decommissioning phases, and proposes appropriate mitigation measures.

Project Description

The proposed Maragima/Tagwa Water Project seeks to expand the irrigation command area from about 75 acres to 125 acres and increase the number of direct beneficiary farmers accessing irrigation water from 280 to about 500. The current irrigation (from the tank) is accessed by 280 members who are part of 424 members, however the design developed is to be used by 500 members this means new connections will accommodate 220 members whilst improving water access for the 280.

The project holds a water abstraction permit allowing abstraction of 230m^3 water from the Rukurwa Stream, a tributary of the River Sagana within the Upper Tana River Catchment. The Rukurwa Stream intake point is located approximately 14km from Chaka Market, with access via the via Chaka-State Lodge tarmac road at Tagwa (about 6km from Chaka). The intake area lies

within the approximate coordinates - Latitude: 0.33877°S to 0.29988°S and Longitude: 37.07679°E.

The project proposal includes the following key components: construction of a sedimentation basin; reinforced concrete intake weir; gravity-fed conveyance pipelines to the distribution network; integration with existing community distribution systems (Maragima A - D, PCEA, and Thegu lines); catchment conservation measures such as bamboo planting, gabion construction, and bank stabilization. The total estimated cost of the project is Twenty-one million, nine hundred twenty-six thousand, eight hundred thirty-three Kenya Shillings (KES 21,926,833).

Implementation of this project will strengthen food security, improve household incomes, and support sustainable rural development.

Policy, Legal and Institutional Framework

Maragima/Tagwa Water Project is guided by national laws on environmental protection, water management, irrigation, occupational safety, and pesticide use, including EMCA (Cap 387), Water Act (2016), Irrigation Act (2019), Occupational Safety and Health Act (2007), and Pest Control Products Act. It also complies with relevant World Bank ESSs covering environmental and social risk management, labour, community health and safety, land acquisition, biodiversity, cultural heritage, and stakeholder engagement. Environmental and Social Safeguards are implemented through the appointed Maragima/Tagwa Water Project's Management Committee, supported by the County and National Project Coordination Units (CPCU/NPCU) and Environmental and Social Safeguards Officers, ensuring compliance and accountability throughout project implementation.

Baseline Environmental and Social Conditions

The project area lies within the Upper Tana River Catchment, characterized by moderate slopes, volcanic soils, and a bimodal rainfall pattern averaging mm 900 -1,100 mm per annum. Vegetation is mainly secondary growth interspersed with crops, hedgerows, and scattered trees. The local economy is predominantly agro-based, focusing on Irish potatoes, cabbages, beans, onions, and fodder.

The ESIA determined no endangered species, critical habitats, or cultural heritage sites within the project footprint. Key environmental sensitivities include the Rukurwa Stream riparian corridor and farmland soil fertility.

Socially, smallholder farming dominates livelihoods, with women and youth significantly involved in crop production. No Indigenous Peoples (IPs) or cultural heritage sites were identified within the project footprint.

Stakeholder Engagement and Public Consultation

Stakeholder engagement and public consultations were held during project screening, field assessment, and validation stages through community meetings, focus group discussions, administration of questionnaires samples, and Key Informant Interviews (KIIs) with County Government Officers and relevant agencies.

A public meeting held on 27th May 2025 at Maragima/Tagwa Water Project Site (attended by 63 participants:43 men and 20 women) representing the Upper Tagwa, Lower Tagwa, Thegu and Maragima zones. Fifteen (15) attendees (9 men and 6 women) comprised representatives of the Maragima/Tagwa Water Project's Management Committee. Key concerns raised during the public consultation meeting included equitable water sharing, employment opportunities for locals, mitigation of construction disturbances (dust, noise), protection of water quality, and clear grievance procedures.

A structured questionnaire survey was administered on 21st May 2025, to 5 members of the local community sampled within the project area. The survey provided quantitative and qualitative insights into community awareness, anticipated benefits and risks, and recommendations for project implementation. Overall, respondents demonstrated a high level of familiarity with the project and expressed strong support for its expected social and economic benefits, while also identifying specific concerns requiring mitigation.

All stakeholders consulted as part of the ESIA study generally expressed strong support for the project due to expected benefits such as improved irrigation reliability, food security, and income generation. All feedback was incorporated into project design and the Environmental and Social Management and Monitoring Plan (ESMMP).

Potential Environmental and Social Impacts and Mitigation Measures

The project is expected to generate several positive environmental and socioeconomic outcomes, including improved irrigation reliability, enhanced agricultural productivity, strengthened food and income security, creation of local employment opportunities, and improved community collaboration and cohesion through collective management of water resources.

The assessment also identified a range of potential adverse impacts which are localized, temporary, and readily mitigable, consistent with the project's Moderate Risk (Category B) classification. These include:

- Vegetation disturbance and localized habitat disruption during site preparation;
- Soil erosion and sedimentation risks, particularly along excavation and pipeline routes;
- Dust and noise generation from construction activities and equipment;
- Temporary traffic and access disruptions affecting community mobility;
- Solid-waste generation, including construction debris and domestic waste;
- Occupational and community health and safety risks, including accidents, noise, and exposure to hazardous conditions;
- Potential water-use conflicts downstream, especially during low-flow periods.

Proposed mitigation measures outlined in Chapter 8 (ESMMP) include:

- Controlled vegetation clearing and progressive site restoration;
- Soil stabilization using gabions, compaction, and erosion-control measures;
- Enforcement of dust suppression and noise-control practices;
- Proper waste segregation, collection, and disposal aligned with EMCA Waste Regulations of 2006;
- Implementation of Occupational Health and Safety (OHS) protocols, including provision and use of Personal Protective Equipment (PPE);

- Deployment of a Traffic Management Plan (TMP) during construction;
- Monitoring of equitable water allocation and strengthening the capacity of the Water Users to manage water distribution sustainably.

These measures, if effectively implemented and monitored throughout the project lifecycle, will ensure that the project achieves its intended benefits while minimizing adverse environmental and social impacts.

Environmental and Social management and Monitoring Plan

The Maragima/Tagwa Water Project's ESMMP, which is a key output of the ESIA, sets out the actions, monitoring, and responsibilities needed to manage environmental and social risks during construction, operation, and decommissioning. It includes two key sub-plans:

- Grievance Redress Mechanism (GRM) to handle complaints from workers and the community, and
- Integrated Pest Management Plan (IPMP) to ensure safe and sustainable pest-control practices in irrigated agriculture.

The estimated costs are KES 625,000 for phase-specific mitigation and monitoring (KES 290,000 for construction phase, KES 235,000 for operation phase, and KES 100,000 for decommissioning phase), KES 70,000 for the GRM, and KES 1,150,000 for the IPMP, totalling KES 1,845,000.

The ESMMP is designed to ensure environmental compliance, promote community participation, and support the long-term sustainability of the water supply system.

Conclusion and Recommendations

This ESIA study concludes that the proposed Maragima / Tagwa Irrigation Water Project is environmentally acceptable and socially viable, provided that the mitigation measures in the ESMMP are fully implemented. The expected benefits, improved irrigation reliability, increased agricultural productivity, and strengthened climate resilience, outweigh the moderate, site-specific risks identified.

Key recommendations include:

- Enforce full implementation of the ESMMP and subplans (GRM, and IPMP) throughout the project cycle;
- Strengthen capacity of the Registered Water Users and the Project Management Committee on safeguards and sustainable irrigation management;
- Install master meters for effective monitoring of water abstraction and equitable distribution;
- Conduct annual Environmental and Social Audits during operation to verify compliance and guide continuous improvement.

Overall, the project is recommended for approval by the National Environment Management Authority (NEMA) and the World Bank, subject to adherence to the prescribed mitigation and monitoring measures.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFFA	Agriculture and Food Authority
AIDS	Acquired Immune Deficiency Syndrome
AIPCA	African Independent Pentecostal Church of Africa
BOQ	Bill of Quantities
CEC	County Environment Committee
C-ESMP	Contractor's ESMP
CGC	Community Grievance Committee
CIDP	County Integrated Development Plan
CPCU	County Project Coordination Unit
CoC	Code of Conduct
CPR	Comprehensive Project Report
DN	Diameter Nominal
dB(A)	A-weighted decibels
DOSHS	Directorate of Occupational Safety and Health Services
EHS	Environmental Health and Safety
EMCA	Environmental Management and Coordination Act
ERP	Emergency Response Plan
ESF	Environmental and Social Framework
EA	Environmental Audit
EIA/EA	Environmental Impact Assessment and Audit
ESIA	Environmental and Social Impact Assessment

ESMF	Environmental and Social Management Framework
ESMP	Environment and Social Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
ESS	Environmental and Social Standards
FGDs	Focused Group Discussions
FLID	Farmer-Led Irrigation Development
GI	Galvanized Iron
GBV	Gender Based Violence
GHG	Greenhouse Gas
GMC	Grievance Management Committee
GPS	Global Positioning System
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
HDPE	High-Density Polyethylene
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HR	Human Resources
IP	Indigenous Peoples
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan
ISFM	Integrated Soil Fertility Management

ISWM	Integrated Solid Waste Management
IWUA	Irrigation Water User Association
JSA	Job Safety Analyses
KFS	Kenya Forest Service
KII	Key Informant Interviews
KMD	Kenya Meteorological Department
KNBS	Kenya National Bureau of Statistics
KPLC	Kenya Power and Lighting Company
LCB	Land Control Board
LMP	Labour Management Procedures
LN	Legal Notice
M&E	Monitoring and Evaluation
MEA	Minimum Environmental Flow
MOALD	Ministry of Agriculture and Livestock Development
MoUs	Memoranda of Understanding
NAVCDP	National Agricultural Value Chain Development Project
NCA	National Construction Authority
NCCAP	National Climate Change Action Plan
NEMA	National Environment Management Authority
NGAO	National Government Administration Officers
NLC	National Land Commission

NIA	National Irrigation Authority
NMK	National Museums of Kenya
NPCU	National Project Coordination Unit
OHS	Occupational Health and Safety
O&M	Operation and Maintenance
OSSP	Operational Safety and Security Plan
PAD	Project Appraisal Document
PAP	Project-Affected Persons
PCEA	Presbyterian Church of East Africa
PEFA	Pentecostal Evangelistic Fellowship of Africa
PIM	Project Implementation Manual
PMC	Project Management Committee
PN	Pressure Nominal
PPE	Personal Protective Equipment
PRV	Pressure Relief Valve
PVC	Polyvinyl Chloride
SAIC	Social Accountability and Integrity Committee
SDGs	Sustainable Development Goals
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SH	Sexual Harassment

SHG	Self-Help Group
SME	Small and Medium Enterprises
STIs	Sexually Transmitted Infections
TMP	Traffic Management Plan
TTD	Temporary Total Disablement
ToR	Terms of Reference
VCT	Voluntary Counselling and Testing
WMP	Waste Management Plan
WRA	Water Resources Authority

DEFINATION OF TERMS

Alternative	The word "alternative" refers to a choice or option between two or more possibilities.
Impacts	The effects of the proposed project to environmental and social welfare of the target community.
Expert	The professional who assesses and manages the potential environmental and social impacts of projects, particularly in sectors like infrastructure, energy, agriculture, mining, and development finance.
Proponent	The project owner who leads in the implementation of the proposed project.
Screening	A preliminary process used to identify potential environmental and social impacts of a proposed project or action.
Scoping	The process of identifying and defining the potential environmental impacts of a proposed project or activity.
Water Resource	any lake, pond, swamp, marsh, stream, watercourse, estuary, aquifer, artesian basin or other body of flowing or standing water

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1 CHAPTER ONE: INTRODUCTION

1.1 Background Information of Subproject

Maragima / Tagwa Water Project was registered as a Self-Help Group (SHG) in 1984, with the objective of providing water for irrigation to its registered members. Due to an increase in water demand caused by both increase in membership and irrigation, Maragima/Tagwa Water Project constructed an intake at Rukurwa Stream to achieve the water demand. However, the water project is yet to achieve the goal of increasing water through the intake at Rukurwa Stream, due to an incomplete water supply network.

To address his challenge, the County Government of Nyeri in collaboration with the community around the Maragima area, the sub-project was identified for funding under the NAVCDP - FLID (Sub-component 2.1). This intervention aims to enhance irrigation efficiency and climate resilience through community-driven investments.

The proposed sub-project entails extension of the water supply network to serve members of the Maragima/Tagwa Water Project. This will increase access to irrigation water and expand irrigated area to approximately 125 acres. Main crops targeted to be grown under irrigation include irish potatoes, beans, cabbages, onions and fodder.

The improved water availability is expected to enhance agricultural productivity, promote year-round cultivation, strengthen food security, and contribute to increased household income within Maragima area.

1.2 Objectives of the Project

The proposed Maragima / Tagwa Water Project aims to enhance sustainable agricultural productivity and climate resilience through improved irrigation infrastructure and water management.

Specific objectives are to:

- To promote climate-resilient agriculture by reducing dependence on rain-fed farming and ensuring year-round access to irrigation water, thereby improving crop yields, food security, and resilience to drought.

- Enhance market-oriented agricultural production by facilitating the cultivation of high-value horticultural and cash crops under irrigated conditions, contributing to increased household income, employment, and livelihood diversification.
- Optimize and operationalize existing water infrastructure investments made by the County Government of Nyeri to ensure functionality, efficiency, and tangible benefits for the intended beneficiaries (registered water users) and the wider community.

1.3 Justification of the Project

Due to an increase in water demand caused by both increase in membership and irrigation, Maragima/Tagwa Water Project constructed an intake at Rukurwa Stream to achieve the water demand. Nevertheless, the water project is yet to achieve the goal of increasing water through the intake at Rukurwa Stream, due to an incomplete Water Supply network. It's for this reason that the proposed Maragima/Tagwa Water Project intends to construct a sedimentation basin and mainline and lateral pipelines to the beneficiaries to supply water for irrigation purposes.

1.4 Rationale for Undertaking the ESIA

The proposed project was subjected to environmental and social screening to determine the appropriate level of assessment, in accordance with the EMCA (Cap 387) and the EIA Regulations (LN 101/2003, as amended by LN 32/2019). Screening results indicated that the proposed project falls under the category of 'water resources and infrastructure, including water abstraction works, and water supply and distribution infrastructures', classified as medium-risk under Legal Notice No. 31, Legislative Supplement No. 16, published in the Kenya Gazette Supplement No. 62 of 30th April 2019.

Under the World Bank ESF, the project is categorized as Low to Moderate Risk. Eight (8) ESSs are triggered by the project namely:

- ESS1: Assessment and Management of Environmental and Social Risks and Impacts
- ESS2: Labour and Working Conditions
- ESS3: Resource Efficiency and Pollution Prevention
- ESS4: Community Health and Safety
- ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

- ESS8: Cultural Heritage
- ESS10: Stakeholder Engagement and Information Disclosure

Based on this categorization, a Comprehensive Project Report (CPR) was deemed sufficient to meet both national regulatory requirements and World Bank ESF due diligence. The CPR provides an appropriate level of analysis to ensure that potential environmental and social risks are identified, mitigated, and monitored throughout the project cycle.

1.5 Objectives of ESIA Study

The objectives of the ESIA include the following:

- To establish baseline socio-economic and environmental conditions of the project area prior to implementation.
- Identify and analyze the potential positive and negative environmental and social risks and impacts associated with the proposed project throughout its life cycle (planning, construction, operations and decommissioning phases).
- Engage stakeholders and Project-Affected Persons (PAPs) in a transparent and inclusive manner in line with national legislation and World bank ESS10.
- Recommend feasible mitigation measures and enhancement measures for identified impacts, and develop an ESMMP, consistent with ESS1 requirements.
- Ensure compliance with EMCA (Cap 387) and World Bank ESS requirements to facilitate informed decision-making and sustainable project delivery.

1.6 Term of Reference

The Terms of Reference (ToR) for this ESIA define the scope and key activities of the assessment including to;

- Review applicable national legislation and institutional frameworks and the World Bank ESF;
- Collect and analyze environmental, social and economic baseline information of the project area, relevant to the proposed development;
- Undertake stakeholder and community consultations to capture local knowledge, opinions and concerns;

- Identify potential environmental and social impacts (positive and negative) expected during the planning, construction, operational and decommissioning phases of the project;
- Develop site-specific mitigation measures and enhancement measures and estimating related costs;
- Prepare a comprehensive ESMMP; and
- Address cross-cutting issues such as gender inclusion, occupational and community health and safety, and management of labour and grievance mechanisms.

The TOR guided the assessment approach, ensuring compliance with national legislation and World Bank ESF requirements.

1.7 ESIA Methodology

The Consultant first undertook environmental and social screening and scoping to avoid unnecessary data. The data collection was carried out through Focused Group Discussions (FGDs) during public participation meeting, observations and photography, site visits, desktop environmental studies and scientific tests where necessary in the manner and criteria specified in Part V (section 31-41) of the EIA Regulations (LN 101/2003, as amended by LN 32/2019).

Steps followed in the assessment are outlined below:

- *Environmental Screening:* Screening was conducted on the 8th January 2025 using the NAVCDP Environmental and Social Management Framework (ESMF) checklist aligned to the World Bank risk classification. The screening process revealed that potential environmental and social issues are site-specific and manageable, necessitating preparation of CPR. A copy of the filled screening checklist is provided under *Annex I*.
- *Scoping:* Scoping involved definition of key environmental and social issues, grouped into physical, ecological and social, and economic themes. Stakeholder inputs from local leaders and community representatives were incorporated to ensure that priority concerns, including water access, equity, safety, and potential land-use conflicts were captured. This helped to narrow down on the most critical issues during assessment.
- **Desktop Study:** Desktop study included documents review on the nature of the proposed activities, project documents including designs, policy and legislative framework

as well as the environmental setting of the area among others. Key documents reviewed included the following: NAVCDP reference documents including the Project Implementation Manual (PIM) and Project Appraisal Document (PAD), the subproject's documents including designs, relevant National and County legislation and the World Bank ESF.

- **Field Assessment:** Site visit was undertaken on 8th January 2025 to assess environmental sensitivity, existing land use, nearby community infrastructure, and accessibility, as well as potential environmental and social receptors in line with ESS1 and ESS8.
- **Stakeholder Engagement:** A public meeting was held on the 27th May 2025 at the Maragima/Tagwa Water Project site, attended by 63 participants:43 men and 20 women) representing the Upper Tagwa, Lower Tagwa, Thegu and Maragima zones. Out of these, 15 attendees (9 men and 6 women) were representatives of the Maragima / Tagwa Water Project's Management Committee. This participatory approach ensured that both environmental and social dimensions were adequately addressed and informed the preparation of the ESMMP.

1.8 ESIA Team Composition

The ESIA team comprised of a NEMA-registered Environmental Impact Assessment and Audit (EIA/EA) Lead Expert, an agriculturalist, marketing expert, sociologist and structural engineer who played key roles during the assessment and reporting.

1.9 Project Implementing Agency

The proposed Maragima / Tagwa Water project is a subproject initiated under NAVCDP, implemented under the County Government of Nyeri - Department of Agriculture, Livestock and Aquaculture. The Proponent (Maragima/Tagwa Water Project) shall be responsible for local implementation of environmental and social safeguards, supported by the County Project Coordination Unit (CPCU) and the County Environmental and Social Safeguards (ESS) Officers, for oversight and ultimate accountability.

1.10 Structure of the ESIA Report

The report is organized into nine chapters as outlined below:

- Chapter 1: Introduction
- Chapter 2: Project Description
- Chapter 3: Policy, Legal and Institutional Frameworks
- Chapter 4: Environment and Social Baseline
- Chapter 5: Analysis of Project Alternatives
- Chapter 6: Public Participation and Stakeholder Consultation
- Chapter 7: Analysis of Potential Alternatives
- Chapter 8: Environmental and Social Management and Monitoring Plan
- Chapter 9: Conclusions and Recommendations

This is followed by the References and Annexes that provide supporting technical information, data, and documentation relevant to the ESIA.

2 CHAPTER TWO: PROJECT DESCRIPTION

2.1 Project Location

The proposed Maragima Tagwa is located in Nyeri County, Kieni-East Sub-County, Thegu River Ward, Maragima Tagwa Location, Maragima Sub-Location. The intake point at the Rukurwa Stream intake is approximately 14km from Chaka Market and is adjacent to Kabaru Forest fence at Mbogoini, South of Mbiriri Shopping Center. The project site can be accessed from Chaka-State Lodge tarmac road at Tagwa approximately 6km from Chaka. The roads connecting the project area are graveled and all weather.

A satellite image showing the proposed project location is presented in *Figure 2-1* below.

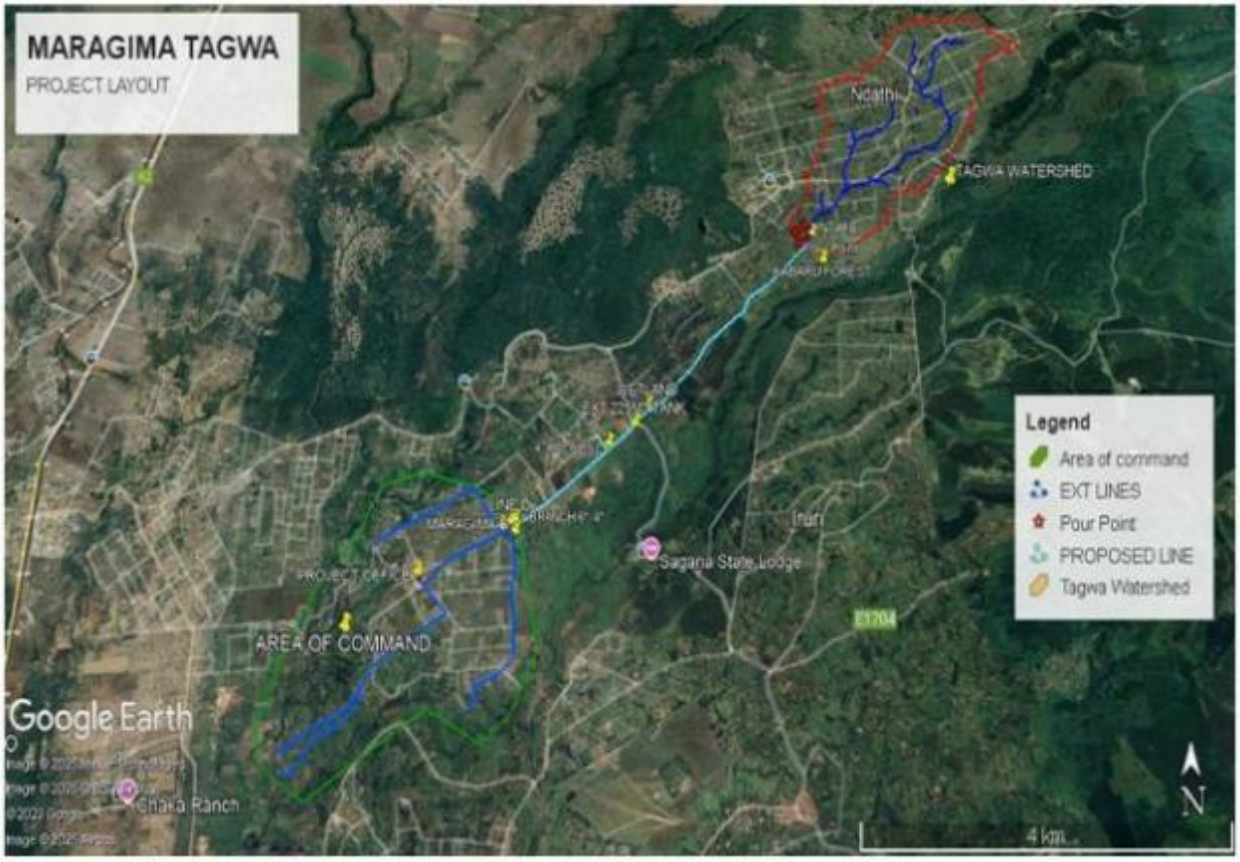

Figure 2-1: Location Map of the Proposed Maragima/Tagwa Water Project (Source: Google Earth)

2.2 Land Tenure and Legal Access Requirements

Maragima / Tagwa Water Project traverses multiple land tenure types, and each requiring legal arrangements to enable installation and operation of project infrastructure. Land access is is secured through statutory licenses for public land and voluntary wayleave agreements (serving as permanent easements) for private and institutional land. Public land licenses allow use without transferring ownership, while wayleave agreements grant the project proponent the right to install and maintain pipelines while landowners retain full ownership. This approach aligns with Kenyan land laws, World Bank ESS5, good engineering practice, and cost-efficiency.

Details of the project's legal interest in each land category are summarized in *Table 2-1*.

Table 2-1: Summary of Project Land Tenure and Legal Access Strategy by Infrastructure Segment

Infrastructure Segment	**Land Category**	**Tenure Status / Legal Right Secured**	**Supporting Documentation**
Source and Headworks (Intake, Reservoir, Initial Pipeline)	Public Land - Forest Reserve	Usufruct Right: Renewable permission issued by the Kenya Forest Service (KFS) allowing use and occupation of a defined forest sections for intake works and reservoir, without transfer of ownership.	KFS Permit No. PER.090 **(**issued in 2021) submitted for renewal and positively recommended (*Annexes 4A and 4B*).
Pipeline Along Road Reserves	Public Land - County Roads	Wayleave Permit: Authority to lay pipes, trench, cross, and maintain the pipeline within county road reserves.	County Government of Nyeri Approval (*Annex 5*): issued on 21 October 2025.
Distribution Network (Farm-level pipelines)	Private Land - Settlement and Agricultural Parcels	Wayleave Agreements (Easements): Permanent non-possessory rights	To be executed by the proponent with 413 Private Landowners (*Annex 14*) representing the project's

		allowing entry for installation, inspection, operation, and repair of buried pipelines without affecting land ownership.	direct household beneficiaries.
Pipeline on Institutional Land	Institutional Land – Schools, Places of Worship, Community Facilities	Institutional Wayleave Agreements: Non-possessory access rights negotiated with institutions for pipeline routing within their boundaries.	To be executed by the proponent with governing bodies of the 11 Institutions: 2 schools, 7 places of worship, and 2 cattle dips (*Annex 14)*

2.2.1 Wayleave Implementation and Monitoring

The proponent (Maragima / Tagwa Waer Project) through its' appointed Project Management Committee (PMC) is responsible for executing wayleave agreements with private landowners and institutional authorities to allow installation, operation, and maintenance of buried pipelines without affecting land ownership. These agreements provide voluntary, legally binding access while ensuring landowners retain full rights to their land.

To ensure full compliance, the proponent will track execution of all pending agreements, including 413 private landowners and 11 institutions, and maintain proper documentation. NAVCDP, as facilitator and grantor, will provide guidance and oversight and receive monthly progress updates from the proponent. This arrangement ensures that all legal access requirements are met prior to construction and aligns with Kenyan land laws and World Bank ESS5, while avoiding any need for compulsory land acquisition.

2.2.2 Condition for Construction on private and Institutional Land

Construction of project components on private and institutional land will only commence once all wayleave agreements (serving as permanent non-possessory easements) have been executed. These agreements are legally required to grant the proponent access for installation, operation, and maintenance of pipelines while ensuring landowners retain full ownership. The proponent is responsible for executing and documenting the agreements, and NAVCDP, as facilitator, will

receive monthly progress updates to verify full compliance. This approach ensures adherence to Kenyan land laws and World Bank ESS5, and prevents any risk of unauthorized access or disputes.

2.3 Project Design

2.3.1 Scheme Water Demand Summary

The Water Resources Authority (WRA) has issued a water abstraction permit authorizing a maximum withdrawal of 230 m³/day from the Rukurwa Stream. The proposed irrigation scheme covers a total command area of 125 acres (50.5 ha), operating on a maximum irrigation interval of 9 days. In the short term, and to remain compliant with the existing abstraction ceiling, the scheme will adopt a four-block rotational irrigation schedule, supplemented by the promotion of on-farm storage structures to enhance reliability during peak demand periods.

Notwithstanding these interim operational measures, the calculated net irrigation water requirement for the full command area is approximately 1,289.568 m³/day, which substantially exceeds the authorized abstraction volume. This gap indicates that while rotational irrigation allows for initial compliance, it is not sufficient to meet the full agronomic water demand required for optimal productivity and system performance.

To ensure long-term viability of the scheme and alignment with both agronomic requirements and regulatory thresholds, it is recommended that the proponent initiates a formal variation or reapplication for an increased water abstraction permit with WRA. Without such an adjustment, the project will remain constrained by the existing permit, limiting its capacity to achieve the intended irrigation benefits and potentially undermining farmer expectations and investment outcomes.

2.3.2 Technical Design

The design aims to deliver a sustainable, reliable, and efficient gravity -fed water supply system based on detailed field assessments, hydraulic modelling and local environmental conditions. The criteria guiding design include water availability, demand projections, system efficiency, long-term sustainability, and community needs.

2.3.2.1 Sedimentation Basin

A sedimentation basin will be constructed upstream of the intake to reduce silt and sediment load entering the system. This will protect the intake and downstream pipelines, ensure efficient operation and reduce maintenance needs.

2.3.2.2 Water Abstraction

The intake comprises a reinforced concrete monolithic weir (8 m wide, 2.05 m high) with a 1.25 m spillway and fitted offtake structures. WRA has authorized abstraction of 230 m^3/day, and the intake has been designed to comply with this limit pending the outcome of the recommended permit variation process.

2.3.2.3 Water Conveyance System and Distribution

The proposed design draws water from Rukurwa Stream (elevation 1911m above sea level) to the existing distribution network (1811m). The design is based on both irrigation demand and assessed water availability. The main pipeline distributes water through gravity to existing distribution lines: PCEA Line, Thegu line, Maragima A, B, C and D.

Pressure differences between the new and old systems will be managed using a Pressure Relief Valve (PRV), and EPANET modelling confirms that the integration will not cause damage to the existing pipelines.

Prior to connecting the new pipeline to the existing PCEA and Thegu Line water systems, the proponent must obtain and document formal written consent from PCEA and Thegu Line's registered water users. This is necessary to ensure that integration of the new system does not reduce, limit, or interfere with existing water rights and routine water access. Compliance with this requirement is essential for meeting World Bank ESS5 on avoiding involuntary restrictions on resource use .

The consent from the two institutions have been sought and annex prior to the implementation of the project.

2.3.2.4 Off-Take Main Line

The off-take main consists of the appropriately sized pipes fitted with valves and other to ensure operational control, pressure management and access for maintenance (*Table 2*-2).

Table 2-2: Main pipeline

S/No.	Pipe Specification	Unit of Measurement	Quantity/Length
1.	125mm PN 8 HDPE	m	1750
2.	125mm PN 10 HDPE	m	1275
3.	110mm PN 10 HDPE	m	1675
4.	110mm PN 12.5 HDPE	m	181
5.	150mm diameter GI Pipes	No.	10
6.	110mm Threaded GI	m	2
7.	90mm Threaded GI	m	2
8.	DN 90 mm HDPE PN 10	m	100
9.	DN 110 mm HDPE PN 10	m	550

The line invert has been designed to a maximum of 1.1m and to a minimum of 0.5m for protection. The specific and accurate points for placement of line protection, air valves and washout have been marked. The appropriate fittings like reducers are also well set out.

2.3.2.5 225m^3 Masonry Distribution Tank

The project incorporates the use of the existing 225m^3 distribution tank, located at an elevation of 1827m above sea level, as the primary reservoir for water storage and distribution into the expanded scheme. While the new works focus on the intake and mainline, the design integrates this tank to serve the expanded irrigation area.

Considering the tank is located approximately 5m from the Sagana-Chaka highway, specific safety protocols and structural mitigation are required to manage risk of vehicular impact and unauthorized access, as detailed in the Chapter 8 (ESMMP).

As this is a shared community asset, the project must secure formal consent from the original user community before commissioning the expanded system. This ensures that existing users' rights and access are protected in line with World Bank ESS5.

2.3.2.6 Conservation Activities

The project incorporates specific conservation activities designed to ensure long-term environmental sustainability of the Rukurwa Stream and intake area. These measures include bamboo planting along both sides of the stream for 1km upstream and 0.5km downstream from the intake, complemented by construction of gabions (2m x 1m x 1m) and hardcore stone fillings to stabilize the river banks and minimize erosion,

In compliance with ESS 2, all labour required for conservation activities (planting and gabion work) will prioritize recruitment from the local community, including women, youth and vulnerable groups. Maintenance activities, such as clearing silt from the intake, will follow a strict pollution prevention waste protocol consistent with ESS3. All dredged silt must be transported to a designated, environmentally approved upland site for disposal, preventing stream re-entry. The transport of conservation materials will follow safety guidelines outlined in the project's TMP to mitigate risks to the community (ESS4).

2.4 Construction Phase Activities

The activities during construction phase will entail: preliminaries and generals; clearing of the bushes; excavation and earth work; concrete work; reinforcement; construction of inlet chamber; construction of outlet chamber; construction of scouring chamber piping; construction of off take chamber; fitting and valves; conservation of the catchment area; protection works.

All listed activities will be strictly implemented under the guidance of a dedicated ESMMP. This includes adherence to the mandatory Labor Management Procedures (ESS2) and detailed safety protocols (ESS4) covering OHS for workers, site security, and the development of an Emergency Response Plan (ERP).

2.4.1 Materials, Equipment and Other Inputs

The materials, equipment and other inputs to be used during construction of the proposed project include: sand, cement, ballast, water, timber, nails, pipes, and valves. All natural resources (sand, ballast, timber) will be procured exclusively from legally licensed and permitted suppliers to ensure responsible sourcing.

The water source for construction activities must be identified, confirmed, and legally permitted by the WRA to prevent any adverse impact on the Rukurwa Stream flow or existing community water rights.

All excess, packaging, and off-cut waste materials will be managed as detailed in the ESMMP, consistent with ESS3.

2.5 Operations Phase Activities

The project's operational activities will focus on sustainable supply of water for small scale irrigation, watering livestock and domestic use. In compliance with ESS5 (Restrictions on Land Use), the project's water allocation and distribution will strictly follow the WRA abstraction permit conditions and the Maragima / Tagwa Water Project's operational by-laws. This governance structure will ensure equitable water sharing and guarantee that the domestic and livestock water reserve is maintained, especially during periods of water stress, thereby protecting established community entitlements.

All repair and maintenance works will adhere a detailed Operational Safety and Security Plan (OSSP), as outlined in the ESMMP (Chapter 8). This plan will include strict protocols for accessing and securing all permanent structures (e.g., the 225m³ masonry distribution tank located 5m from the Sagana - Chaka Highway) and an Emergency Response Protocol for rapid, safe response to pipeline failures (e.g., bursts or washouts).

2.6 Project Cost

The estimated total cost of the project, including all construction works, materials, supervision, and contingencies is Kenya Shillings Twenty-One Million, Four Hundred and Thirty-Eight Thousand, Two Hundred and Eighty-One Kenya Shillings (KES 21,438,281.00). A copy of the approved Bill of Quantities (BoQ) is provided in *Annex 10*.

2.7 Waste to be Generated and Methods of Disposal

During construction works the main waste likely to be generated will include metal off-cuts, broken concrete/ ballast, cement / packaging material, and pipe pieces. Solid wastes can negatively impact the environment by blocking of drainage systems and polluting soils/water bodies. In compliance with ESS 3 (Pollution Prevention), the Contractor will adhere to the waste hierarchy

(reduce, reuse, recycle) and develop a site-specific Waste Management Plan (WMP). Any residual waste that cannot be re-used or recycled must be collected and transported by a NEMA-licensed waste handler and disposed of only at an approved and licensed disposal facility. Similarly, solid waste from the operational repair and maintenance phase will be managed through re-use and proper licensed disposal.

3 CHAPTER THREE: RELEVANT POLICIES, INSTITUTIONAL AND LEGAL FRAMEWORK

3.1 Introduction

This chapter reviews the relevant Kenyan legislation, policies, and plans, as well as applicable international safeguards, including the World Bank ESF and applicable ESSs. The purpose is to outline the legal and institutional context that governs the environmental and social aspects of the project, and to demonstrate how potential impacts will be mitigated in accordance with national laws, regulations, and international best practice.

3.2 Policies

3.2.1 Kenya Vision 2030

The Kenya Vision 2030 is the current National Development blueprint for period 2008 to 2030. It recognizes that measures should be taken to modernize and encourage farmers to adopt agriculture as a business. Institutions and mechanisms for supporting agriculture as business.

Relevance: *The proposed project will directly contribute towards achievement of the objectives of the vision because it will provide sufficient water to the farmers for crop and livestock production thus increasing the household income.*

3.2.2 National Environment Policy (NEP), 2013

The policy sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources, recognizing fresh waters are part of the country's critical ecosystems due to their capacity to store water for various uses. The government therefore pledges to improve the management and conservation of water supply sources. It also requires infrastructural projects to undergo ESIA. In addition, public participation in the planning and approval of the proposed project is mandatory.

Relevance: *This environment and social assessment acts as a first step in fulfilling the Policy requirements to ensure that ecosystems are not significantly negatively affected.*

3.2.3 National Gender and Development Policy, 2019

The policy by the department of gender in the Ministry of Public Service, Youth and Gender outlines the national agenda for gender equality and how Kenya intends to realize these ideals. The policy promotes national values and principles of governance in relation to as equality, equity, inclusiveness and non-discrimination.

Relevance: *This This policy provides the national framework for promoting equality and equity in hiring and procurement. Critically, it provides the foundation for the project's commitment to preventing Gender-Based Violence (GBV) and Sexual Exploitation and Abuse / sexual Harassment (SEA/SH). It will guide the implementation of the GBV/SEAH Action Plan outlined in the ESMMP (Chapter 8) to ensure equality of opportunity and safety for all persons (ESS2).*

3.2.4 Kenya National Youth Policy 2006

This Policy aims to address youth issues, promote their mainstreaming in national development, and ensure they have equal opportunities to realize their fullest potential. It emphasizes increasing youth participation in economic activities and decision-making processes.

Relevance: *The proposed project will directly contribute to youth employment and empowerment. The proponent commits to implementing the specific, measurable targets for the local employment of youth and women outlined in the ESMMP (Chapter 8). This ensures fairness and equity in recruitment for both construction and operational phases, maximizing social benefits in line with the policy's objectives.*

3.2.5 National Land Policy 2009

The National Land Policy (2009) classifies all land in Kenya as Public, Community, or Private and provides a framework for sustainable and productive land use. The policy emphasizes efficient land utilization, guided by principles on land management, productivity targets, and planning.

Relevance: *The Maragima/Tagwa Water Project traverses multiple land tenure types. Public land and road reserves along the project route are accessed through statutory licenses and permits, allowing use without transferring ownership. On private land and institutional land, the proponent will secure voluntary wayleave*

agreements (permanent non-possessory easements) prior to construction, granting legal access for installation, operation, and maintenance of pipelines while landowners retain full ownership.

This approach ensures alignment with the National Land Policy, Kenyan land laws, and World Bank ESS5, facilitating legal, voluntary, and compliant access. Further details on legal access arrangements and monitoring of wayleave agreements are provided in Section 2.2.

3.2.6 National Irrigation Policy, 2017

This Policy is the central high-level guiding document for developing and managing the irrigation sector in Kenya. Its primary objective is to ensure national food security, wealth creation, and poverty reduction through accelerated and sustainable irrigation development. It sets the standard for promoting efficient irrigation systems, coordinating infrastructure development, and ensuring the long-term governance and management of irrigation schemes within a broader agricultural strategy.

***Relevance**: The project aims to provide water for crop and livestock production, a direct function of this Policy. Full compliance is confirmed as the scheme's governance structure is already anchored in the officially registered Maragima/Tagwa Water Project (certificate of registration as Water Users attached in Annex 2). The proponent commits to designing the water-use strategy and providing technical support to the Registered Water Users to ensure the project operates with the highest standards of sustainable management and water use efficiency.*

3.2.7 National Climate Change Framework Policy, 2018 and National Climate Change Action Plan III (2023 - 2027)

The National Climate Change Framework Policy, 2018, provides the overarching strategic direction for Kenya's response to climate change. This policy mandates the integration of climate change considerations into all sectoral development and planning. It is operationalized through the subsequent National Climate Change Action Plan (NCCAP) III (2023–2027), which specifically designates the Water and Blue Economy sector as a priority area for adaptation, focusing on building infrastructure resilience and enhancing adaptive capacity against climate change-induced risks.

***Relevance**: Since the project relies on a surface water source, its sustainability is directly threatened by climate change -induced events like droughts and floods. The project must demonstrate adherence to this Policy by: (a) designing infrastructure (intake and reservoir) using climate - resilient standards, and (b) contributing to the national adaptation goal by providing a stable, guaranteed water source that increases the community's overall climate resilience*

3.3 Relevant Legislation

3.3.1 Constitution of Kenya 2010

The constitution of Kenya (2010) establishes the foundational framework for sustainable development, environmental protection, and fundamental socio-economic rights. Key relevant articles include;

- Article 42 (Environmental Right): Entitles every person the right to a clean and healthy environment, including the right to have the environment protected for the benefit of present and future generations through legislative and other measures.
- Article 43 (Socio-Economic Rights): Recognizes that every person has the right to clean and safe water in adequate quantities and to be free from hunger.
- Article 69 (Obligations in respect to the environment) Mandates the State to ensure sustainable exploitation, utilization, management, and conservation of natural resources and to establish systems of environmental impact assessment, audit, and monitoring.

***Relevance:** The project directly addresses the fundamental rights enshrined in the Constitution. By abstracting water and facilitating irrigation, it promotes the realization of the right to a clean and safe water and the right to be free from hunger (Article 43). Furthermore, by undertaking this ESIA process and providing mitigation measures, the proponent seeks is fulfilling the constitutional obligation (Article 69) to protect the environment and ensure that the exploitation of the water resource is managed and conserved for the benefit of present and future generations (Article 42). The public participation component of the ESIA process is a direct measure to uphold constitutional transparency and engagement principles.*

3.3.2 Irrigation Act, 2019 (Amended 2022)

The Irrigation Act is the current primary law establishing the legal and institutional framework for the development, management, and regulation of all irrigation schemes in Kenya. It grants the National Irrigation Authority (NIA) the mandate to promote and regulate irrigation development, and provides for the legal recognition, registration, and regulation of Water Users and their formation into Irrigation Water Users Association (IWUAs) for scheme management. The 2022 amendments further refine the roles and collaboration between national and county agencies in the sector.

Relevance: *The Proponent, currently operating as a group of Registered Water Users, derives its legal status and management authority from this Act. Compliance requires the Proponent to ensure the project design, governance structure, and planned operational management protocols adhere to the standards set by the NIA. Furthermore, the Registered Water Users group must obtain any necessary NIA approvals or licenses for scheme development and construction and follow the laid-out process for future formalization as an IWUA, thereby legitimizing the scheme's management structure and its ability to collect necessary levies.*

3.3.3 Water Resources Management Rules, 2006

The Water Resources Management Rules, 2006 are the primary operational rules regulating the abstraction, use, and conservation of water resources in Kenya. Although these Rules were made under the repealed Water Act (2002), they remain in force under the transitional provisions of the Water Act (2016). They are implemented by the WRA and govern the requirements for permits, water allocation, pollution control, and the protection of riparian zones.

Relevance: *The project's key operational component, which is abstraction of water from the Rukurwa Stream, is governed by these Rules. Compliance is mandatory and is enforced by the WRA, requiring the Proponent to:*

- *Secure a valid Water Use Permit from the WRA for the proposed volume of abstraction;*
- *Demonstrate that the project's abstraction will not violate the established Minimum Environmental Flow (MEF) of the Rukurwa Stream, which is critical for protecting aquatic ecology and the rights of downstream users; and*

Adhere to all WRA conditions regarding the installation of flow measuring devices (e.g., weirs) and the protection of the stream's riparian land during and after construction.

3.3.4 Environmental Management and Coordination Act,1999 (Amendment 2015)

The EMCA (Cap 387) represents the primary statute governing environmental management in Kenya. It establishes the legal framework and institutions (such as NEMA) for coordinated management, conservation of natural resources, and sustainable development. The Act mandates environmental planning tools to be used prior to and during project implementation.

Key provisions include:

- Section 58: Mandates the proponent of any project listed in the Second Schedule to undertake an ESIA and obtain a license from NEMA before commencing.
- Second Schedule: Specifically includes the "construction of waterworks, water diversion, and development of irrigation schemes" as projects requiring an ESIA.
- Part VIII (Water Pollution): Prohibits the discharge of any harmful, toxic, or polluting matter into any aquatic environment.

Relevance: *The proposed construction of the water infrastructure, including the intake, pipeline, and reservoir, falls under the scope of EMCA's Second Schedule. Undertaking and submitting this CPR is the Proponent's direct measure for compliance with Section 58 of the Act. The commitment to implement the proposed mitigation measures ensures adherence to the Act's broader principles of environmental protection and the prohibition of aquatic pollution (Part VIII).*

3.3.5 EMCA Subsidiary Legislations (Regulations)

The following Regulations give practical effect to the provisions of the principal Act (EMCA) and govern specific environmental controls crucial to the proposed Maragima/Tagwa Water Project.

3.3.5.1 Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019

These Regulations detail the mandatory procedures, content, and application process for conducting an EIA (which results in this ESIA report) and for carrying out Environmental Audits (EA) during project operation.

Relevance: *The entire process of preparing and submitting this ESIA report, including the public consultation, is in direct compliance with these Regulations. The proponent is legally bound to secure the EIA license under these Regulations before physical commencement and to submit to subsequent mandatory EAs, as required by NEMA.*

3.3.5.2 The Environmental Management and Coordination (Water Quality) Regulations, 2024

These Regulations provide updated standards and procedures for protecting water resources in Kenya. The Regulations outline requirements for protection of water bodies, establishment of buffer zones, and control of effluent discharge and pollution from domestic, agricultural, or industrial sources. They prescribe water quality standards for abstraction, treatment, and reuse, and mandate continuous water quality monitoring and reporting by users and project proponents to safeguard public health and aquatic ecosystems.

Relevance: *The project involves abstraction and distribution of water from a natural stream source. The Proponent must ensure compliance with the Water Quality Regulations, including maintaining defined buffer zones, protecting the intake from contamination, and implementing a water quality monitoring program during construction and operation. Any wastewater or runoff generated on-site must meet the prescribed discharge standards, and all activities should aim to maintain the ecological integrity of the water source.*

3.3.5.3 The Environmental Management and Co-ordination (Waste Management) Regulations, 2006

These Regulations provide the framework for managing all types of waste, including solid, liquid, and hazardous waste, emphasizing waste minimization, segregation, and disposal by licensed entities.

***Relevance**: The project must comply with these Regulations by implementing a robust WMP. This plan will cover the proper handling and disposal of construction debris, excavated material, maintenance wastes (oil, grease), and domestic waste generated on site. This commitment ensures that waste generated during the project does not lead to environmental pollution or degradation.*

3.3.5.4 EMCA (Noise & Excessive Vibration Pollution Control) Regulations, 2009

Part 11 section 6 (1) provides that no person shall cause noise from any source which exceeds any sound level as set out in the First Schedule of the regulations. It gives standards for maximum permissible noise levels for construction sites, mines, and quarries. It also gives maximum permissible noise levels for silent zones, places of worship, residential (indoor/outdoor), mixed residential; and commercial.

***Relevance:** The proponent will ensure compliance at all stages of the project implementation by implementing measures that minimize noise and excessive vibration some of which have been proposed in this report.*

3.3.5.5 Environmental Management and Coordination Act (Air Quality) Regulations, 2014

This act provides for prevention, control, and abatement of air pollution to ensure clean and healthy ambient air, emission standards for various sources of air pollution including mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in EMCA (Cap 387).

***Relevance:** The proponent will ensure compliance with Air quality regulations by enforcing all the proposed preventive and mitigation measures proposed in this report.*

3.3.5.6 Environmental Management and Co-ordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations, 2009

These Regulations provide for the protection, conservation, and sustainable management of wetlands and riparian areas in Kenya. They define the procedures for identifying, managing, and protecting wetlands, riverbanks, and lakeshores, and prohibit any reclamation, degradation, or construction within such areas without prior authorization from NEMA. The Regulations also require that any

proposed development within or adjacent to a wetland or riparian reserve be subjected to an ESIA study process and approval by NEMA.

Relevance: *The The project involves the abstraction of water from the Rukurwa Stream and construction of pipelines that may cross riverbanks or riparian zones. The proponent will ensure that all works are located outside the legally defined riparian reserve, unless written approval is obtained from NEMA. The ESIA includes mitigation measures to protect riverbanks and adjacent wetlands, including erosion control, restricted machinery access, and vegetation restoration along the pipeline corridor. Continuous monitoring will be conducted to ensure no degradation or encroachment occurs within protected riparian or wetland areas.*

3.3.6 The Water Act, 2016

The Water Act, 2016, governs the sustainable management, regulation, and use of water resources in Kenya. It requires that all significant water uses, including abstraction, impoundment, and diversion, be authorized through a Water Use Permit issued by the WRA. Permit conditions include maintaining ecological flows, monitoring abstraction, and protecting catchment areas.

Relevance: *The existing WRA permit allows abstraction of 230 m³/day from the Rukurwa Stream, while the total irrigation demand for the 125-acre command area is estimated at 1,289.568 m³/day, substantially exceeding the permitted volume. To comply with the Water Act, the Proponent must either:*

1. *Reapply or request a variation from WRA to authorize the required abstraction, supported by hydrological data and environmental flow assessments; OR*
2. *Maintain abstraction within the current 230 m³/day limit by implementing rotational irrigation in four blocks, encouraging on-farm water storage, and optimizing irrigation scheduling to ensure equitable and sustainable water use.*

The Proponent must also install master metering and implement a monitoring and reporting system to ensure ongoing compliance with the permit and protection of the Rukurwa Stream catchment. Full validation and approval by WRA are required before construction or operation commences.

3.3.7 The Agriculture and Food Authority Act, 2013

This Act delineates the respective roles of the National and County Governments in agriculture (excluding livestock, which is generally under County jurisdiction), in furtherance of the relevant provisions of the Fourth Schedule to the Constitution.

Relevance: *The project directly promotes the objective of this Act by providing irrigation water to enable reliable crop production within the scheme area. The proponent and its' registered water users must ensure that all crops grown under the scheme adhere to the standards, sanitary, and phytosanitary measures established by Agriculture and Food Authority (AFFA) and its successor bodies for quality assurance and market access. Furthermore, the project supports the Act's goal of improving food security through the promotion of commercial agriculture within the regulated framework.*

3.3.8 The Occupational Health and Safety Act, 2007

This Act is the principal law governing the safety, health, and welfare of workers and all persons lawfully present at workplaces in kenya. It is administered by the Directorate of Occupational Safety and Health Services (DOSHS).

The Act imposes duties on employers (defined as 'occupiers' of a workplace) to ensure that all work activities are carried out in a manner that protects the health and safety of employees and non-employees who may be affected by the work.

Key Provisions include:

- Section 6 (General Duties): Obliges the occupier (the proponent/contractor) to ensure the safety, health, and welfare of all persons working in the workplace. This includes providing and maintaining safe plant, systems, and procedures of work; providing adequate training and supervision; and maintaining a safe means of access and egress.

- Section 13 (Duties of Employees): Requires employees to take reasonable care for their own safety and that of others, to use the provided PPE, and to report any risks or accidents.

- Part VII (Machinery Safety): Contains provisions for the safe use, fencing, and maintenance of all plant, machinery, and equipment used in construction (e.g., cranes, hoists, power tools).
- Part VI (Health General Provisions): Covers workplace conditions such as cleanliness, ventilation, lighting, sanitary conveniences, and first-aid facilities.
- Section 44 (Registration of Workplaces): Mandates the registration of all workplaces (including construction sites) with the DOSHS.
- Section 7 (Safety and Health Policy): Requires the preparation of a Safety and Health Policy Statement and the conduct of a thorough safety and health audit at least once every twelve months.

Relevance: *Construction and operation of the water project constitute a workplace under OSHA, 2007. Compliance to the Act is mandatory for the contractor during the construction phase and for the proponent / WU during the operation phase. The proponent will share the ESMMP with the contractor to enable him/her to develop a Contractor's ESMP (C-ESMP) which will be strictly followed during construction. The contractor will be required to comply with the requirements of this Act through obtaining relevant work site permits and licences, training workers on OHS, inspection of equipment to ensure good working condition and provide appropriate PPE to workers among other measures.*

Compliance of the C-ESMP will be monitored by the regulatory agents. A comprehensive occupational health and safety audit will be carried out periodically to ensure compliance with this Act, particularly during the construction phase.

3.3.9 Work Injury Benefits Act, 2007

This Act provides a framework for the payment of compensation to employees who sustain work-related injuries or contract occupational diseases in the course of employment. The Act establishes '*no-fault*" compensation system, meaning the employer is liable regardless of who caused the accident.

Key provisions include;

- Section 7 (mandatory insurance): Every employer is legally required to obtain and maintain an insurance policy with an approved insurer to cover their liabilities under the Act in respect of all their employees. Failure to insure is an offence punishable by law.

- Section 10 (Employer's Liability): An employee is entitled to compensation for any accident arising out of and in the course of their employment that results in the employee's disablement or death.

- Compensation: The Act specifies compensation for:

    - Temporary Total Disablement (TTD): Periodical payments equivalent to the employee's earnings for up to 12 months.

    - Permanent Disablement: Calculated based on 96 months' earnings and the percentage of disablement.

    - Death: Compensation to the dependents of the deceased employee, calculated on the basis of 96 months' earnings.

- Section 47 (Medical Aid): The employer is liable to pay all reasonable expenses for medical, surgical, and hospital treatment, as well as the supply of necessary appliances.

- Section 22 (Reporting): The employer must notify the DOSHS of any work-related injury or death within 24 hours for a fatality or 7 days for a non-fatal accident.

Relevance: *The proponent and the contractor are fully subject to the provisions of WIBA for all workers employed during the construction and operation phases. The project has an inherent risk of accidents associated with earthworks, trenching, heavy machinery operation, and working in confined spaces.*

- *Mandatory Insurance: The proponent/contractor must immediately procure and maintain a WIBA insurance policy for all project employees, covering the full extent of their legal liability under the Act.*

- *Safety Culture: Compliance with WIBA is intertwined with the OSHA, 2007. The proponent's commitment in the ESMMP to ensure a safe working environment is the primary measure to prevent accidents, thereby managing WIBA liability.*

Claims Management: Clear procedures must be established for the immediate reporting of all accidents and occupational diseases to both the insurer and DOSHS as stipulated by the Act. This ensures injured workers or their dependents receive prompt compensation and medical aid.

3.3.10 The Public Health Act (Cap. 242)

The Public Health Act is the key legislation safeguarding public health, ensuring sanitation, and providing for the prevention and suppression of disease. It places a fundamental duty on property owners and owners and developers to maintain hygienic conditions and prevent conditions harmful to human health.

Key provisions include:

- Section 115 (Nuisances Prohibited): States that no person/institution shall cause a nuisance or condition liable to be injurious or dangerous to human health.
- Section 118 (What Constitutes Nuisance): Broadly defines nuisances, specifically including -
    - Any noxious matter or waste water flowing or discharged into any watercourse or irrigation channel not approved for the reception of such discharge.
    - Any well, cistern, or other source of water supply that is, or is likely to be, used by man for domestic purposes and the water from which is polluted or otherwise dangerous to health.
    - All collections of water, sewage, rubbish, refuse, and other fluids which permit or facilitate the breeding or multiplication of pests (e.g., mosquitoes).

- Section 129 (Duty of Local Authority): Places a duty on health authorities to take all lawful, necessary, and reasonably practicable measures for preventing any pollution dangerous to health of any public water supply.

Relevance: *Compliance with the Public Health Act is non-negotiable for this project. The proponent must ensure the construction and operation activities do not create any of the defined nuisances. Specifically, the project must:*

- *Prevent Water Pollution: Strictly manage all discharges (wastewater, silt, debris, or fuel/oil) to avoid polluting the Rukurwa Stream and surrounding water sources.*
- *Ensure Sanitation: Implement a robust sanitation plan during the construction phase to provide appropriate sanitary conveniences (toilets and washing facilities) for the workforce to prevent fecal contamination and disease spread.*
- *Manage Stagnant Water: Design the water conveyance and storage infrastructure to prevent the creation of stagnant water that could facilitate the breeding of mosquitoes or other vectors.*

The commitment to implementing the ESMMP serves as the primary mechanism for the proponent to prevent any condition liable to be injurious or dangerous to human health, as required by the Act.

3.3.11 Employment Act, 2007

The Employment Act, 2007, is the principal legislation governing the relationship between employers and employees in Kenya. It establishes the basic minimum terms and conditions of employment, including contracts of service, protection of wages, leave, working hours, termination, and prohibition of forced labour.

Key provisions:

- Section 3 (1): States that the Act applies to all employees employed during the project implementation under a contract of service.

- Section 5 (3): Prohibits an employer from discriminating (directly or indirectly) demand that no employer shall discriminate directly or indirectly, against an employee or prospective employee or harass an employee or prospective employee on grounds of race, colour, sex, language, religion, political or other opinions, nationality, ethnic or social origin, disability, pregnancy, mental status or HIV status.

- Part IV(Wages): Governs the timely payment, calculation, and permissible deduction of wages, ensuring fair compensation.

- Part VI (Protection of Wages): Stipulates the conditions under which wages must be paid and prohibits the reduction of wages without an employee's written consent.

- Part VII (Employment of Women and Young Persons): Provides special protection regarding working hours, maternity, and employment conditions for specific categories of workers.

Relevance: *The Proponent (and the engaged Contractor) is the "employer" and must comply with all provisions of the Act during the construction and operational phases. Specifically:*

- *Non-Discrimination: The proponent will ensure fairness and gender equity during the recruitment of the labour force in all phases of the project, strictly avoiding the discriminatory and harassment practices prohibited by Section 5(3). Preference will be given to the local community for both skilled and unskilled labour as provided for in the ESMMP.*

- *Contracts and Terms: All workers must be engaged under a formal written contract of service that clearly outlines the terms of employment, working hours, leave entitlements, and wages, adhering to the statutory minimums and best labour practices.*

- *Grievance Mechanism: The proponent must establish and communicate a clear, accessible, and non-retaliatory GRM for workers to address issues such as unfair treatment, wage disputes, or harassment, ensuring compliance with both this Act and international labour standards.*

3.3.12 National Construction Authority ACT, 2011

This Act establishes the National Construction Authority (NCA) with the mandate to oversee,

regulate and coordinate the development of the construction industry in Kenya. Its primary purpose is to standardize construction practices, promote quality assurance, and enforce the Code of Conduct (CoC) for the industry.

Key provisions include:

- Section 15 (Contractor Registration): Mandates that all contractors, local or foreign, must be registered by the NCA and hold a valid annual practicing license for the relevant class of works (e.g., Civil Engineering Works for water projects).
- Section 17 (Project Registration): Requires the Owner/Proponent to register the entire construction project with the NCA within 30 days of awarding the contract.
- Quality and Safety: Empowers the NCA to conduct site inspections to ensure compliance with quality, safety standards, and the construction industry's CoC.
- Accreditation: The NCA accredits and certifies skilled construction workers and site supervisors to ensure competence on-site.
- Section 18 (Foreign Contractor Rule): Requires foreign contractors to subcontract a minimum of 30% of the contract value to local firms and commit to skills transfer.

***Relevance**: Compliance with the Act is mandatory for the project to legally proceed. The Proponent will ensure:*

- *Legal Operation: The selected Main Contractor and all Sub-Contractors are registered and licensed by the NCA for the required category of Civil Engineering Works (Water and Roads).*
- *Statutory Approval: The project is registered with the NCA, and the required compliance certificates are obtained before, during, and after construction.*
- *Local Content: Compliance with the 30% local sub-contracting and skills transfer requirement, especially if a foreign firm is engaged, thereby meeting the project's commitment to local empowerment.*

3.3.13 Sexual Offences Act, 2006

This Act provides the legal framework for the prevention, definition, and punishment of sexual offences in Kenya. It seeks to protect all persons, particularly women, children, and other vulnerable groups, from sexual abuse, exploitation, and harassment. The Act criminalizes offences such as rape, defilement, sexual harassment, and indecent acts. Sections relating to minors provide strict protection against sexual contact, exploitation, or inducement. Various amendment bills (2016, 2020, and 2023) have been proposed to strengthen penalties and improve protection and reporting mechanisms, and the Proponent should monitor their status to ensure ongoing compliance with the law.

Relevance: *During construction and operation, the project may involve interaction between workers and community members, increasing the risk of SEA/SH. The Proponent will develop and implement a SEA/GBV Action Plan as part of the C-ESMP. The plan will include:*

- *A Code of Conduct signed by all workers and contractors.*
- *Awareness and training on SEA/SH prevention for staff and local communities.*
- *Confidential reporting and grievance mechanisms with clear survivor support and referral pathways.*
- *Strict enforcement measures and coordination with local authorities for case management.*

These actions will ensure that project implementation upholds national law, promotes community safety, and prevents sexual misconduct throughout the project lifecycle.

3.3.14 County Government Act, 2012

The County Government Act, 2012 provides the legal framework for the organization, powers, and functions of county governments in Kenya. Part VIII emphasizes public participation as a key principle in County governance. It also requires reasonable access for citizens and stakeholders to participate in formulation and implementation policies, laws, regulations and development initiatives.

The Act also upholds transparency, accountability and inclusivity, ensuring that the interest of minorities, marginalized groups, and local communities are protected and that they have access to relevant information during the decision-making process.

Relevance: *The proposed project will be implemented within the jurisdiction of Nyeri County Government and therefore must comply with the requirements of this Act. The Proponent will ensure active engagement with the County Government throughout the project lifecycle, including during approval of development proposals, issuance of relevant permits, and project monitoring. Public consultations will be conducted to ensure that local communities, including marginalized groups, are meaningfully involved and that project information is readily accessible.*

All county-level approvals, including construction and environmental compliance clearances, will be obtained promptly and transparently in line with the Act's provisions on citizen participation and accountability.

3.3.15 Children Act, 2022

This is an Act of Parliament to give effect to Article 53 of the Constitution of Kenya (2010) by safeguarding the rights and welfare of all children. It outlines provisions on parental responsibility, care and protection, alternative arrangements, and protection from abuse, neglect, and exploitation. It emphasizes that the best interests of the child must guide all actions concerning children, and explicitly prohibits child labour and employment of persons under 18 years in hazardous or inappropriate work environments.

Relevance: *To ensure compliance with the Act and uphold children's rights during project, the Proponent must ensure that:*

- *No person under 18 years is employed in any project activity, including casual labour.*
- *Project activities do not expose children to harm or exploitation, either directly or indirectly.*
- *Community engagement and awareness activities promote the protection and welfare of children in surrounding communities.*

3.3.16 Sustainable Waste Management Act, 2022

The Sustainable Waste Management Act, 2022 provides a national framework for promoting sustainable, efficient, and circular waste management practices in Kenya. The Act aims to protect human health and the environment by reducing pollution, enhancing waste recovery and recycling, and ensuring that waste generators take responsibility for proper disposal. It establishes principles such as segregation of waste at source, the polluter-pays principle, extended producer responsibility, and zero-waste approaches. It also assigns county governments key roles in planning and implementing integrated waste management systems, while NEMA oversees enforcement and compliance.

Relevance: *The proponent will prepare and implement a site-specific WMP within the ESMMP, outlining waste minimization, segregation, reuse, recycling, and safe disposal measures. All waste will be handled by licensed service providers, using color-coded and labeled receptacles in line with the Act's requirements. Hazardous waste, such as oils or chemicals, will be stored and disposed of in approved facilities.*

By adopting sustainable waste management practices, the project will minimize environmental pollution, promote resource efficiency, and ensure full compliance with national and county waste management regulations.

3.3.17 Land Governance and Access Framework

Key Acts relevant to the project are summarized below:

3.3.17.1 Land Act, 2012

The Land Act operationalizes the constitutional principles on land and provides the overarching framework for sustainable use, administration, and acquisition of land. It regulates voluntary land transactions, public land management, and the creation of easements and wayleaves. It also sets out the procedures for compulsory acquisition through the National Land Commission (NLC), ensuring prompt and just compensation where acquisition is unavoidable.

Relevance: *For this project, the Act is relevant primarily for the establishment of lawful wayleaves across private and institutional land and the formalization of access rights. No compulsory acquisition is anticipated; however, if any permanent land take becomes necessary, the process would be undertaken through the NLC in accordance with the Act.*

3.3.17.2 Land Registration Act, 2012

This Act governs the registration, protection, and transfer of all interests in land, including easements and wayleaves. It establishes the requirement for proper title searches, registration of land rights, and rectification of registry records where necessary.

Relevance: *In the context of the project, wayleave agreements with private landowners and institutions will be formally documented and registered to give the proponent a legally recognized, non-possessory right of access for pipeline installation and maintenance. Registration under this Act safeguards both the landowner and the project from future disputes.*

3.3.17.3 National Land Commission Act, 2012

The Act establishes the NLC and mandates it to manage public land on behalf of national and county governments, oversee compulsory acquisition, and ensure transparent, equitable land administration.

Relevance: *Its primary relevance to the project concerns the public land components, specifically the forest reserve areas where the intake, reservoir, and initial pipeline are located. Access to forest land has been granted through a renewable usufruct right issued by the KFS. If any future project modifications require public land allocation or acquisition, the NLC would facilitate such actions in accordance with the law.*

3.3.17.4 Land Control Act (Cap. 302)

The Land Control Act regulates dealings in agricultural land and requires approval from the Land Control Board (LCB) for transactions such as transfers, leases, and easements within designated agricultural zones. Without LCB consent, such transactions are void.

Relevance: Given that much of the distribution network passes through agricultural holdings, any wayleave agreement involving agricultural parcels will be submitted to the relevant LCB for consent prior to registration. This ensures that all land transactions related to the project remain valid and enforceable.

3.3.17.5 Physical and Land Use Planning Act, 2019

This Act provides the framework for spatial planning and development control at national and county levels. It ensures that land use decisions are consistent with approved physical and local

development plans, protects sensitive areas, and mandates county-level review and approval of development proposals.

Relevance: *The project will obtain the necessary planning permissions from the Nyeri County Government to confirm that the siting and design of the water infrastructure align with county spatial plans and land use policies. Compliance with this Act ensures orderly development and minimizes land use conflicts.*

3.3.18 The Forest Conservation and Management Act, 2016

This Act provides the legal basis for the protection, sustainable management, and utilization of forest resources in Kenya. It establishes the KFS as the authority responsible for administering all public forests, preparing forest management plans, regulating access, and enforcing conservation measures.

The Act classifies forests as public, community, or private, and strictly prohibits any activity within a gazetted forest, including infrastructure development, water abstraction, clearing, or access road construction, without prior written authorization from KFS. Such authorization must be supported by an approved ESIA and adherence to forest management objectives.

Relevance: *Portions of the Maragima–Tagwa Water Project, including the intake, reservoir, and initial pipeline sections, are located within gazetted forest areas managed under the Kabaru and Hombe Forest Stations. A KFS permit previously issued on 7 March 2022 (Annex 4A) has expired, and the Proponent has submitted a renewal request (Annex 4B), which has been positively recommended. No works may proceed within forest land until the renewed permission is granted. Once approved, the Proponent will comply fully with KFS conditions relating to vegetation clearance, construction access, catchment protection, and post-construction restoration to ensure that project activities remain compatible with sustainable forest management requirements.*

3.3.19 HIV and AIDS Prevention and Control Act, 2006 (Revised 2011)

The objective and purpose of this Act is to promote public awareness, prevention, and management of HIV and AIDS in Kenya. It seeks to protect the rights and dignity of persons living with or affected by HIV, prohibiting discrimination in employment, education, and access to services. Section 31 specifically prohibits any form of discrimination in employment or

recruitment based on a person's real or perceived HIV status, unless a specific medical condition is required for the job.

Relevance: *The contractor will implement HIV/AIDs awareness and prevention programs targeting workers and surrounding communities. These will include education campaigns, provision of condoms on site and facilitation of Voluntary Counselling and Testing (VCT) services in collaboration with local health facilities. All testing and counselling will remain confidential, and the contractor will enforce fair and non-discriminatory employment practices consistent with the Act.*

3.3.20 Public participation policy 2023

The policy aims to strengthen citizens' involvement in governance, building on the Constitution's mandate for participatory democracy, by addressing gaps in current processes, enhancing access to information, and promoting inclusivity through better frameworks, technology, and standardized guidelines. Its main objective is to ensure open, accountable, inclusive, and timely engagement in law-making and development.

Relevance: *The ESIA process will include public participation, stakeholder engagement, and consultation to ensure the timely disclosure of investment activities and proper documentation of the feedback received. This input should serve as a key guiding factor for both project implementation and licensing decisions.*

3.3.21 National GBV Policy.

The policy designed to prevent and respond to violence, integrating survivor-centered care, legal reforms, coordination across sectors, and data management to create a society free from violence, often focusing on holistic approaches and protecting all genders, including men and boys as potential victims. Key elements include strengthening laws (like Kenya's Domestic Violence Act), ensuring trauma-responsive justice, empowering survivors economically, and collaborating with civil society for implementation.

Relevance: *During construction and operation, the project may involve interaction between workers and community members, increasing the risk of GBV .The Proponent and the contractor will develop and implement a GBV Action Plan as part of the C-ESMP. The plan will include:*

- *A Code of Conduct signed by all workers and contractors.*
- *Awareness and training on GBV prevention for staff and local communities.*
- *Confidential reporting and grievance mechanisms with clear survivor support and referral pathways.*

- *Strict enforcement measures and coordination with local authorities for case management.*

These actions will ensure that project implementation upholds national law, promotes community safety, and prevents sexual misconduct throughout the project lifecycle.

3.3.22 Nyeri County Gender and Development Policy 2021-2025

The policy focuses on systemic eradication through multi-sectoral collaboration, behavior change programs, and empowering community champions (like trained GBV champions) to tackle root causes like harmful cultural practices, ensuring survivor-centered response and promoting gender equality across all sectors for development. The county utilizes a GBV Technical Working Group (TWG) for strategy, involving national/county government, CSOs, and FBOs, aiming for inclusion of men and addressing issues like teenage pregnancies through initiatives like community sensitization and policy integration.

Relevance: The proponent shall ensure the involvement of trained GBV champions. Their role will include training project members and site workers on GBV prevention and response, and disseminating information on GBV/SEAH referral pathways to facilitate timely reporting and survivor care

3.4 International Conventions and Treaties

3.4.1 United Nations Framework Convention on Climate Change, 1992 and Paris Agreement 2015

These global agreements aim to stabilize greenhouse gas (GHG) concentrations and strengthen adaptive capacity to climate impacts. *The project contributes to Kenya's climate adaptation goals by improving water availability, supporting catchment restoration, and enhancing community resilience to droughts and rainfall variability*.

3.4.2 Ramsar Convention on Wetlands, 1971

This convention emphasizes the conservation and wise use of wetlands as critical ecosystems for biodiversity and water regulation. *The project will maintain riparian buffer zones, safeguard ecological flow at the intake, and avoid degradation of wetland or riverbank ecosystems during construction.*

3.4.3 United Nations Convention to Combat Desertification, 1994

This Convention promotes sustainable land management and rehabilitation of degraded lands. *The project supports soil and water conservation through improved irrigation management, reduced erosion, and sustainable catchment rehabilitation activities.*

3.4.4 Convention on the Elimination of All Forms of Discrimination Against Women, 1979

This Convention commits member states to promote gender equality and protect women's rights in all sectors. *The project will ensure inclusive participation of women and youth in planning, capacity-building, and water management, promoting equitable benefit-sharing across all groups.*

3.4.5 Sustainable Development Goals

The Sustainable Development Goals (SDGs) provide a universal framework for sustainable development. *The project supports several goals, particularly - Goal 2 (Zero Hunger), Goal 5 (Gender Equality), Goal 6 (Clean Water and Sanitation), and Goal 9 (Industry, Innovation and Infrastructure), by ensuring sustainable water supply, improved food production, gender empowerment, and climate-resilient infrastructure.*

3.5 Applicable World Bank's Environment and Social Standards

a) ESS1: Assessment and Management of Environmental and Social Risks and Impacts

ESS1 requires an integrated assessment of environmental and social risks and impacts throughout the project lifecycle. It ensures that projects are designed and implemented in an environmentally and socially sustainable manner.

Relevance: *This ESIA has been prepared in line with ESS1 requirements to identify, assess, and propose mitigation measures for potential risks such as soil erosion, water abstraction impacts, vegetation loss, occupational and community health and safety, and social impacts including land access and labour relations. The proponent will be required to implement the proposed measures throughout the project phases.*

b) ESS2: Labor and Working Conditions

ESS2 promotes fair treatment, non-discrimination, and safe and healthy working conditions. It applies to all workers engaged in the project, including those directly employed, contracted, or working through suppliers. NAVCDP has established Labour Management Procedures (LMP) to guide labour recruitment, working conditions, grievance handling, and prevention of SEA/SH.

Relevance: *The project will engage the following categories of workers, consistent with NAVCDP LMP provisions:*

- *Direct workers: Staff employed by CPCU and Supervising Engineer under NAVCDP.*
- *Contracted workers: Construction and technical staff hired by the contractor(s) to implement civil works, including skilled and unskilled laborers, drivers, and machine operators.*
- *Primary supply workers: Those employed by suppliers providing key materials such as pipes, aggregates, cement, and equipment.*
- *Community workers: Local residents voluntarily engaged in non-specialized activities such as tree planting, minor trenching, or catchment restoration under community arrangements.*

Labor Management and Contractor Obligations

The Contractor will maintain a worker registry and provide all employees with written contracts detailing employment terms, wages, hours, OHS measures, grievance channels, and termination conditions. All staff and contracted workers will sign a CoC, a requirement under NAVCDP's SEA/SH Prevention and Response Plan, covering acceptable workplace behaviour, gender equality, child protection, and prohibition of GBV/SEA/SH.

A Child Protection Plan will be implemented to ensure no person under 18 years is employed. The project will also undertake induction and periodic training on labour rights, SEA/SH awareness, and OHS.

Worker GRM

A dedicated Worker GRM will be established at the site level, integrated into the NAVCDP three-tier grievance structure:

- *Contractor's Worker Grievance Redress Committee (GRC) - chaired by the Site OHS/Human*

Resources (HR) Officer, responsible for resolving worker-related grievances within 14 days.

- *General Project GRC - for unresolved cases elevated to the CPCU.*
- *GBV/SEAH GRC - managed by a gender/SEA focal person to handle SEA/SH-related complaints confidentially and with survivor-centered care.*
- *Grievances can be submitted verbally, in writing, or via suggestion boxes. All grievances will be logged, acknowledged within 2 working days, and resolved within 14 days, following NAVCDP timelines. Retaliation against complainants is strictly prohibited.*

c) ESS3: Resource Efficiency and Pollution Prevention and Management

ESS3 promotes the sustainable use of energy, water, and raw materials, and aims to prevent and manage pollution throughout project design, construction, and operation. The standard requires projects to adopt measures that enhance efficiency in resource use while minimizing environmental degradation and GHG emissions.

The project has been designed to incorporate measures that will promote resource efficiency and reduce pollution. Key proposed actions include:

- The irrigation scheme will be divided into 4 irrigation blocks to maintain abstraction within the WRA-approved limit of 230 m^3/day. Installation of flow control valves, master meters, and on-farm storage tanks will minimize water losses and ensure equitable water distribution.
- The project will support catchment protection interventions such as reforestation, riparian restoration, terracing, and soil stabilization within the upper catchment to safeguard water sources and reduce sedimentation.
- The design will prioritize gravity-fed systems where feasible to minimize pumping requirements. Where pumping is necessary, energy-efficient pumps and pressure regulation systems will be used to reduce operational energy demand.
- The contractor will be required to source construction materials locally, where possible, to reduce transport-related emissions and support local economic participation.
- A site-specific WMP will be prepared and implemented to ensure proper handling, reuse, and disposal of excavated materials, oils, and packaging waste, consistent with the EMCA (Waste Management) Regulations, 2006.

- In addition, the project will be guided by the IPMP proposed under Chapter 8 (ESMMP). The IPMP promotes environmentally sound pest control methods and safe pesticide use.

Relevance: *ESS3 is applicable because the project involves water abstraction, irrigation development, and agricultural intensification. The Proponent will ensure efficient use of natural resources, adherence to the proposed IPMP, and implementation of catchment conservation measures to maintain ecological integrity. These measures will contribute to sustainable water resource management in the project area.*

d) ESS 4: Community Health and Safety

ESS4 seeks to protect project-affected communities from health, safety and security risks arising from construction and operational activities. It covers issues such as traffic safety, communicable SEA/SH and public awareness during project implementation.

Relevance

The project will involve interaction between construction workers and local communities, which may increase risks related to transmission of sexually transmitted infections (STIs), GBV, SEA/SH, and community safety incidents. To mitigate these risks, the following measures will be implemented:

- *The contractor will prepare and implement a Community Health and Safety Plan as part of the C-ESMP. This will include awareness campaigns on HIV/AIDS, GBV, SEA/SH, and OHS.*
- *All workers will be required to sign and adhere to a CoC covering behavior towards community members and prohibiting GBV and SEA/SH.*
- *The contractor and CPCU will establish working relationships / Memoranda of Understanding (MoUs) with nearby government-owned health facilities to provide HIV testing, counselling, and GBV/SEA support services for both workers and community members.*
- *The GRM will integrate a GBV/SEA/SH-sensitive reporting pathway, ensuring confidentiality. Survivor protection, and timely referrals to qualified service providers. The community will be sensitized on the available grievance redress mechanism in the project.*

e) ESS5: Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement

ESS5 addresses land acquisition, restrictions on land use, and involuntary resettlement, aiming to

avoid or minimize displacement while ensuring that affected persons are treated fairly. The standard emphasizes meaningful consultation, transparent and participatory processes, and appropriate compensation to restore livelihoods and living standards when land access or acquisition cannot be avoided. It also requires monitoring and documentation of all land-related actions to safeguard land tenure rights and ensure accountability throughout the project lifecycle.

Relevance: *The project involves temporary and limited permanent use of land for the construction of a water intake, transmission and distribution pipelines, storage tanks, and control structures. The project's land requirements cover both public and private holdings. Public land includes forest areas managed by KFS, riparian reserves, and county-designated utility spaces, with all necessary permits obtained from the relevant authorities before construction. Private land includes agricultural and institutional parcels along the pipeline route, where negotiated wayleave agreements will allow temporary construction access while enabling continued farming after works are completed.*

To ensure full compliance with ESS 5 and relevant national laws, the Proponent will:

- *Engage all affected landowners early and in writing regarding land access, project timelines, and procedures.*
- *Secure documented wayleave agreements witnessed by local administration.*
- *Assess, document, and provide replacement-cost compensation for all verified temporary or permanent losses prior to commencing works.*
- *As the project utilizes the existing 225m^3distribution tank (a community asset), the Proponent must secure explicit, documented consent from the original user community, confirming their agreement to the expanded scheme's use and management protocol.*
- *Establish a grievance mechanism to resolve disputes promptly and transparently.*
- *Monitor and restore all temporary access areas and pipeline corridors, maintaining detailed records for audit and accountability.*
- *Obtain all necessary permits for public land use in advance and adhere to relevant provisions of the Land Act (2012) and other applicable Kenyan regulations.*

Through these measures, the project will safeguard land tenure rights, ensure equitable treatment of affected persons, and comply fully with ESS 5 and national legal requirements.

f) ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

ESS6 addresses project-related risks and impacts on biodiversity, the variety of life in all its forms, including species, ecosystems, and genetic diversity. The standard is designed to protect natural habitats, critical habitats, and modified habitats, requiring the Borrower to demonstrate efforts to avoid or minimize impacts and, where possible, achieve net gains in biodiversity. Furthermore, it promotes the sustainable management of living natural resources, ensuring that projects utilizing these resources (such as water for irrigation) do so responsibly to maintain ecological functionality.

Relevance: *The project involves the abstraction of water from the Rukurwa Stream for irrigation, which inherently modifies the stream's natural flow regime. This activity poses a risk to aquatic biodiversity (e.g., fish and invertebrates) and the riparian habitat that supports local flora and fauna. Compliance with ESS 6 requires the project to implement strict measures to conserve the ecological health of the stream, most critically by ensuring that the established MEF is protected as mandated by the WRA. The ESMMP includes measures to prevent sedimentation and pollution of the stream during construction and to manage the impacts of agricultural chemical use to maintain the integrity of this natural habitat.*

g) ESS 8: Cultural Heritage

ESS 8 addresses the protection and preservation of Cultural Heritage. This includes both tangible heritage (movable or immovable objects, sites, or structures with archaeological, historical, religious, or aesthetic value) and intangible heritage (practices, knowledge, traditions, and living culture). The standard requires the Borrower to identify any known cultural heritage potentially affected by the project and establish protocols to manage and protect any undiscovered heritage during the project life cycle, ensuring consultation with relevant stakeholders regarding its significance and use.

Relevance: *ESS8 is applicable because the construction phase of the project involves excavation for the intake structure, pipeline trenches, and distribution network across the project area. Although no known sites of tangible cultural heritage may have been pre-identified, these civil works present a risk of encountering 'chance finds' (undiscovered archaeological artifacts, burial sites, or historical relics).*

To ensure compliance, this ESIA has provided a mandatory, legally binding Chance Finds Procedure as an

Annex to the ESMMP (Annex 16). This procedure outlines the protocol for the Contractor to immediately stop work, cordon off the area, and notify the relevant government authorities and project management if any material cultural heritage is unearthed, thereby ensuring its protection and proper management.

h) ESS 10: Stakeholders Engagement and Information Disclosure

ESS10 is applicable to the proposed Maragima/Tagwa Water Project because it mandates continuous stakeholder consultation and full project information disclosure throughout all implementation phases. The project ensures full compliance by adopting and operationalizing the robust NAVCDP Stakeholder Engagement Plan (SEP) and its functional GRM.

Relevance: *To maintain compliance with ESS10 and national laws, the proponent will be required to:*

- *Implement stakeholder consultations following the NAVCDP SEP, ensuring inclusivity across gender, age, and vulnerability lines.*
- *Provide timely and accessible project information on scope, activities, and anticipated impacts.*
- *Implement the Project-level GRM for all grievances and ensure that all contractors and local committees are trained in its procedures.*
- *Maintain up-to-date grievance logs and submit regular reports to the CPCU and NPCU.*
- *Provide continuous feedback to communities through the Water Users' Group meetings and public forums.*

The GRM for the Maragima/Tagwa Project will be locally customized based on the NAVCDP's tiered framework to ensure accessibility and local ownership. The mechanism is operationalized at the Community Level (Tier 1) through the Grievance Management Committee (GMC), which serves as the primary entry point for all project-related grievances. The GMC for the Maragima/Tagwa Project will be composed of:

- *The Maragima/Tagwa Water Project's GRM Focal Person (elected by the Registered Water Users group).*
- *Local Community Representatives (selected to ensure broad representation of beneficiaries and non-beneficiaries).*
- *Mandatory inclusion of members from women and vulnerable groups to guarantee an inclusive and*

accessible reporting channel.

- *The Contractor's representative (during the construction phase).*

The standard operation flow for the project-level GRM is described in detail in Chapter 8 (ESMMP).

3.6 Institutional Framework

3.6.1 National Environment Management Authority

NEMA, established under EMCA (Cap. 387), is the principal government agency responsible for coordination and supervision and co-ordination over all matters relating to the environment management in Kenya. Specific NEMA roles related to this project are:

- Reviewing the ESIA report in collaboration with relevant lead agencies and issuing approval, improvement comments, or rejection where necessary;
- Issuing EIA license with project -specific environmental and social compliance conditions;
- Monitoring the implementation of the ESMMP, and adherence to EIA license conditions. Where necessary the Authority may issue compliance notes, or stop orders as prescribed under Section 117 of EMCA (Cap. 387).

3.6.2 Water Resources Authority

WRA, established under Part IV of the Water Act (2016), is responsible for regulation and management of water resources in Kenya. Its responsibilities include issuing water abstraction and effluent discharge permits, enforcing environmental flow requirements to maintain river ecosystem integrity, monitoring water use, and promoting equitable allocation among users.

WRA has issued an abstraction permit for 230 m^3/day from the Rukurwa Stream. The Proponent must ensure continuous flow monitoring, maintain records of abstraction volumes, and comply with all permit conditions to safeguard downstream users and ecosystem sustainability.

3.6.3 Department of Occupational Health and Safety (DOSHS)

DOSHS, a department under the Ministry of Labour and Social Protection, enforces OSHA (2007), ensuring safe working environments. The project proponent and contractor must register

the site as a work place with DOSHS, prepare a site-specific Health and Safety Plan, and report workplace accidents in line with WIBA (2007) and ESS2 requirements.

3.6.4 County Government of Nyeri

The County Government Nyeri, through its Departments of Water, Environment, Agriculture, and Public Health, plays a key role in local-level project implementation and oversight. In line with the Fourth Schedule of the Constitution of Kenya (2010) and the County Governments Act (2012), the County Government will collaborate with the Registered Water Users, WRA, and the County Environment Committee (CEC) to ensure sustainable management and environmental compliance for the Maragima/Tagwa Water Project.

The CEC, established under EMCA (Cap. 387) serves as the county-level coordination body for environmental management. The Committee is responsible for:

- Overseeing the implementation of environmental policies and ESMMPs within the county;
- Facilitating collaboration between NEMA, county departments, and project proponents; and
- Reviewing and providing input on environmental and social compliance reports from projects within the county.

Specifically, the Department of Water and Irrigation will:

- Provide technical backstopping and extension support to the Registered Water Users and farmer groups;
- Participate in joint monitoring of ESMMP implementation with NEMA and the CEC;

Support capacity building of the Project's Management Committee and farmer groups to enhance sustainability and compliance with project safeguards.

3.6.5 Current Water Users' Group / Future Irrigation Water Users Association

Maragima/Tagwa Water Project is currently a group of Registered Water Users. This status provides legal recognition for the farmers to benefit from the scheme, but requires institutional

maturity for long-term sustainability. The framework for their governance and management transition is established under the Irrigation Act, 2019.

- Current Status: The Registered Water Users' Group derive their initial legal status and authority to represent the beneficiaries from the Irrigation Act (2019). They function as the primary community liaison for project planning and environmental compliance during the construction phase.
- Mandatory Transition (IWUA): The Act mandates the formalization of water user groups into an IWUA (specifically under Part III, Sections 18 - 20 of the Act). This transition is a core requirement for the project's sustainability, as the formalized IWUA structure grants the necessary legal capacity to: enter into operation and maintenance agreements; open and manage bank accounts; and legally enforce bylaws and collect tariffs operation and maintenance (O&M fees) from members.

Responsibilities of the Future IWUA

Upon formal registration, the IWUA will become the legally mandated entity responsible for managing, operating, and maintaining the irrigation infrastructure under the oversight of the NIA. Key responsibilities will include:

- Managing the equitable distribution of irrigation water within the 125-acre scheme.
- Collecting O&M fees from members to secure long-term financial viability.
- Managing routine maintenance and technical repairs of the distribution system.
- Serving as the key institutional link to the County Government, the WRA for water use compliance, and the NIA for scheme oversight.
- Continuing to serve as the mechanism for community liaison under the SEP, ensuring that women and vulnerable groups are represented in governance and decision-making.

4 CHAPTER FOUR: ENVIRONMENT AND SOCIAL BASELINE

4.1 Introduction

This Chapter presents the environmental and social baseline information for the proposed Maragima/Tagwa Water Project. describes the existing physical, biophysical, and socio-economic conditions of the project area, providing a reference point against which potential project impacts will be assessed.

4.2 Biophysical Environment

4.2.1 Climate

The project area experiences a bimodal rainfall pattern, characterized by two distinct rainy seasons the long rains from March to May and the short rains in October and November, separated by a prolonged dry spell from December to February when irrigation becomes essential to sustain agricultural production. According to data from the Kenya Meteorological Department (KMD) and the Nyeri County Integrated Development Plan (CIDP 2023 - 2027), the greater Kieni East Sub-County receives an average annual rainfall ranging between 700 mm and 1,200 mm, depending on elevation and proximity to Mount Kenya.

Temperatures in the project area generally range between 10 °C and 28 °C, consistent with records from the KMD Nyeri and Chaka stations (mean annual minimum of 10 - 12 °C and maximum of 26 - 28 °C). The warmest period typically occurs between January and February, while the coolest months are June to July, occasionally experiencing light frost, particularly in the higher elevations near the Mount Kenya slopes.

The project area lies within the Lower Highland Agro-Ecological Zone II (LH2), which is characterized by moderate rainfall, cool temperatures, and high potential for mixed and horticultural farming under irrigation. These climatic conditions underscore the importance of the proposed irrigation scheme as a climate-resilient intervention to enhance agricultural productivity in Maragima Sub-Location.

4.2.2 Topography

Maragima/ Tagwa Rukurwa Stream intake is located at approximately 0.3388° S, 37.0768° E, at an elevation of about 1,839 m above sea level. From the intake, the terrain descends towards the

Maragima farming areas with an average slope of 15 - 22 percent, providing sufficient hydraulic head to support gravity-fed water conveyance. The topography facilitates natural flow for irrigation distribution and reduces the need for pumping systems.

To minimize erosion and maintain slope stability, the project includes specific conservation interventions such as bamboo planting along both sides of the Rukurwa Stream, and construction of gabions and stone pitching, as detailed in the ESMMP.

4.2.3 Geology and Soils

The project area lies within the Central Highlands region, which is geologically characterized by Tertiary volcanic formations associated with the Mount Kenya volcanic system. The soils in the area are predominantly deep red loams, derived from volcanic parent material, and are generally well-drained and highly fertile.

Field observations during the ESIA confirm that the dominant soils within the command area are deep (>1 m), friable, and suitable for intensive agriculture. These soils exhibit good water-holding capacity and are commonly utilized for crop and fodder production.

Despite their fertility, the area's moderate to steep slopes (averaging 15 - 22%) increase the risk of surface erosion, particularly during the rainy seasons. To address this, the project integrates soil and water conservation measures such as stabilization of riverbanks using gabions and bamboo planting, to reduce sedimentation and maintain soil integrity along the irrigation corridor, consistent with the ESMMP.

Where soils may be disturbed during trenching or construction, the ESMMP provides for topsoil conservation and site reinstatement to prevent compaction and degradation of productive land.

4.3 Socio-economic

4.3.1 Population

According to the Kenya National Bureau of Statistics (KNBS, 2019 Kenya Population and Housing Census), Maragima Sub-Location in Thegu River Ward, Kieni East Sub-County had a recorded population of approximately 2,200 persons across about 440 households. Applying the county's average rural population growth rate of around 2 % per year, as used in the Nyeri CIDP 2023 -

2027, the 2025 population is projected to be about 2,480 persons in roughly 490 - 500 households.

Settlement in the project area is rural and scattered, with homesteads surrounded by agricultural land. The main local centres are Maragima Market and Tagwa Market, which provide access to basic goods, services, and social interaction. Community facilities within the area include Maragima Primary School, Maragima Secondary School, several churches representing different Christian denominations, and Maragima Police Post, which provides local security coverage.

Land is held under freehold tenure, and most households practice mixed farming for both subsistence and income. The area's settlement pattern reflects long-established family holdings with gradual land subdivision among household members.

4.3.2 Farming Systems

Farming is the main economic activity within the project area. The dominant production system is mixed farming, which combines both crop cultivation and livestock rearing. The main food crops cultivated include maize, beans, and potatoes, while horticultural crops such as kales, cabbages, french beans, onions, courgettes, and capsicum are also grown for household consumption and sale in local markets.

Livestock production plays a significant complementary role, with most households keeping dairy cattle, sheep, goats, and poultry. Dairy farming is a key income source and an important contributor to household nutrition.

Land ownership in the project area is freehold, with individual title deeds held by farmers. The average landholding size is about 5 acres per household, although subdivision through inheritance has gradually reduced the size of arable plots. Agricultural production is largely rain-fed, making farming activities highly dependent on seasonal rainfall.

The proposed irrigation project aims to enhance water availability and support year-round cultivation to improve crop yields, diversify production, and strengthen household food security. The main crops targeted for irrigation include Irish potatoes, beans, cabbages, onions, and fodder crops for livestock.

4.3.3 Education Institutions

According to the Nyeri CIDP 2023 - 2027, Kieni East Sub-County has an established network of public primary and secondary schools supported by the County Education Department. However, rural areas such as Maragima experience challenges related to classroom congestion, limited learning materials, and teacher shortages during peak enrolment periods.

Education levels among residents are moderate to high, reflecting the county's strong emphasis on literacy and youth development. Most school-going children in the area walk or use local transport to access nearby institutions, with secondary education enrolment supported by national bursary and scholarship programs.

The project area forms part of Thegu River Ward in Kieni East Sub-County, where access to basic education is generally good, though some schools face infrastructure and resource limitations. Within the immediate project area, the main learning institutions are Maragima Primary School and Maragima Secondary School, which serve the surrounding communities.

4.3.4 Religion

The population within the project area is predominantly Christian, reflecting the general religious composition of Nyeri County and central Kenya region. The main Christian denominations represented include the Presbyterian Church of East Africa (PCEA), the Catholic Church, the African Independent Pentecostal Church of Africa (AIPCA) and several Pentecostal and Evangelical groups such as the Full Gospel Church and the Pentecostal Evangelistic Fellowship of Africa (PEFA).

Churches serve not only as centres of worship but also as important platforms for community mobilization, information sharing, and social support within the project area. In addition, a small number of residents identify with Islamic or traditional belief systems, though these represent a small minority within the area (KNBS, 2019 Census: Nyeri County Religious Affiliation Data).

The strong presence of organized religious institutions provides a valuable avenue for stakeholder engagement and public sensitization during the implementation of the proposed project.

4.3.5 Market Centres

The project area is served by two main rural trading centres: Maragima Market and Tagwa Market. These two centres act as focal points for sale of farm produce, and access to agricultural inputs and household goods. They also provide social and administrative functions, hosting small retail shops, agro-vet outlets, produce aggregation points, and local eateries.

The presence of these markets is expected to enhance the socio-economic benefits of the proposed irrigation scheme by providing reliable outlets for increased farm production once the project becomes operational.

4.3.6 Security

According to the Nyeri CIDP (2023 - 2027), Kieni East Sub-County continues to experience low crime levels, and collaboration between local administrators, community policing units, and the County Security Committee has enhanced public confidence and safety.

The project area is generally peaceful and secure, benefiting from active administrative and community-based security structures. Security within Maragima Sub-Location is maintained through the Maragima Police Post and the Chief's Camp, which coordinate with the Kieni East Sub-County Police Division under the National Police Service.

The community also implements the *Nyumba Kumi Initiative*, a national neighborhood watch system that promotes information sharing and collective responsibility for local safety. This has contributed to effective prevention and response to petty theft and other minor security incidents.

Overall, the area provides a conducive environment for project implementation, with existing law enforcement and community safety structures capable of supporting construction and operational activities.

Gender relations

According to the Nyeri County Gender and Development Policy 2021-2025 it reveals that there are various forms of sexual and gender-based violence, with physical violence being the most commonly observed issue. Hitting or battering is reported at an alarmingly high rate of 71.4%, followed by domestic conflict at 52.4% and rape at 33.3%, indicating a severe crisis of physical and sexual abuse. Economic abuse (22.2%) and verbal abuse (17.5%) are also significant, highlighting multifaceted control and coercion. While some extreme outcomes like killings of GBV victims are reported at 9.5%, other forms like psychological humiliation, forced marriages, and deprivation of resources are observed at lower but still concerning rates (4.8% each). The presence of issues like early marriage (1.6%) and trafficking (1.6%) points to systemic exploitation, yet the reported 0% for marital rape and isolation may reflect underreporting or societal normalization of these specific abuses rather than their absence. While the data reveals significant issues, it is important to note that it is not ward-specific. With proper sensitization and surveillance, these problems can be minimized. Furthermore, the overall prevalence shown is not at an alarming level.

Physical Infrastructure

4.3.7 Roads and Accessibility

The project is well served by tarmacked and murram feed access roads connecting Chaka, Tagwa and the project area. These roads facilitate the delivery of construction materials, equipment, and transport of farm produce from the irrigation command area. Seasonal conditions may affect some murram sections; however, the roads remain generally passable throughout the year, with periodic maintenance ensuring year-round accessibility.

4.3.8 Energy

The project area is connected to the Kenya Power and Lighting Company (KPLC) main grid, which provides electricity for operational and potential construction activities. To enhance sustainability and reduce reliance on the grid, solar energy systems are recommended for pumping and irrigation operations, as well as for any project offices or support facilities.

4.3.9 Communication

The Mobile network coverage in the area is adequate, with Safaricom and Airtel providing reliable services. Landline telecommunication services are also available. These communication facilities support effective coordination of project activities and provide connectivity for residents in the command area.

4.3.10 Water Supply

The area is supplied with piped water abstracted from Rukurwa stream. It is recommended that the residents of the area should consider roof catchment to harvest rainwater so as to supplement the water supplied from the river.

4.3.11 Financial Institutions and Cooperative Societies

Kieni East's financial ecosystem is anchored by mainstream banks providing broad financial services and a strong cooperative movement offering tailored support to its agricultural and small-business communities. Kieni has numerous farmer-focused societies for , dairy, poultry, and cereals, plus sector-based SACCOs such as transport (matatu and bodaboda), traders' cooperatives (

4.4 Regulatory Compliance / Permits

The project will require several permits and approvals from relevant authorities to ensure legal and environmental compliance during construction and operation. These include approvals for water abstraction, land access, use of public lands, forest reserves, and construction activities. Compliance with these permits is essential to safeguard environmental resources, protect stakeholders' interests, and meet the requirements of regulatory bodies, including NEMA, WRA, KFS, and County Government authorities.

Key permits and approvals required for the project, the issuing authorities, their purpose, relevant compliance considerations, and current status are summarized in *Table 4-1*.

Table 4-1: Project Permits and Compliance Status

Permit / Approval	Issuing Authority	Purpose / Scope	Compliance Notes	Status / Remarks
Water Abstraction Permit	WRA	Authorizes abstraction of water from Rukurwa Stream for irrigation	Maintain within permitted limits; reapply or vary permit if total irrigation demand exceeds current limit	Obtained; variation recommended due to irrigation demand

Permit / Approval	Issuing Authority	Purpose / Scope	Compliance Notes	Status / Remarks
Wayleave / Temporary Land Access Agreements	Private landowners / institutions	Grants temporary access for construction along pipeline and infrastructure corridors	Ensure all agreements are signed prior to construction; maintain continued land use post-construction	In negotiation; to be signed before construction
Forest / Public Land Use Permit	KFS	Access and use of forest stations, riparian reserves, and other public lands	Obtain all required approvals before construction; comply with forest management guidelines	Pending approval; to be obtained before works commence
County Government Approvals / Utility Permits	County Government (relevant departments)	Use of county-designated utility spaces, road reserves, and public land	Secure necessary permits for construction; adhere to local regulations and conditions	Obtained
Environmental Impact Assessment (ESIA) Approval	NEMA	Approve environmental management plan and baseline assessment	Implement ESMP during construction and operation; periodic reporting to NEMA	Ongoing; EIA license to be obtained before works commence.
Construction / Building Permits	Local Authorities	Approvals for tanks, control structures, and civil works	Comply with local building codes and standards	To be obtained before construction
Occupational Health & Safety Compliance	Directorate of Occupational Safety and Health Services (DOSHS)	Ensure safe working conditions during construction	Implement health and safety plan; provide training and PPE for workers	Ongoing; compliance plan in place

5 CHAPTER FIVE: PUBLIC PARTICIPATION AND STAKEHOLDER CONSULTATION

5.1 Introduction

The Constitution of Kenya (2010), EMCA (Cap. 387), and the EIA Regulations (LN 101/2003, as amended by LN 32/2019) require public participation to ensure that communities and stakeholders are informed, consulted, and able to contribute to project planning and decision-making. Consistent with these requirements, the proponent has conducted focused consultations as part of the ESIA process, to understand community needs, potential impacts, and expectations, and to integrate these views into project design and management measures.

The project is also guided by the World Bank's ESF, particularly ESS10: Stakeholder Engagement and Information Disclosure, which requires transparent, inclusive, and ongoing engagement throughout the project life cycle.

This chapter summarizes the engagement activities undertaken, stakeholders consulted, key issues raised, and how stakeholder input has informed the project.

5.2 Objectives of Public Participation and Stakeholders Consultation

The key objectives of the public participation and stakeholders'consultation for proposed project were to:

a) Disseminate and inform the public and stakeholders about the project including key components and anticipated impacts.
b) Raise awareness among the public on the need for the ESIA process and its purpose.
c) Collect comments, suggestions and concerns from interested and affected parties.
d) Ensure stakeholder feedback is integrated into the ESA findings and project design.
e) Build community consensus and acceptance of the proposed project.
f) Promote inclusive participation, particularly of women, youth and vulnerable groups, in line with ESS10.

5.3 Methodology of Public Participation and Consultation

Members of the local community and other project stakeholders were engaged through a public meeting (baraza), key informant interviews (KIIs) with local leaders, and administration of

questionnaire samples. This approach allowed community members to share their views, raise concerns, and provide input that has been considered in project planning and mitigation measures.

5.3.1 Administration of Questionnaire Samples

A structured questionnaire survey was administered to 5 individuals sampled within the project area on 21st May 2025, to capture their perceptions of the proposed project. The survey provided quantitative and qualitative insights into community awareness, anticipated benefits and risks, and recommendations for project implementation. Overall, respondents demonstrated a high level of familiarity with the project and expressed strong support for its expected social and economic benefits, while also identifying specific concerns requiring mitigation.

A summary of the responses is presented in Table 5-1 below.

Table 5-1: Analysis of Questionnaire Responses

S/No.	Topic / Aspect	Analysis of Responses
1.	Familiarity with the Proposed Project / Need for the Irrigation Project	The vast majority of respondents answered "Yes." This indicates that the community is already aware of the project and recognizes the need for it within the Maragima/Tagwa communities.
2.	Perceived Negative Impact on Livelihood or Income	Most respondents answered "No," while a significant minority responded "Yes." Those who expressed concern mainly referred to a potential increase in population buying land in the area.
3.	Compatibility of the project with surrounding developments	Responses were mixed but leaned towards "Yes." Respondents generally felt the irrigation project would fit well with existing agricultural activities and community structures.
4.	Anticipated Positive Social and Environmental Impacts	Key positive impacts cited: job creation, increased income, improved food security,

S/No.	Topic / Aspect	Analysis of Responses
		general improvement of living standards, and increase in land value. One respondent linked economic improvement to a reduction in "climate crime" such as illegal logging due to poverty.
5.	Anticipated Negative Social and Environmental Impacts	Social: Concerns about social conflict, influx of labour from outside areas, and language/cultural barriers. Environmental: Concerns about water-related "legalities," poor waste management (possible micro-plastic issues), and trenches/road cuts causing transport difficulties and erosion.
6.	Community Suggestions for Mitigation Measures	The community suggested: prioritizing local labour, ensuring fair treatment and timely payment of workers, preserving vegetation ("leaving of trees where need be"), proper restoration of trenches, and providing training for farmers on irrigation and related technologies.
7	Additional Comments and Safeguards Recommendations	Respondents emphasized: need for training and education, business skills support, provision of quality seeds and protective gear, need for clear communication, and preference for using local labour so youth can benefit.

5.3.2 Public Meeting (Baraza)

A public consultation meeting was held on 27th May 2025 at the Maragima/Tagwa Water Project site. The meeting was attended by 63 stakeholders (43 men and 20 women), including representatives of the Maragima Tagwa Project Management Committee (15 members: 9 men and 6 women), zone representatives from Upper Tagwa, Lower Tagwa, Thegu, and Maragima, immediate neighbours of the project, and local administration officials.

The objectives of the meeting were to:

- Share details of the proposed project and anticipated benefits.
- Provide a forum for stakeholders to raise concerns, suggestions, and expectations.
- Ensure feedback is integrated into project design, consistent with ESS10.

During the public participation meeting, stakeholders had a chance to interact with the proponent and the ESIA team. Key issues raised and responses from the project are highlighted in Table 5-1 below.

Table 5-2: Issues Raised and Project Responses

S/No	Issue / Concern Raised	Stakeholder Group That Raised the Issue	Project Response / Required Action
1	Labour distribution: The community raised concerns regarding the distribution of labour during the implementation of the project.	Men and youth	The project committee will be involved. Labour allocation will involve the local community, prioritizing youth participation.
2	Occupational Health & Safety: There was a concern on how conflicts and Occupational Safety	Men	The committee shall ensure that distributions lines will be located in the right areas /road reserves to ensure there are land-related conflicts and human displacements.

	and Health Issues will be handled during laying of distribution lines		Appropriate PPEs will also be provided to workers according to nature of work.
3	Insecurity	Men	Community shall be encouraged to support project security measures; contractor to implement site security protocols.
5	Political Interference	Women	The Project Management Committee shall oversee implementation without political influence.
6	Corporate Social Responsibility (CSR) by the Contractor	Women	Community discussions will guide appropriate CSR initiatives during implementation.
7	Poor Access Roads	Men	Contractor shall be required to clear and maintain access roads for improved site accessibility.
8	Environmental and soil conservation	Youth	Community shall be sensitized on sustainable agriculture and environmental conservation practices.

A sample photograph of the public consultation meeting is displayed in Plate 5-1 below.

Plate 5-1: Sample Photograph of the Public Consultation Meeting held at the Maragima/Tagwa Water Project Site, 27th May 2025.

Copies of the minutes of the public meeting and attendance list are provided in *Annexes 11 and 12,* respectively.

5.4 Acceptability of the Proposed Project

From the stakeholder consultation and public participation conducted as part of the ESIA process, it was determined that the proposed Maragima/Tagwa Water Project is broadly acceptable to the local community. Participants expressed support for the project, highlighting anticipated benefits such as:

- Employment creation during construction and operation phases
- Improved water supply for domestic use, irrigation, and livestock
- Enhanced agricultural productivity, including crops and livestock

- Enhanced food security and nutrition for households in the project area
- Capacity building and community engagement through involvement in project activities.

The feedback collected from stakeholders has been analyzed and incorporated into the ESIA findings and project design, ensuring that project planning reflects local priorities and concerns, consistent with World Bank ESS10.

No objections were raised against the implementation of the project, indicating strong community acceptance. Continuous engagement and transparent communication will be maintained throughout the project lifecycle to preserve this acceptability.

6 CHAPTER SIX: ANALYSIS OF PROJECT ALTERNATIVES

6.1 Introduction

This chapter presents an analysis of the feasible alternatives considered for the proposed Maragima/Tagwa Water Project, examining the environmental, technical, economic, and social implications of each. The evaluation aligns with the requirements of the EMCA (Cap. 387), EIA Regulations (LN 101/2003, as amended by LN 32/2019), and the World Bank's ESF, particularly ESS 1 on the assessment and management of environmental and social risks and impacts.

The analysis covers the alternatives related to site location, water source, technology and design, project scale and phasing, construction materials, waste management, and energy use. The "*No Project*" option is also examined to provide a comprehensive assessment of the possible development scenarios.

6.2 Alternative Project Site

The option of relocating the proposed project to a different site was considered during preliminary screening. However, the current site was selected following extensive community consultations, technical feasibility assessments, and confirmation of its strategic location relative to beneficiary settlements and existing water infrastructure. Relocating the project would exclude the intended beneficiaries and introduce additional costs related to land acquisition, hydrological studies, and new approvals. Consequently, the proposed site remains the most suitable and socially justified location for the sub-project.

6.3 The No Project Alternative

Selection of the "*No Project*" alternative would mean that the proposed project would not be implemented and the proposed project site would remain in its current state. While this option would avoid temporary environmental disturbances associated with construction, it would also perpetuate the prevailing water scarcity challenges, limit agricultural productivity, and constrain improvements in health and sanitation. The community would continue to depend on unreliable and often unsafe water sources. This alternative is therefore not considered viable, as the socio-economic and public health benefits of the project far outweigh the minimal environmental risks that can be effectively mitigated through proper planning and management.

6.4 Alternative Technology and Design Options

6.4.1 Alternative Intake Designs

Two options were examined for the intake design, as described below:

a) Intake with Sediment Basin (Proposed Option)

This option entails the construction of a sediment basin at the intake point to trap sediments from upstream before water enters the main supply line. This approach improves water quality, reduces sediment load in the system, and prolongs the lifespan of the pipeline, though it requires additional land and periodic maintenance to remove accumulated silt. This option was preferred due to its long-term operational and environmental benefits.

b) Intake without Sediment Basin

This option, construction of a simple intake structure without sediment-trapping features, would reduce initial construction costs and allow for faster implementation. However, it would lead to more frequent pipe blockages and higher maintenance costs over time. Given these trade-offs, the intake with a sediment basin is preferred for its operational efficiency and long-term sustainability.

6.4.2 Water Conveyance Alternatives

Two conveyance methods were assessed: a gravity-fed system and a pumped distribution system.

a) Gravity-fed Piping System (Proposed Option)

The gravity-fed design relies on the natural topography to deliver water through a network of main and lateral pipes, minimizing operational costs, reducing energy use, and limiting the project's carbon footprint. The main drawback is that it requires optimal topography and alignment to maintain flow.

In view of the area's suitable gradient and the community's preference for low-maintenance infrastructure, the gravity-fed system is considered the most appropriate and sustainable option.

b) Pumped Irrigation System

Under this alternative, water is abstracted using pumps and then conveyed through pipes to farms. The main advantage of this alternative is that it can overcome topographical challenges and

reach distant farms. The main drawbacks are due to high energy costs, frequent maintenance, potential for noise pollution and emissions especially when diesel run pumps are used.

6.5 Catchment Management Options

Effective catchment management is critical for the sustainability of the proposed water system. Two approaches were evaluated- integrated catchment conservation and no catchment conservation, as described below.

6.5.1 Integrated Catchment Conservation (Proposed Option)

This option incorporates soil and water conservation measures such as such as tree planting, grass strips and construction of gabions to control soil erosion and reduce sedimentation. This approach enhances water quality, stabilizes slopes, and promotes long-term ecological resilience, although it demands consistent community participation and periodic maintenance.

The integrated catchment conservation was adopted as an essential component of the project design.

6.5.2 No Catchment Management

This alternative, proceeding without catchment management, would lower initial costs but would expose the system to rapid sedimentation, water quality degradation and reduced project lifespan.

6.6 Alternative Water Sources

6.6.1 Rainwater Harvesting

Rainwater harvesting was examined as an alternative water supply method. The system would involve rooftop catchments (metal or tile roofs preferred); gutters and downspouts with first flush diverter; storage tanks (above or underground); filtration unit; distribution system (gravity-fed or pumped). The benefits of rain water harvesting include: reduces dependency on groundwater or surface water; mitigates flood risk and soil erosion and low operational cost.

Although effective at household level, rainwater harvesting cannot meet the scale and reliability requirements of the proposed community water supply. Its dependence on seasonal rainfall and limited storage capacity renders it inadequate as a primary source. It is, however, recommended as a supplementary measure for households and public institutions within the project area.

6.6.2 Other Sources: Surface and Groundwater

Other potential water sources were considered, including nearby streams, springs, and groundwater abstraction through boreholes. Groundwater abstraction was found less favorable due to the depth of aquifers, potential salinity, and high energy and maintenance costs associated with pumping. The selected option (abstraction from Rukurwa Stream) was identified as the most viable based on its adequate yield, water quality, accessibility, and compatibility with gravity conveyance. It offers the most sustainable and technically feasible supply option for the project.

6.7 Alternative Project Scale and Phasing

The possibility of implementing the project in phases, beginning with limited-service coverage, was also explored. While this approach could reduce initial financial outlays, it would increase per-unit construction costs, complicate future system integration, and delay the realization of project benefits. Implementing the project at the designed full scale ensures efficiency, equitable access, and timely delivery of benefits to the community. The full-scale approach is thus retained as the most practical and cost-effective.

6.8 Alternative Construction Materials and Methods

Various materials were assessed for use in the construction of the water conveyance system. High-Density Polyethylene (HDPE) pipes were selected over Polyvinyl Chloride (PVC) pipes and galvanized steel due to their durability, flexibility, resistance to corrosion, and lower environmental footprint. Construction materials such as sand, gravel, and masonry will be sourced locally to minimize transportation impacts and support local livelihoods. Environmentally sensitive construction practices, including controlled excavation, site restoration, and dust suppression, will be applied to minimize disturbance during implementation.

6.9 Waste Management Options

Construction activities are expected to generate solid waste, including excavated materials, packaging, and metal scraps. Alternatives for managing these wastes include on-site disposal, off-site disposal at approved facilities, and reuse or recycling of materials. The preferred approach emphasizes waste minimization, segregation, reuse of excavated soil, and proper disposal of non-recyclables through licensed service providers in compliance with the EMCA (Waste

Management) Regulations, 2006. This approach ensures environmental protection and aligns with best practices for sustainable construction.

6.10 Alternative Energy Sources

Although the project primarily utilizes gravity flow, limited energy requirements may arise during construction or operation of auxiliary facilities. Energy options assessed include grid electricity, diesel generators, and solar systems. Solar energy was identified as the most sustainable and cost-effective option, offering clean and renewable power with minimal greenhouse gas emissions and low operational costs. This aligns with national energy policy and World Bank climate co-benefit objectives.

6.11 Preferred Alternative and Conclusion

Following a comprehensive evaluation of all feasible options, the combination of a gravity-fed system, sediment basin intake, and integrated catchment conservation emerges as the most technically feasible, environmentally sustainable, and socially acceptable design. Complementary use of HDPE materials, solar power for auxiliary needs, and sustainable waste management practices further enhance the project's environmental performance.

This configuration minimizes energy consumption, reduces sedimentation, and ensures long-term system reliability while supporting Kenya's objectives for sustainable water resource management. The "*No Project*" alternative remains undesirable as it would perpetuate water scarcity and limit community development opportunities.

In conclusion, the selected design provides the optimal balance between technical viability, cost efficiency, environmental protection, and community benefit, and is therefore recommended for implementation as the preferred alternative under the proposed Maragima/Tagwa Water Project.

7 CHAPTER SEVEN: ANALYSIS OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

7.1 Introduction

This chapter presents the analysis of potential environmental and socio impacts and risks associated with the proposed Maragima/Tagwa Water Project. The assessment covers project phases, namely, construction, operation and decommissioning, and identifies both beneficial and adverse impacts likely to arise from project implementation.

The objective of this analysis is to ensure that potential impacts are systematically evaluated, and that appropriate mitigation and enhancement measures are incorporated into project planning and execution.

The assessment draws upon findings from field surveys, stakeholder consultations, engineering designs, and professional judgment, and is guided by the EMCA 1999 (Amended 2015), the EIA Regulations (LN 101/2003, as amended by LN 32/2019), and relevant World Bank ESSs.

7.2 Project Construction Phase

The construction phase is expected to generate several social and economic benefits for the local community. While these impacts are largely temporary, they can be enhanced through deliberate measures to maximize local value, promote inclusivity, and align with World Bank ESSs.

7.2.1 Potential Positive Impacts and Enhancement Measures

(a) Creation of Temporary Job Opportunities

The project will create temporary job opportunities for skilled and unskilled workers drawn from the local community, providing a source of income and reducing short-term unemployment. Women and youth, as historically disadvantaged groups, can particularly benefit through targeted recruitment and mentoring.

Enhancement Measures: Prioritize local hiring through transparent processes, establish recruitment targets for women and youth, and monitor workforce composition to ensure inclusivity.

(b) Capacity Building and Skills Transfer

Workers engaged during construction will gain technical experience in masonry, plumbing, trenching, and environmental management. These skills can improve employability beyond the project and contribute to local human resource development.

Enhancement Measures: Provide structured on-the-job training, mentorship programs, and certification where feasible, with particular support for women and youth to build lasting capacity.

(c) Local Economy and Business Opportunities

The project will generate demand for construction materials, transport services, and other goods, benefiting local suppliers, traders, and small and medium enterprises (SMEs). The influx of workers will further stimulate local markets, which will in turn increase trade and strengthen livelihoods.

Enhancement Measures: Source materials locally where possible, provide advance procurement information to suppliers, and offer guidance on regulatory compliance and quality standards.

(d) Infrastructure Improvements

Construction activities may lead to improvements in access roads and related infrastructure, facilitating movement of materials and personnel. These enhancements can also benefit the broader community after project completion.

Enhancement Measures: Coordinate infrastructure upgrades with local authorities to ensure continued community use and maintenance.

(e) Contribution to Government Revenue

Taxes and levies on construction labour, materials, and services will support county and national government revenue, contributing to broader development objectives.

(f) Corporate Social Responsibility Opportunities

The contractor may undertake voluntary initiatives that support community priorities, such as upgrading local water points, schools, or health facilities, fostering goodwill and strengthening project-community relations.

Enhancement Measures: Align CSR activities with community needs and coordinate with local authorities to maximize benefits and avoid duplication.

7.2.2 Potential Negative Impacts and Mitigation Measures

7.2.2.1 Occupation Health and Safety (Workers)

Construction workers are exposed to dust, noise, machinery accidents, and musculoskeletal strain from lifting heavy equipment. Without proper management, these hazards may lead to injuries, illness, or fatalities.

Sensitive Receptors: Construction workers on-site, especially labourers involved in trenching, material handling, and machinery operation.

Proposed Mitigation Measures

- Register the site with DOSHS and ensure all workers are provided with appropriate PPE (helmets, gloves, safety boots, ear and eye protection) according to their tasks.
- Conduct regular toolbox talks and regular OHS training for all workers.
- Equip the site with a fully stocked first aid kit (as per the First Aid Rules, 1977) at all times and managed by qualified and trained first aid personnel.
- Develop and implement an ERP for incidents such as fire outbreaks, oil spills and accidents.
- Restrict site access to authorized personnel only.
- Ensure all workers have insurance and workmen's compensation.
- Facilitate the formation of a Safety and Health Committee, if workforce exceeds 20, in accordance with the Health and Safety Committees Rules, 2004.
- Conduct medical examination of workers as required by national laws.

  Inspect, maintain, and repair all vehicles, machinery, and equipment regularly; ensure machine operators are trained on safe operation. Maintain accidents and incidents records on site and implement a worker grievance mechanism for safety concerns.
- Maintain accidents and incidents records on site and implement a worker-GRM for safety concerns.

7.2.2.2 Traffic-Related Accidents (Community and Workers)

The laying of irrigation pipelines along existing road reserves is likely to temporarily disrupt traffic flow during construction. Movement of construction vehicles, excavation works, and partial road closures may cause traffic congestion, slow movement, and inconvenience to road users. There is also an increased risk of road accidents involving workers, pedestrians, and motorists due to the presence of open trenches, machinery, and inadequate signage or traffic control.

Proposed Mitigation Measures

- Prepare and implement a TMP covering all construction access routes, internal roads, and delivery schedules.
- Restrict vehicle speeds within the construction site and on nearby roads.
- Erect clearly visible warning signs, barriers, and flag persons at high-traffic or crossing points to alert and guide road users.
- Provide high visibility PPE such as vests and jackets, for all workers exposed to traffic.
- Schedule deliveries and heavy vehicle movements outside peak community activity hours to reduce interaction with residents and school children.
- Train all drivers and machinery operators on road safety, signaling, and defensive driving.
- Ensure adequate lighting and reflective markings on vehicles operating during low-light conditions.
- Ensure all machinery and vehicles are roadworthy and operated by licensed drivers.
- Restore road surfaces and remove debris immediately after completion of works.
- Establish a reporting and monitoring system for near-misses and traffic incidents, with corrective actions implemented immediately.
- Establish a reporting and monitoring system for near-misses and traffic incidents, with corrective actions implemented immediately.

7.2.2.3 Community Health and Safety Risks

Disturbances During construction, community members may be exposed to health and safety hazards, including noise, vibration, dust, open trenches, and the movement of construction vehicles and machinery. These risks can lead to injuries, stress, or other adverse effects if not properly managed.

The pre-existing 225m^3 masonry distribution tank located approximately 5m from the Sagana-Chaka highway is a high-risk area. This proximity poses a high risk of vehicular accidents and unauthorized public access, particularly by children and livestock.

Proposed Mitigation Measures

- Conduct all construction activities during daylight hours (8.00 am to 5.00 pm) to minimize community disturbance.
- Erect temporary notice boards or signage at strategic locations to inform the community of ongoing works, expected timelines, and potential hazards.
- Clearly mark and secure trenches and excavated areas with safety tapes, barriers, or cones.
- Provide visible warning signs, barriers, and signals at key access points to prevent accidents involving the community.
- Avoid trenching during the wet season and promptly backfill trenches after laying water pipelines.
- Carry out public health and safety awareness campaigns in nearby settlements to educate residents on site hazards, safe movement around construction areas, and pipeline trenching activities.
- Inform the community in advance of any temporary road closures and provide clear, visible signage to guide road users.
- Promptly fill excavated depressions to prevent the formation of stagnant water pools, which may serve as disease vectors.
- Promote awareness of the project grievance redress mechanism to enable community members to report concerns or incidents safely.

Proposed Mitigation for Masonry Distribution Tank

- Install robust, secure, and lockable fencing and safety gates around the entire tank perimeter to prevent unauthorized access and minimize the risk of accidental falls.
- Erect clear, highly visible hazard signage facing both the community and the adjacent highway.

- Implement drainage and structural stabilization (e.g., retaining structures) to prevent erosion or washout from the tank area onto the Sagana-Chaka highway.

7.2.2.4 Water pollution from Construction Runoff

Sediment, debris, and accidental spills from construction can enter Rukurwa Stream and adjacent wetlands, degrading water quality and affecting downstream users.

Proposed Mitigation Measures

- Install silt traps, sediment fences, or temporary bunds around excavation areas.
- Avoid construction activities (e gashing equipment or disposing chemicals) near watercourses.
- Store fuels, oils, lubricants, and chemicals in bunded areas away from drainage lines or water courses.
- Monitor Rukurwa Stream water quality during construction.
- Schedule construction to avoid heavy rainfall periods where feasible.

7.2.2.5 Soil Erosion

Excavation of trenches and earth works may cause loss of fertile soil, sedimentation in drains or water bodies, and destabilization of surrounding land.

Sensitive Receptors: Agricultural parcels, drainage channels, and riparian areas.

Proposed Mitigation Measures

- Implement soil conservation structures on erosion-prone areas to control soil movement.
- Limit unnecessary movement and disturbance of soil materials.
- Manage runoff and storm water effectively to reduce soil displacement.
- Restrict construction activities during rainy or wet conditions.
- Landscape and revegetate open areas upon project completion to restore soil fertility.
- Install appropriate drainage systems to manage surface runoff.

7.2.2.6 Loss of Vegetation and Biodiversity / Disturbance of Riparian Habitat

Clearing vegetation for construction and working near Rukurwa Stream can affect soil stability, microclimates, and ecosystem connectivity.

Proposed Mitigation Measures

- Limit clearly strictly to the areas required for construction.
- Rehabilitate cleared areas post-construction using native plant species.
- Control vehicles and machinery movement to avoid inadvertent disturbance.
- Implement riverbank stabilization measures (e.g gabions, stone pitching, bamboo planting).
- Avoid instream works during critical periods for local species.
- Monitor riparian habitats during and after construction to address unintended disturbance.

7.2.2.7 Air Pollution (Dust and Exhaust Emissions)

The construction activities will result to increased dust and gas emissions. Dust particles caused by vibrations of machines and vehicle movement suspends in the air. In addition, vehicles/trucks and machinery used in the construction will produce fumes that will affect the quality of air.

Sensitive receptors: workers onsite, local residents (homesteads, market centres, learning institutions, and places of worship).

Proposed Mitigation Measures

- Sprinkle water on exposed surfaces and access roads.
- Limit vehicle speeds to reduce dust dispersion.
- Cover trucks transporting friable materials.
- Provide appropriate PPE such as nose masks/respirators to exposed workers.
- Regular and prompt maintenance of construction machinery and equipment. This will minimize fuel consumption and emissions.
- Avoid unnecessary idling and schedule efficient equipment use.
- Use low-emission machinery where feasible.
- Monitor air quality in high traffic or machinery intensive areas.
- Workers should be encouraged to go for regular health check-ups for respiratory monitoring.

7.2.2.8 Generation of Solid Waste and Excavated /Spoil Material

During construction, the project will generate various forms of solid waste, including excavated soils, packaging materials, timber offcuts, broken pipes, and domestic waste from workers. Improper management of these materials can result in soil contamination, obstruction of drainage

systems, sedimentation of watercourses, and general environmental degradation. Similarly, excavated or spoil material, if not properly handled, may contribute to erosion, dust emissions, and blockages of drainage channels, with potential downstream impacts.

Proposed Mitigation Measures

- Prepare and implement a construction WMP as part of the C-ESMP, in line with NEMA requirements and WB ESS1. The plan should cover waste minimization, segregation, storage, collection, transportation, and disposal.
- The wastes should be properly segregated at source into reusable, recyclable and non-recyclable streams, providing clearly labelled waste receptacles on site.
- Stockpile spoil and excavated material only in designated areas away from drains, watercourses, and community areas. Stabilize or cover spoil piles to prevent erosion, dust generation, and runoff.
- Reuse suitable spoil for backfilling, landscaping, or other construction purposes wherever feasible.
- Transport excess waste and spoil to NEMA-approved disposal sites, ensuring proper documentation of movement and disposal.
- Prohibit open burning and indiscriminate dumping of construction waste on-site or in surrounding areas.
- Implement site grading and drainage to manage runoff from spoil piles and prevent sedimentation of nearby drains or watercourses.
- Conduct awareness and training sessions for workers on proper waste handling, spill response, and environmental protection.
- Maintain records of all waste and spoil generation, storage, reuse, and disposal for auditing purposes and compliance with regulatory requirements.

7.2.2.9 Non-Responsible Sourcing of Natural Resources

The construction of the project requires significant quantities of bulk materials, including sand, ballast, timber, and construction water. The demand for these resources, if sourced from unpermitted quarries, illegal timber harvesters, or unapproved water abstraction points, poses a risk of localized environmental degradation (e.g., habitat loss, accelerated erosion, riverbank

instability, and water scarcity conflicts). To mitigate this risk, all materials must be procured exclusively from legally licensed and permitted suppliers.

Proposed Mitigation Measures

- The Contractor shall procure all bulk natural resources (sand, ballast, timber, water) exclusively from suppliers who possess valid operating licenses and permits issued by the relevant national or county authorities (NEMA, WRA, KFS, etc.).
- Prior to any procurement, the Contractor must submit proof of the supplier's legal operating status to the Supervising Engineer and the County Safeguards Team for verification.
- Specifically, the Contractor must obtain and maintain:
    - Valid licenses/permits from NEMA/County authorities for all quarrying sites supplying sand and ballast.
    - Legal documentation proving sustainable sourcing of timber (where applicable).
    - A valid WRA Permit or licensed vendor documentation for the abstraction or supply of construction water.
- The Contractor will implement a tracking system to record the volume and source location of all materials used to ensure compliance and traceability.

7.2.2.10 Noise Pollution and Vibration Generation

Noise during construction is expected mainly from operation of machinery, construction equipment and vehicle movement. Prolonged exposure to high noise levels (>90dB (A) continuous for 8 hours) may affect workers' hearing and create nuisance for nearby residents.

Proposed Mitigation Measures

- Construction work should be uundertaken during the day, typically between 08:00 am to 5:00 pm as per NEMA EIA License conditions, to minimize disturbance to the community.
- Sensitize drivers and machinery operators to switch off engines when vehicles and machinery when not in use.

- Provide appropriate PPE such as earmuffs and earplugs, to workers operating noisy machinery or working in high-noise areas.
- Machinery and equipment should be maintained regularly to reduce noise resulting from friction or malfunctions.
- Where feasible, employ manual labour to minimize machinery noise.
- Sensitize workers on the importance of noise control and proper use of PPE.

7.2.2.11 Land and Soil Contamination (Oil and Grease Spills)

Accidental spills or leaks from construction machinery and equipment may contaminate soil and potentially affect nearby ecosystems**.**

Proposed Mitigation Measures

- Regularly inspect and maintain all machinery and equipment to prevent leaks.
- Store all fuels, oils and lubricants in designated, bunded areas away from water courses.
- Carry out maintenance activities only in service bays with containment measures.
- Promptly clean any accidental spills following NEMA-approved procedures.
- Train workers on safe handling of fuels, oils and chemicals.

7.2.2.12 Chance Finds / Cultural Heritage

Excavation and earthworks may uncover archaeological, historical, or culturally significant materials. Disturbance or removal of such finds can result in loss of heritage and non-compliance with national legislation and World Bank ESS8 - Cultural Heritage.

Proposed Mitigation Measures

- Develop and implement a Chance Finds Procedure aligned with national laws and ESS8.
- Immediately halt construction and notify relevant authorities if cultural heritage materials are discovered.
- Train construction workers to identify and report potential cultural artifacts.

- Ensure that any recovered artifacts are handled, documented, and conserved according to legal and professional standards

7.2.2.13 Sexual Exploitation and Abuse (Community-Focused)

Community members, particularly women and girls, may be vulnerable to sexual exploitation or abuse by project workers if safeguards are not implemented. SEA risk can arise from insufficient awareness, lack of monitoring, or inaccessible reporting mechanisms.

Proposed Mitigation measures

- Implement a SEA Action Plan aligned with the World Bank Good Practice Note on GBV.
- Enforce Codes of Conduct for all project personnel, with ongoing sensitization on SEA prohibitions and consequences of violations.
- Establish a community GRM: confidential, survivor-centered complaint channels accessible to all community members.
- Provide referral pathways, psychosocial support, and case management for survivors.
- Integrate SEA responsibilities to staff contracts, performance appraisals, and training programs.

7.2.2.14 Sexual Harassment (Worker Focused)

Workplace sexual harassment may occur among project staff if human resource policies are weak or poorly enforced. This can create a hostile work environment, reduce productivity, and potentially compromise safety.

Proposed Mitigation Measures

- Implement robust HR policies aligned with national law and best practice practices.
- Integrate SH provisions into worker CoC, specifying expected behaviour and reporting mechanisms.
- Conduct training for staff on appropriate workplace behavior and reporting mechanisms.
- Establish a worker-GRM: confidential complaint channels for employees, including escalation procedures and protection from retaliation.

7.2.2.15 Gender-Based Violence (Community and Worker-Focused)

Project activities, including employment and compensation schemes, may heighten GBV risk both in the workforce and the surrounding community.

Proposed Mitigation Measures

- Conduct proactive community engagement, particularly with women and vulnerable groups, to identify GBV risk points.
- Review project components (e.g., compensation or employment practices) to mitigate triggers.
- Implement specific mitigation plans for identified GBV risks.
- Ensure referral mechanisms and psychosocial support services are available for both community members and workers affected by GBV.
- Maintain separate GRMs for community and workforce complaints, ensuring confidentiality and survivor-centered handling.

7.2.2.16 Risk of Increased Sexually Transmitted Infections (Community and Workers)

The influx of workers during construction may expose individuals to communicable diseases, including HIV and AIDS and other STIs.

Proposed Mitigation Measures

- Conduct awareness campaigns and workshops for workers and the community on HIV and AIDS, STIs, and general communicable disease prevention.
- Provide condoms and promote safe sexual practices.
- Include health monitoring and preventive measures in the Contractor's Health and Safety Plan.

7.3 Project Operations Phase

7.3.1 Potential Positive Impacts and Enhancement Measures

a) Reliable Water Supply and Agricultural Productivity

A consistent and reliable water supply for irrigation and domestic use will enhance agricultural output, increase fodder and crop production, and support livestock management.

Enhancement Measures: Provide training and extension services to farmers on efficient water use, modern irrigation techniques, and sustainable crop management to maximize productivity and resource efficiency

b) Food and Nutrition Security

Increased crop and livestock will improve household food availability and dietary diversity, particularly for vulnerable groups.

Enhancement Measures: Encourage crop diversification, introduce high-nutrition crops, and integrate community nutrition awareness programs.

c) Employment and Livelihood Opportunities

Project operation and maintenance activities will create long-term jobs for technical staff, including water system operators, mechanics, and administrative personnel.

Enhancement Measures: Prioritize local recruitment, provide structured training, and support career development to strengthen local capacity and human capital.

d) Economic Stimulus for Local Communities

Reliable water and agricultural outputs will generate surpluses that can be sold in local markets, increasing household income and stimulating the local economy.

Enhancement Measures: Facilitate market linkages, promote access to financial services, and encourage women and youth participation in agri-business ventures.

e) Strengthening Community Resilience

Water availability contributes to long-term community resilience against climate variability, drought, and food insecurity.

Enhancement Measures: Encourage community-managed water governance structures to ensure equitable access and sustainable use.

f) Infrastructure Benefits

Operational activities may necessitate upgrading or maintaining access roads and water points, which also benefits the wider community.

Enhancement Measures: Coordinate infrastructure improvements with local authorities to maximize community access and utility.

7.3.2 Potential Negative Impacts and Mitigation Measures

The operations phase of Maragima/Tagwa Water Project will focus on irrigation management, farm-level water use, and engagement with the project's registered water users. While these activities are critical for improving agricultural productivity and livelihoods, they can also give rise to several potential negative impacts if not properly managed. The expected negative impacts, along with mitigation measures, are described below.

7.3.2.1 Gender-Based Violence and Sexual Exploitation and Abuse (Community)

Women youth, and vulnerable households may face GBV or SEA due to power imbalances, inequitable access to irrigation resources, or increased interaction with project staff. Such incidents could lead to physical, emotional, and economic harm, undermine trust in the project, reduce participation in irrigation schemes, and exacerbate existing social inequalities.

Proposed Mitigation Measures

- Conduct community awareness and sensitization campaigns on GBV/SEA and reporting mechanisms.
- Establish a confidential, survivor-centered community GRM guided by the NAVCDP GRM framework but tailored to local context, with clear escalation pathways.
- Provide psychosocial support and referral services through established County or partner institutions.
- Promote women's participation in water management committees to enhance decision-making power.
- Conduct targeted gender-sensitive training sessions for women at household and farm level on crop production, climate-smart agriculture, and financial management.
- Track women's engagement and decision-making in project activities through gender-responsive M&E to guide adaptive management.

Supporting activities include baseline gender analysis, targeted workshops, and periodic reporting on participation metrics.

7.3.2.2 Sexual Harassment (Workers)

Project workers may experience workplace sexual harassment if behavioural standards and reporting mechanisms are weak.

Proposed Mitigation Measures

- Integrate explicit SH prohibitions within worker CoC consistent with national labour laws and World Bank ESS2.
- Ensure all staff sign the CoC prior to engagement and are briefed on consequences of non-compliance.
- Conduct mandatory training and refresher on professional conduct and reporting.
- Implement the NAVCDP worker-GRM framework, tailored for the subproject, to ensure confidential and safe reporting channels with protection from retaliation.
- Designate a trained Gender/GBV focal point within the project team.
- Enforce disciplinary action for confirmed SH incidents.
- Periodically monitor workplace culture and grievance trends through staff surveys and GRM reports to identify risks early.

7.3.2.3 Gender Disparities and Social Inclusion

Without targeted actions, benefits from irrigation may not be equitably shared, limiting participation of women, youth, and marginalized households.

Proposed Mitigation Measures

- Mainstream gender and inclusion principles in all operational activities to ensure equitable access to water, training, and governance.
- Ensure 30-40 % representation of women, youth, and vulnerable groups in Maragima/Tagwa Water Project's management and related committees.

- Conduct gender-responsive capacity building on irrigation management, leadership, financial literacy, and resource planning.
- Provide targeted agricultural support and inputs (e.g., seeds, tools, irrigation equipment) to women- and youth-led households.
- Establish transparent benefit-sharing mechanisms with clear communication on water allocation, tariffs, and maintenance obligations.
- Track participation and benefits using sex-disaggregated data and inclusion indicators.
- Engage local leadership and the project's management / governance structures to address potential exclusion, discrimination, or elite capture of project benefits.

7.3.2.4 Theft, Vandalism and Damage to Infrastructure

The project's distributed assets (pipelines, valves, storage facilities) are vulnerable to theft or vandalism, which can interrupt water supply and lead to disputes. This risk is compounded by the exposure of the 225m^3 masonry distribution tank, which is approximately 5m from the Sagana-Chaka highway, making it susceptible to external damage and unauthorized access.

Proposed Mitigation Measures

- Strengthen community awareness and ownership through continuous engagement led by by the PMC.
- Develop a community-based monitoring and reporting system.
- Incorporate security features (lockable valve chambers, tamper-proof meters, and signage) during installation and rehabilitation.
- Develop and implement a detailed OSSP detailing strict protocols for regular inspection, maintenance, and securing all permanent structures, with specific attention given to the high-risk location of the 225m^3 masonry distribution tank.
- Ensure grievance redress mechanisms are accessible for reporting theft or disputes.

7.3.2.5 Water Use Conflicts and Governance Risks

Inequitable water distribution or unclear allocation schedules may create disputes between users.

Potential Mitigation Measures

- Establish transparent water-allocation plans and water users' by-laws.

- Convene periodic stakeholder forums for scheduling and dispute resolution.
- Train the PMC in mediation and document all allocation decisions.

7.3.2.6 Occupation Health and Safety Risks (Workers)

Project staff and contracted workers involved in irrigation infrastructure maintenance, water distribution, or administrative functions may face various occupational hazards, including physical injuries from slips, falls, and accidents during maintenance.

Proposed Mitigation Measures

- Regular OHS training and refresher courses for all operational and maintenance workers, including safe work procedures, equipment handling, and emergency preparedness.
- Conduct task-specific risk assessments before undertaking any maintenance or repair activities to identify hazards and preventive controls.
- Provide and enforce the proper use of PPE such as helmets, gloves, boots, reflective jackets, hearing protection, and eye shields, as per OSHA 2007.
- Maintain clean, dry and unobstructed work areas to minimize slips and falls, particularly in offices, pumping stations and maintenance yards.
- Ensure first aid kits are available and adequately stocked at all operation sites, with at least one trained first aider per shift.
- Prepare and regularly update ERPs for the operational phase. These protocols must specifically address procedures for rapid and safe response to pipeline failures (e.g., bursts, major leaks, washouts) to minimize property damage and prevent injury.
- Conduct routine medical examination for maintenance personnel as required by the Medical Examinations Rules of 2005.
- Where the workforce exceeds 20, facilitate formation of a safety and health committee.
- Carry out regular safety audits and workplace inspections to ensure compliance.
- Maintain an incident register and investigate all reported cases or near misses.

7.3.2.7 Public Health and Waterborne Disease Risks

Stagnant irrigation water may promote mosquito or snail breeding, leading to malaria or bilharzia outbreaks.

Proposed Mitigation Measures

- Maintain proper drainage and remove stagnant pools.
- Promote hygiene and sanitation awareness.
- Collaborate with County Public Health offices for surveillance and vector control.
- Encourage household use of mosquito nets and clean canal surroundings.

7.3.2.8 Soil Erosion and Land Degradation

During the operational phase, irrigation and cultivation on sloping land may accelerate soil erosion, particularly where vegetation cover is inadequate or conservation measures are weak. This may lead to loss of topsoil, siltation of canals and storage tanks, reduced soil fertility, and long-term land degradation, undermining both agricultural productivity and infrastructure sustainability.

Proposed Mitigation Measures

- Establish soil and water conservation structures such as "*Fanya Juu* / *Fanya Chini*" terraces, contour bunds, grass strips, and hedgerows.
- Encourage contour ploughing and planting along contour lines to reduce surface runoff.
- Promote vegetative cover and agroforestry to stabilize soils and enhance moisture retention.
- Regularly monitor erosion-prone areas and implement corrective measures.
- Provide training through extension officers on land husbandry and conservation agriculture techniques.

7.3.2.9 Soil Degradation and Pollution

Improper irrigation practices, overuse of fertilizers and pesticides, and inadequate drainage may cause soil degradation and contamination. These can result in nutrient depletion, salinization, and pollution of nearby water bodies through agrochemical runoff, reducing soil fertility and posing risks to human and ecosystem health.

Proposed Mitigation Measures

- Promote integrated soil fertility management (ISFM), including contour ploughing, mulching, crop rotation, and use of organic manure to maintain soil structure and fertility.
- Ensure appropriate irrigation scheduling and soil moisture monitoring to prevent over-irrigation and waterlogging.
- Train farmers on safe handling, application, and disposal of agrochemicals in accordance with NEMA and Pest Control Products Board guidelines.
- Encourage periodic soil testing to guide fertilizer application and maintain nutrient balance.
- Establish and maintain drainage systems within the irrigated areas to prevent salinity buildup and stagnation.
- Establish buffer strips and vegetation along waterways to filter runoff.
- Integrate soil and water quality monitoring into the routine operations of the PMC.

7.3.2.10 Water Pollution and Contamination Risks

Water quality within the Maragima Tagwa scheme and downstream areas may be affected by runoff carrying sediments, fertilizers, pesticides, or oil residues from irrigation equipment and vehicles. Inadequate chemical storage or accidental spills could also contaminate surface and groundwater sources, affecting domestic users, livestock, and aquatic life. Without proper mitigation, such pollution can degrade ecosystem health and reduce the safety and reliability of water resources for the community.

Proposed Mitigation Measures

- Train farmers and irrigation operators on safe handling, mixing, and application of agrochemicals, and encourage use of environmentally friendly alternatives where feasible.
- Provide designated, bunded chemical storage areas away from water bodies to prevent accidental leaks and spills.
- Develop and enforce buffer zones between irrigation plots and natural watercourses.
- Promote integrated pest management (IPM) to minimize dependence on chemical pesticides.

- Ensure all fuels, lubricants, and oils are stored and handled in line with NEMA and county regulations.
- In case of contamination, scoop and dispose of polluted soils in approved disposal sites and report incidents to NEMA and relevant authorities.
- Conduct periodic water quality monitoring (e.g., turbidity, pH, nitrates, phosphates) to detect pollution trends and guide adaptive management.

7.3.2.11 Inefficient Water Use and Resource Over-Extraction

During the operational phase of the project, there is a risk of inefficient or excessive water use among farmers and community members benefiting from the irrigation system. Low awareness of efficient irrigation practices, inadequate scheduling, and lack of maintenance of water distribution infrastructure can result in water wastage, over-abstraction from the source, and reduced availability for downstream users. Over time, such inefficiencies may contribute to conflicts among users, decreased water pressure, and long-term stress on the watershed and associated ecosystems. If unaddressed, this could undermine the sustainability of both the irrigation scheme and community livelihoods that depend on it.

Proposed Mitigation Measures

- Conduct regular community training and awareness programs on efficient water use, irrigation scheduling, and climate-smart farming practices
- Promote water-saving irrigation technologies such as drip and sprinkler systems where feasible.
- Strengthen the capacity of the PMC to enforce equitable water distribution schedules, usage quotas, and penalties for overuse.
- Install master meters and sectional metres to monitor water use both at source and farm level, with records maintained by the PMC.
- Undertake periodic leak detection, pipeline maintenance, and prompt repair of damaged infrastructure to prevent unnecessary losses.
- Encourage the use of rain water harvesting and storage tanks to supplement irrigation water during dry seasons.

- Incorporate water-use efficiency indicators within the project's Monitoring and Evaluation (M&E) framework, linked to the Water Users' reporting, to ensure sustainability and compliance with water management plans.
- Encourage collection of spilled water in a reservoir for use in establishment of community - managed tree nurseries.

7.3.2.12 Solid Waste Generation and Management

The project's operation and maintenance phase will generate diverse solid waste, including general materials like scrap metal, plastics, and office refuse, in addition to potentially hazardous streams such as contaminated rags and chemical containers. Improper disposal of this waste stream, generated during pipe replacement and administrative works, is a significant environmental risk, leading to contamination, drainage blockage, and visual pollution. These impacts are of particular concern due to the proximity of sensitive receptors, including local settlements, schools, and the riparian areas along the Rukurwa Stream.

Proposed Mitigation Measures

- Implement an integrated solid waste management (ISWM) approach emphasizing waste minimization, segregation, recycling, and safe disposal.
- Segregate waste at source into recyclable, reusable, and non-recyclable streams categories using labelled containers at offices, storage areas, and work sites.
- Engage NEMA-licensed waste handlers for transport and disposal of non-recyclable and hazardous waste at approved facilities.
- Promote reuse or recycling of of salvageable materials (e.g., metal offcuts, old pipes, timber) through partnerships with local recyclers.
- Maintain a waste register and disposal records to ensure traceability and compliance with national waste management practices.
- Conduct periodic training and awareness sessions for the project's registered members, operators, and community workers on proper waste management practices.
- Include solid waste performance indicators in the project's monitoring plan, such as volume of waste recycled, safely disposed, or diverted from dumpsites.

7.3.2.13 Biodiversity and Ecosystem Disturbance

Operation of the irrigation scheme may alter natural water flows and affect aquatic habitats, wetlands, and riparian vegetation. Runoff carrying sediments or agrochemicals could degrade water quality and disturb fish, amphibians, and pollinators. Clearing of vegetation for canals or farmland may also fragment habitats and reduce biodiversity if unmanaged.

Proposed Mitigation Measures

- Maintain riparian buffer zones with native vegetation to stabilize banks and filter runoff.
- Prevent discharge of polluted or sediment-laden water into rivers and wetlands.
- Apply IPM and reduce use of chemical pesticides.
- Avoid expansion of cultivation into wetlands or other sensitive areas.
- Periodically monitor key species and vegetation cover around irrigation areas.
- Conduct community awareness programs on conservation and sustainable land use.

7.3.2.14 Energy Use and Greenhouse Gas Emissions

Continuous operation of irrigation pumps and water distribution systems may increase energy use and GHG emissions, particularly where diesel or grid electricity is used. Inefficient equipment or poor maintenance can raise operational costs and the project's carbon footprint.

Proposed Mitigation Measures

- Maintain pumps and equipment regularly to improve efficiency.
- Promote solar-powered or other energy-efficient pumping systems where feasible.
- Schedule pumping to reduce unnecessary operation and energy wastage.
- Track energy consumption and emissions through project M&E.
- Train operators on energy-efficient irrigation practices

7.4 Project Decommissioning Phase

At the end of the project's operational life, the Maragima/Tagwa Water Project may undergo decommissioning, involving dismantling of structures, removal of pipelines and fittings, and rehabilitation of the affected areas. This process will aim to restore the site to an environmentally stable and socially acceptable condition while ensuring compliance with national environmental regulations and World Bank ESS.

Decommissioning activities, though limited in duration, will generate both positive and negative environmental and social impacts. The positive impacts relate mainly to short-term employment and material recovery, while the negative ones arise from demolition waste, dust emissions, noise, and occupational safety risks. These impacts and corresponding enhancement and mitigation measures are discussed below.

7.4.1 Potential Positive Impacts and Enhancement Measures

a) Short-Term Employment and Livelihood Opportunities

Decommissioning activities will require both skilled and unskilled labour for demolition, segregation, transport and restoration. This will provide temporary income and employment to local workers, particularly the youth.

Enhancement Measures

- Prioritize local hiring with gender inclusion.
- Offer short technical induction on safe demolition and waste management practices.
- Ensure fair labor conditions consistent with ESS2.

b) Material Recovery and Reuse

Demolition will generate recoverable materials such as pipes, fittings, timber, and scrap metal. Reuse or recycling of these materials will reduce waste volumes and resource demand.

Enhancement Measures

- Segregate materials at source to identify those suitable for reuse or recycling.
- Donate reusable materials to local community institutions where appropriate, ensuring transparency and record-keeping.
- Contract licensed recyclers for metal and plastic components.

c) Support to Transport Service Sector

Haulage of debris and reusable materials will stimulate local transport businesses and small enterprises providing food, supplies, or accommodation.

d) Site Rehabilitation and Environmental Restoration

Once decommissioning works are complete, disturbed areas can be rehabilitated and re-vegetated. This will restore visual aesthetics, stabilize soils, and support long-term land productivity.

Enhancement Measures

- Implement site restoration plans including backfilling, grading, and replanting with native species.
- Coordinate rehabilitation activities with county environmental officers and the Project's Management Committee.

7.4.2 Potential Negative Impacts and Mitigation Measures

7.4.2.1 Occupational Health and Safety Risks (Workers)

Decommissioning involves manual dismantling, lifting, cutting, and handling heavy or sharp materials. Workers will be exposed to risks of falls, lacerations, dust inhalation, and accidents with tools or machinery.

Proposed Mitigation Measures

- Conduct pre-demolition risk assessments and Job Safety Analyses (JSAs)
- Provide PPE (helmets, gloves, safety boots, goggles, dust masks).
- Ensure induction training on OHS, emergency response, and use of tools.
- Maintain first-aid kits, trained first-aiders, and firefighting equipment on-site.
- Implement and regularly test the ERP.
- Form a Health and Safety Committee where workforce exceeds 20 people.
- Ensure workers' insurance and workmen's compensation coverage.

7.4.2.2 Generation and Management of Demolition Waste

During the decommissioning phase a lot of waste is generated that include the demolition waste such as concrete, metals, timber and plastics. If not properly managed, these wastes could cause land pollution, blocked drainage, and community health risks.

Proposed Mitigation Measures

- Apply ISWM principles emphasizing waste minimization, reuse and recycling.

- Segregate waste at source and transport non-recyclable residues to approved disposal sites using NEMA-licensed waste handlers.
- Maintain documentation on quantities of waste generated, reused, recycled and disposed.
- Sensitize workers on proper waste management procedures/practices.

7.4.2.3 Air Pollution (Dust and Emissions)

Demolition, transportation, and waste handling will generate dust and exhaust emissions, potentially affecting workers and nearby residents.

Proposed Mitigation Measures

- Regularly water unpaved surfaces and earth stockpiles to suppress dust.
- Maintain vehicles and equipment to minimize emissions.
- Limit speed of haulage trucks within and around the site.
- Provide dust masks to workers and limit exposure duration.

7.4.2.4 Noise and Excessive Vibration

Use of mechanical tools and haulage vehicles will increase noise and vibration levels, potentially disturbing nearby communities and wildlife.

Proposed Mitigation Measures

- Restrict noisy operations to daytime hours (08:00 am - 5:00 pm).
- Use well-maintained equipment fitted with mufflers.
- Educate workers and drivers to switch off idling engines.
- Provide ear protection where noise exceeds 85 dB(A).

7.4.2.5 Loss of Vegetation and Habitat Disturbance

Decommissioning and site clearance may destroy vegetation planted during operation or natural regrowth, leading to minor habitat disturbance.

Proposed Mitigation Measures

- Minimize clearance footprint and avoid unnecessary destruction of vegetation.
- Replant disturbed areas with indigenous plant species after works.

- Involve the registered water users and wider community in post-decommissioning restoration activities.

7.4.2.6 Community Health and Safety Risks

Dust, noise, vehicle movement, and open excavations could endanger nearby residents, particularly children. Poor access control could also expose the public to injury risks.

Proposed Mitigation Measures

- Erect warning signage and secure work areas with fencing or barricades.
- Maintain clear communication with local communities regarding work schedules and restricted zones.
- Enforce vehicle safety (speed limits, flagmen, reflective markings).
- Provide contact information for reporting incidents or accidents.

8 CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

8.1 Introduction

This chapter presents the environmental and social mitigation and monitoring measures for the proposed Maragima / Tagwa Water Project, which form an integral component of this ESIA. The ESMMP operationalizes the assessment findings by translating the potential environmental and social impacts identified in Chapter Seven into a practical, actionable framework for mitigation, monitoring, and management throughout the project's lifecycle.

The ESMMP comprises phase-specific plans (construction, operation, and decommissioning) and two key thematic sub-plans, namely:

- A GRM that provides a structured process for receiving and resolving project-related complaints; and
- An IPMP that promotes sustainable, safe, and environmentally sound pest management practices under irrigated agriculture.

8.2 Objectives of the ESMMP

The ESMMP serves as the operational tool for managing, monitoring, and reporting on the project's environmental and social performance. Its objectives are to:

- Provide a structured approach for implementation of mitigation measures proposed in Chapter 7;
- Define roles and responsibilities for environmental and social management;
- Establish measurable indicators for performance monitoring and compliance;
- Identify institutional and financial resources for ESMMP implementation; and
- Ensure continual improvement through adaptive management and regular reviews.

8.3 Phase - Specific ESMMP Tables

The ESMMP is organized into phase-specific matrix tables (Tables 8-1 to 8-3):

- Specifying mitigation and enhancement actions to prevent, minimize adverse impacts;
- Assigning clear institutional responsibilities for implementation and supervision;
- Setting measurable timelines and performance indicators; and
- Providing indicative cost estimates for implementation.

Table 8-1: Construction Phase ESMMP

Potential Environmental / Social Impact	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor / Oversight	Estimated Cost (KES)
Occupational Health and Safety (Workers)	• Register project site as a workplace - DOSHS. • Provide PPE (helmets, gloves, boots, ear & eye protection). • Conduct regular toolbox talks, OHS training, medical exams. • Equip first aid kits with trained personnel. • Develop ERP, restrict site access to authorized personnel. • Form Safety & Health Committee if workforce >20. • Maintain machinery/equipment; keep accident logs; implement worker GRM.	• % of workers trained in OHS • PPE compliance rate • No. of incidents/near misses reported • ERP availability • Accident/incident log completeness	Contractor / Site Safety Officer	Weekly inspection; monthly reporting	County Safeguards Team, DOSHS	20,000
Traffic-Related Accidents	• Develop and implement Traffic	• No. of traffic incidents/near-misses • TMP compliance	Contractor / Traffic Safety Officer	Weekly	County Safeguards Team	10,000

Potential Environmental / Social Impact	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor / Oversight	Estimated Cost (KES)
(Workers and Community)	Management Plan (TMP). • Restrict speeds, use signage, barriers, flaggers at crossings. • Schedule deliveries outside peak hours; provide high-visibility PPE. • Train drivers and operators on defensive driving. • Implement incident reporting and corrective actions.	• Visibility and signage adequacy			County Department of Transport	
Community Health and Safety	• Restrict construction to daytime hours (8:00am - 5:00pm). • Install notice boards/signage at strategic locations. • Secure trenches with barriers, safety tape, cones. • Avoid wet season trenching; promptly backfill trenches.	• No. of safety awareness campaigns • No. of trenches properly secured • No. of grievances received/resolved • Fencing and signage installed/maintained at the Masonry Tank	Contractor / Community Liaison Officer	Monthly	County Safeguards Team National Government Administration Officers (NGAO)	20,000

Potential Environmental / Social Impact	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor / Oversight	Estimated Cost (KES)
	• Conduct community safety awareness campaigns. • Inform community of road closures and hazards. • Promote project GRM. • Install robust, secure, and lockable perimeter fencing and safety gates around the 225m^3 Masonry Tank (5m from highway) • Erect highly visible hazard signage at the Masonry Tank					
Water Pollution from Construction Runoff	• Install silt traps, sediment fences, bunds around excavation. • Prevent washing of equipment into watercourses. • Store fuels/chemicals in bunded areas away from water.	•Presence/functionality of sediment control structures • Water quality measurements	Contractor	Monthly	County Safeguards Team NEMA WRA	20,000

Potential Environmental / Social Impact	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor / Oversight	Estimated Cost (KES)
	• Monitor stream water quality. • Schedule construction to avoid heavy rains.					
Soil Erosion	• Construct erosion control structures on vulnerable sites. • Limit unnecessary soil movement. • Proper runoff management; restrict work during wet conditions. • Rehabilitate and re-vegetate open areas post-construction.	• No. of erosion control measures implemented • % of land rehabilitated/re-vegetated	Contractor	Monthly	County Safeguards Team, County Agriculture Department	50,000
Loss of Vegetation and Riparian Habitat Disturbance	• Limit clearing to construction footprint. • Replant native vegetation post-construction. • Control machinery movement; implement riverbank stabilization (gabions, stone pitching). • Avoid in-stream work during sensitive	• Area cleared vs. replanted • Condition of riparian habitat	Contractor	Monthly	County Safeguards Team, KFS	20,000

Potential Environmental / Social Impact	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor / Oversight	Estimated Cost (KES)
	periods; monitor habitat.					
Air Pollution / Dust / Exhaust Emissions	• Sprinkle water on dusty surfaces; limit vehicle speed. • Cover material transport trucks; provide dust masks. • Maintain machinery; avoid unnecessary idling; use low-emission equipment. • Conduct air quality monitoring in high-dust areas.	• Dust levels at site boundaries • % of workers using dust PPE • No. of machinery maintained	Contractor	Weekly	County Safeguards Team, County Department of Environment, NEMA	10,000
Solid Waste and Spoil Material	• Implement Construction WMP – segregation, storage, collection, transport, disposal. • Stockpile spoil in designated areas; reuse or transport excess to NEMA-approved sites. • Prohibit open burning; manage site grading/drainage. • Maintain waste records.	• No. of waste bins on site • No. of spoil stockpiles properly managed • Waste disposal documentation	Contractor	Weekly	County Safeguards Team, County Environment Committee NEMA	10,000

Potential Environmental / Social Impact	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor / Oversight	Estimated Cost (KES)
Illegal or Unsustainable Sourcing of Materials (Sand, Ballast, Timber, Water)	• Mandate procurement of all bulk natural resources exclusively from legally licensed and permitted suppliers. • Ensure construction water is sourced from WRA-permitted points or licensed vendors. • Maintain documentation proving legal origin and volume of all resources used.	• Copy of NEMA/County quarry licenses for sand/ballast. • Copy of WRA Permit or vendor license for construction water. • Contractor's Material Sourcing Log and contracts.	Contractor/Procurement Officer	Pre-Construction (Verification); Monthly (Audit)	County Safeguards Team, County Department of EnvironmentNEMA, WRA	N/A (Cost included in overall procurement)
Noise Pollution and Vibration	• Limit noisy activities to 8:00 -17:00hrs. • Provide appropriate PPE (earmuffs, earplugs). • Maintain machinery; switch off idle engines. • Use manual labour where feasible; sensitize workers on noise control.	• Noise levels (dBA) • % of workers using PPE • No. of complaints from community	Contractor	Weekly	County Safeguards Team, NEMA	20,000

Potential Environmental / Social Impact	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor / Oversight	Estimated Cost (KES)
Land / Soil Contamination (Oil and Grease Spills)	• Regular inspection and maintenance of machinery; store fuels/oils in bunded areas. • Carry out maintenance in service bays; clean spills promptly. • Train workers on safe handling of fuels and chemicals.	• No. of spills recorded • Spill response records	Contractor	Monthly	County Safeguards Team NEMA	50,000
Chance Finds / Cultural Heritage	• Develop and Implement Chance Finds Procedure per ESS8 and national law. • Stop work and notify authorities if artifacts found. • Train workers to recognize cultural materials.	• No. of chance finds reported • Compliance with notification procedures	Contractor / County Safeguards Team	As needed	County Safeguards Team, NMK	N/A (Cost included in overall procurement)
Sexual Exploitation and Abuse – Community	• Implement SEA Action Plan per WB Good Practice Note. • Enforce Codes of Conduct; community awareness sessions. • Confidential community GRM;	• No. of GRM cases reported/resolved • No. of SEA awareness sessions	Contractor / Social Safeguards Officer	Monthly	County Gender and Social Office	20,000

Potential Environmental / Social Impact	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor / Oversight	Estimated Cost (KES)
	referral pathways for survivors.					
Sexual Harassment (SH) – Worker	• HR policies against harassment; integrate SH provisions in Code of Conduct. • Training for staff; establish confidential worker GRM.	• No. of SH awareness sessions • Functionality of worker GRM	Contractor / HR Officer	Monthly	County Safeguards Team County Gender and Social Office, Labour Dept.	
Gender-Based Violence (GBV) – Community & Workers	• Conduct proactive community engagement; identify GBV risks. • Review project activities that may trigger GBV. • Implement mitigation plans and referral mechanisms for survivors.	• No. of GBV mitigation plans implemented • No. of referrals and cases handled	Contractor / Social Officer	Monthly	County Safeguards Team County Gender Office	20,000
STIs / HIV/AIDS Risk – Community and Workers	• Awareness campaigns and workshops on HIV/AIDS and STI prevention. • Control access to worker camps. • Provide condoms; promote safe sexual practices.	• No. of awareness sessions conducted • Availability of condoms at site • No. of reported infections	Contractor	Monthly	County Safeguards Team County Health Department.,	20,000

Potential Environmental / Social Impact	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor / Oversight	Estimated Cost (KES)
Total Budget for Implementation of Construction Phase ESMMP						**290,000**

Table 8-2: Operations Phase ESMMP

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KES)
GBV and SEA (Community)	• Community awareness campaigns on GBV/SEA and reporting • Confidential survivor-centered GRM • Psychosocial support and referral services • Promote women's participation in water committees • Gender-sensitive training on crop production and financial management • Track women's engagement and decision-making	• No. of campaigns conducted • Functionality of GRM • No. of women in committees • Training sessions conducted • Participation metrics reported	Project Management Committee, County Water Officers	Quarterly	County Department of Gender and Social	10,000
Sexual Harassment – Workers	• Integrate SH prohibitions into Codes of Conduct • Mandatory staff training • Tailored worker GRM • Designate Gender/GBV focal point	• No. of staff trained • No. of SH reports • Functionality of worker GRM	County Safeguards Team, Project Management Committee	Quarterly	County Department of Gender and Social, Labour Department	10,000

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KES)
	• Enforce disciplinary action • Monitor workplace culture	• Focal point assigned				
Gender Disparities and Social Inclusion	• Mainstream gender in operations • Ensure 30 - 40% representation of women, youth, vulnerable groups in the Project's Management Committee (PMC) • Provide targeted agricultural support and inputs • Transparent benefit-sharing and water allocation • Track participation and benefits	• Representation in PMC • No. of households receiving inputs • Benefit-sharing reports • Sex-disaggregated data tracked	Project Management Committee, County Safeguards Team	Quarterly	County Department of Gender and Social	10,000
Theft, Vandalism, Damage to Infrastructure	• Community awareness and ownership campaigns • Community-based monitoring and reporting system • Develop and implement a detailed Operational Safety and Security Plan (OSSP) for accessing and securing all permanent structures. • Collaboration with local leaders and security agencies • Ensure security features (fencing, locks) at the 225m^3 distribution tank are regularly	• No. of security incidents reported • OSSP completed, approved, and disseminated. • Maintenance records updated • Condition of tank fencing/signage (lockable and intact).	Project Management Committee, Local Administration	Quarterly	Community members, Local leaders	20,000

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KES)
	inspected and maintained per the OSSP • Accessible GRM for infrastructure issues					
Water Use Conflicts and Governance Risks	• Transparent water allocation plans and by-laws • Periodic stakeholder forums for dispute resolution • Training of Water Users' leaders in mediation • Documentation of allocation decisions • Maintain documentation of the original community consent for the shared use and management of the 225m^3 distribution tank.	• Water allocation compliance • No. of stakeholder forums conducted • Conflict reports and resolution records • Availability of documented consent for shared tank use.	Project Management Committee, Water Users	Quarterly	County Water Officers WRA	15,000
Occupational Health and Safety – Workers	• Regular OHS training • Task-specific risk assessments • Provide and enforce PPE use • Maintain clean and safe work areas • Update and implement Emergency Response Protocols for pipeline failures (bursts, washouts) • Workplace inspections and audits conducted • Incident register maintained	• No. of trainings • PPE compliance • ERPs updated, communicated and practiced. • Safety audits conducted • Incident reports reviewed	Project Management Committee	Quarterly	DOSHS	20,000

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KES)
Public Health and Waterborne Disease Risks	• Proper drainage and removal of stagnant pools • Hygiene and sanitation awareness campaigns • Collaboration with County Health offices for surveillance and vector control • Encourage mosquito nets and clean canal surroundings	• No. of stagnant water pools removed • Awareness sessions conducted • Vector surveillance reports	County Public Health Department	Quarterly	County Department of Health Water Users Community	10,000
Soil Erosion and Land Degradation	• Establish soil and water conservation structures (terraces, contour bunds, grass strips, hedgerows) • Promote contour ploughing and vegetative cover • Regular monitoring of erosion-prone areas • Training on land husbandry and conservation agriculture	• No. of structures installed • Erosion monitoring reports • Training sessions conducted	Project Management Committee, Water Users, Extension Officers	Quarterly	County Department of Agriculture	20,000
Soil Degradation and Pollution	• Promote ISFM (contour ploughing, mulching, crop rotation, organic manure) • Proper irrigation scheduling and soil moisture monitoring • Safe handling and disposal of agrochemicals • Periodic soil testing • Maintain drainage and buffer strips	• Soil test results • ISFM practices implemented • No. of trainings • Agrochemical handling reports	Project Management Committee, Water Users, Extension Officers	Quarterly	NEMA, County Department of Environment	20,000

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KES)
	• Integrate soil/water monitoring into PMC operations					
Water Pollution & Contamination	• Safe handling, storage, and application of chemicals • Bunded storage areas for chemicals• Buffer zones along watercourses • IPM to minimize chemical use • Proper handling of fuels, oils, lubricants • Contaminated soil disposal in approved sites • Water quality monitoring (turbidity, pH, nitrates, phosphates)	• No. of storage sites established • Water quality results • Training sessions conducted	Project Management Committee, Water Users	Quarterly	NEMA County Department of Water	40,000
Inefficient Water Use and Over-Extraction	• Community training on efficient water use, irrigation scheduling • Promote drip/sprinkler irrigation • Strengthen PMC capacity to enforce equitable water use • Install master/sectional meters • Leak detection and infrastructure maintenance • Rainwater harvesting and storage tanks	• Water consumption reports• Meter readings • Leak detection and repair logs • No. of trainings conducted	Project Management Committee, Water Users,	Quarterly	WRA, County Department of Water, NEMA	10,000

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KES)
	• Incorporate water-use efficiency indicators in M&E					
Solid Waste Generation and Management	• Implement ISWM (waste minimization, segregation, recycling, safe disposal) • Segregate waste at source • Engage licensed waste handlers • Promote reuse/recycling • Maintain waste register • Conduct periodic training and awareness sessions	• No. of waste containers provided • Waste disposal records • Training sessions conducted	Project Management Committee, Water Users, Contractor	Quarterly	NEMA, County Department of Environment	20,000
Biodiversity and Ecosystem Disturbance	• Maintain riparian buffer zones • Prevent discharge of polluted water into wetlands • Apply IPM and reduce chemical use • Avoid expansion into sensitive areas • Monitor key species and vegetation • Community awareness on conservation	• Vegetation cover maintained • No. of monitoring reports • Compliance with IPM practices	Project Management Committee, Water Users	Quarterly	County Department of Environment	20,000
Energy Use and Greenhouse Gas Emissions	• Maintain pumps and equipment for efficiency • Promote solar/energy-efficient systems • Schedule pumping to reduce wastage	• Energy consumption reports • No. of energy-efficient systems installed	Project Management Committee, Water users	Quarterly	NEMA, County Energy Office	10,000

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KES)
	• Track energy consumption and emissions • Train operators on energy-efficient practices	• Records of training sessions conducted				
Total Budget for Implementation of Operations Phase ESMMP						**235,000**

Table 8-3: Decommissioning Phase ESMMP

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KSh.)
Occupational Health and Safety (Workers)	• Conduct pre-demolition risk assessments and Job Safety Analyses (JSAs) • Provide PPE (helmets, gloves, boots, goggles, dust masks) • Induction training on OHS, ERP, and tool use • Maintain first aid kits, trained first-aiders, and firefighting equipment • Implement and test ERP regularly • Form Health & Safety Committee (>20 staff) • Ensure workers' insurance and compensation coverage	• No. of JSAs conducted • PPE compliance rate • Training sessions conducted • ERP available and tested • Incident reports recorded	Contractor, Project Management Committee	Weekly during decommissioning	DOSHS	10,000
Generation and Management of Demolition Waste	• Apply ISWM principles (waste minimization, reuse, recycling) • Segregate waste at source • Transport non-recyclable residues to NEMA-approved sites using licensed handlers • Maintain documentation on quantities generated, reused, recycled, disposed	• Quantity of waste segregated, reused, recycled • Waste disposal records maintained • No. of training sessions for workers	Contractor, Project Management Committee	Weekly	NEMA County Environment Office	20,000

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KSh.)
	• Sensitize workers on proper waste handling procedures					
Air Quality (Dust and Emissions)	• Regularly water unpaved surfaces and debris piles • Maintain vehicles and equipment to reduce emissions • Limit speed of haulage trucks • Provide dust masks to workers and limit exposure duration	• Dust levels monitored • No. of workers using dust masks • Equipment maintenance logs • No. of complaints from community	Contractor	Weekly	County Department of Environment	20,000
Noise and Excessive Vibration	• Restrict noisy operations to daytime (08:00 - 17:00hrs) • Use well-maintained equipment with mufflers • Educate workers and drivers to switch off idling engines • Provide ear protection where noise >85 dB(A)	• Noise monitoring reports • No. of workers using ear protection • Complaints from nearby residents	Contractor, Project Management Committee	Weekly	County Department of Environment, NEMA	10,000
Loss of Vegetation and Habitat Disturbance	• Minimize clearance footprint and avoid unnecessary destruction • Replant disturbed areas with indigenous species post-decommissioning • Involve registered water users and the wider community in restoration activities	• No. of trees/vegetation replanted • Area restored • Monitoring reports of habitat condition	Contractor Project Management, Committee Water users	Monthly	County Environment Office	20,000

Potential Environmental / Social Impacts	Proposed Mitigation / Enhancement Measures	Monitoring Indicators	Responsible Party	Monitoring Frequency	Who to Monitor	Estimated Cost (KSh.)
Community Health and Safety Risks	• Erect warning signage and secure work areas with fencing/barricades • Maintain clear communication with community on work schedules and restricted zones • Enforce vehicle safety: speed limits, flagmen, reflective markings • Provide contact information for reporting incidents	• No. of safety signage/warning signs erected • Community incident reports • Compliance with vehicle safety measures	Contractor, Project Management Committee Water Users	Weekly	Local community, County Safety Officers	20,000
Total Budget for Implementation of Decommissioning Phase ESMMP						**100,000**

Total Estimated Cost for Implementation of ESMMP (Construction 290,000 + Operations 235,000 + Decommissiong Phases 100,000) is ***KES. 625, 000***

8.4 Grievance Mechanism

8.4.1 Institutional Framework and Compliance

The Maragima/Tagwa Irrigation Project has institutionalized a structured grievance redress mechanism (GRM) designed to facilitate the transparent receipt, evaluation, and resolution of stakeholder concerns. This mechanism serves as a critical safeguard to ensure that project preparation, construction, and operational phases adhere to the following international and national benchmarks:

- World Bank ESF: Primarily ESS10 (Stakeholder Engagement and Information Disclosure) and ESS2 (Labor and Working Conditions), including the mandate for a distinct worker-GRM.
- National Statutory Provisions: The Constitution of Kenya (2010) regarding the right to administrative justice and access to information, and the EMCA, 1999 (Amended 2015).

The GRM is aligned with the NAVCDP GRM Framework, localized to integrate the PMC, County Government structures, and community leadership.

8.4.2 Objectives of the GRM

The GRM is designed to move beyond reactive complaint handling toward a proactive risk management tool, specifically aiming to:

- Establish a formal, predictable, and transparent pathway for redress.
- Prevent the escalation of localized disputes into legal or social conflicts through early-stage mediation.
- Build sustained stakeholder trust through inclusive engagement and visible responsiveness.
- Utilize grievance trends to inform adaptive management and continuous improvement of project safeguards.

8.4.3 Typology of Potential Grievances

Project-related grievances are categorized to ensure specialized handling and appropriate escalation:

- Environmental and Technical: Impacts related to dust, noise, hydrology, or degradation of vegetation.
- Resource Access: Conflicts regarding land easements or downstream water equity.
- OHS: Risks to both the workforce and the surrounding community.
- Labor & Working Conditions: Disputes involving wages, contracts, or workplace conduct.
- Protection Safeguards: Cases involving GBV or SEA/SH) - which are subject to a confidential, survivor-centric referral pathway.
- Governance: Perceived inequities in benefit-sharing or misconduct by project representatives.

8.4.4 Governance Principles

The efficacy of the Maragima/Tagwa GRM is anchored on the following core principles:

- Accessibility and Inclusivity: Ensuring the mechanism is culturally appropriate and accessible to vulnerable or marginalized groups without barrier.
- Confidentiality and Non-Retaliation: Safeguarding the identity of complainants to prevent any form of reprisal or victimization.
- Procedural Clarity: Utilizing simple, publicly displayed protocols to ensure the process is understood at all community levels.
- Objectivity: Maintaining an impartial stance in all investigations and adjudications.

8.4.5 Composition and Structure of the Subproject's GRM

The Maragima/Tagwa GRM comprises a five-member Grievance Management Committee (GMC) that was elected by project beneficiaries. The GMC includes an appointed-GRM Focal Person, local community representatives (selected to ensure broad representation), and the area Assistant Chief (Table 8-4).

Table 8-4: Maragima /Tagwa Grievance Management Committee

Name	**Designation / Position in the committee**	**Mobile Number**
Simon Maina Makotha	Chairperson & GRM Focal Person	0727485877
Gladys Wangari Maina	Secretary	0723536945
Susan Wanjiru Gakure	Committee Member	0788374658
Patrick Kamunya Karugi	Committee Member	0739348974
Stanley Ndiritu	Assistant Chief	0728962286

The GMC's mandate is to mediate concerns at the source, ensuring that social accountability is maintained throughout the project's implementation. It is responsible for sensitizing the community on the existence utilization of the GRM. It also serves as an intermediary between the CPCU and the PMC / future IWUA. The committee will be meeting monthly and when need arises.

The GRM will operate at three hierarchical levels to ensure that grievances are addressed promptly and at the lowest level possible. The mechanism is supported by the Web based / digital "*Tusuluhishe*" platform, which facilitates lodging, tracking, and documentation via SMS, web form, or in-person reports.

The standard operational flow for receiving, recording, and resolving grievances is detailed below:

- Level 1 - Community Level
    - Entry Point: Complaints can be made verbally, in writing, via suggestion boxes, or through phone/SMS to the Maragima /Tagwa Water Project appointed-GRM Focal Person or GMC.
    - Action: Issue acknowledgment of grievance will be issues within 48 hours, record in the Grievance Register, and attempt resolution within 14 working days.
    - GBV/SEA Cases: Immediately referred to a trained GBV/SEA Focal Point, and onward to County-level survivor support services per the NAVCDP GBV Response Protocol.
- Level 2 - Project Level (County)
    - Escalation: Unresolved grievances referred to the CPCU and County Safeguards Team.
    - Action: Joint review, field verification if needed, and resolution within 30 days.
    - Documentation: Decisions communicated in writing to the complainant and recorded in the Project GRM Database.
- Level 3 - Appeal / National Level
    - If unresolved at Level 2, grievances may be escalated to the NPCU (which hosts the National Grievance Committee) or the World Bank Grievance Redress Service (GRS).
    - The GRS can be accessed directly through the link: grievances@worldbank.org.

8.4.5.1 Documentation and Reporting

Each grievance will be tracked using a standardized Grievance Log Sheet capturing: Unique ID, date, complainant; Nature of complaint; Responsible person; Action taken, and Resolution status.

8.4.5.2 GRM Awareness and Capacity Building

- Awareness sessions will be conducted for community members, Registered Water Users, and contractors on how to access and use the GRM.
- GRM - focal persons and committee members will receive training on grievance handling, record-keeping, and GBV/SEA-sensitive approaches.
- GRM contacts and procedures will be displayed at all project sites and community centers in both English and Kiswahili.

8.4.5.3 Cost Estimates for GRM Implementation

The indicative cost for GRM implementation is estimated at KES 70,000, as outlined in Table 8-5 below.

Table 8-5: GRM Implementation Budget

Item	Estimated Cost (KES)
Training and sensitization workshops (2 sessions)	30,000
GRM communication materials	10,000
Operational support (SMS, portal, log management)	10,000
Monitoring and reporting	20,000
Total Cost	**70,000**

8.4.6 Integrated Pest Management Pan

The proposed Maragima / Tagwa Water Project is expected to increase crop production and diversification in the area, thereby improving livelihoods and food security in the area. However, increased irrigation and intensified cropping may heighten risk of pest infestations and reliance on chemical pesticides. With the intensified manifestation of climate change impacts which significantly influences biology, ecology, occurrence, and distribution of plant pests (insects, pathogens, and weeds), pest - host plant interactions, and activity of natural enemies. Consequently, there is a risk of increased reliance on chemical pesticides, which can lead to environmental degradation, pest resistance, harm to beneficial organisms, contamination of water bodies (including Rukurwa Stream), and adverse effects on human health if not properly managed.

To address these risks, this Integrated Pest Management Plan (IPMP) has been developed, which provides a framework for safe, sustainable, and environmentally sound pest management. The IPMP emphasizes preventive and non-chemical control methods, judicious use of pesticides when necessary, and continuous capacity building for th project's Registered Water Users and farmers.

The subplan has been developed in accordance with the World Bank's ESSs, particularly - ESS3: Resource Efficiency and Pollution Prevention and Management, and ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, and national laws and Regulations, including the Pest Control Products Act (Cap 346), EMCA (Cap. 387), and OSHA, 2007.

8.4.6.1 Crops to be Grown and Major Pests / Diseases

Main crops to be grown under irrigation, their pests and related diseases as well as management options are presented in Table below. The main crops to be grown are informed by the feasibility study and the data from the directorate of crops for the sub-project investment.

Table 8-6: Major, Pests / Diseases and Management Options

Crop	Major pest - insect /Weeds	Major Pest / Disease	Management options
Tomato	Thrips, aphids, *Tuta absoluta*, leaf miners	Blights, bacterial wilt	Timely spraying with recommended pesticides; staking; crop rotation, use of / tolerant /resistant varieties; Traps and pheromones.
Irish potato	Potato tuber moth, Potato cyst Nematode	Blights and bacterial	Timely spraying with recommended pesticides; crop rotation; use of / tolerant /resistant varieties
Onion	Thrips,	Powdery mildew, rust	Timely spraying with recommended pesticides; crop rotation; use of / tolerant /resistant varieties
Kales (Sukuma Wiki)	DBM, aphids and scales	Mildews, blights and black rot, black leg	Regular scouting; biopesticides; neem-based sprays; rotation with non-crucifer crops and use of tolerant varieties.
Cabbage	Thrips, DBM, thrips and aphid	Black leg, black rot and deficiencies	Use of chemicals; traps pheromones and micro nutrient foliar.

8.4.6.2 Common Pesticides and Associated Environmental and Social Risk

Table 8-6 below summarizes typical pesticides likely to be used by farmers in the area and their associated risks. Emphasis is placed on promoting Class III and U pesticides (slightly or least hazardous), and discouraging use of Class Ia, Ib, and II pesticides, unless no alternative exists and with adequate safeguards.

Table 8-7: Common Pesticides and Environmental/Health Risks

Crop	Pesticide used	Active ingredient	WHO Class	Health/ environmental Risk
Tomatoes	Dudu Acelamectin 46EC	Abamectin	Class 11	Accumulated effects over time includes-Acute in toxification to the user, marine life. and microbial habitats changes and mutations. Chronic effects to the user. Water and soil pollution. Development of pest resistance.

Crop	Pesticide used	Active ingredient	WHO Class	Health/ environmental Risk
Irish Potatoes	Ridomil Oshothane Milraz Agrizad Acrobat	Mefenoxam (Metalaxyl) Mancozeb, cymoxanil, metalaxyl, azoxystrobin	Class II	Accumulated effects over time includes - Acute in toxification to the user, marine life. and microbial habitats, changes and mutations. Chronic effects to the user. Water and soil pollution. Development of pest resistance
Kales (Sukuma wiki)	Duduthrin	Lambda-cyhalothrin	Class 11	Accumulated effects over time includes- Acute in toxification to the user, marine life. and microbial habitats changes and mutations. Chronic effects to the user. Water and soil pollution. Development of pest resistance.
Cabbages	Duduthrin	Ethoprophos	Class 11	Accumulated effects over time includes - Acute intoxification to the user, marine life and microbial habitats - changes and mutations. Chronic effects to the user. Water and soil pollution. Development of pest resistance.

WHO Hazard Classification
Class Ia: Extremely hazardous

Class Ib: Highly hazardous

Class II: Moderately hazardous

Class III: Slightly hazardous

Class U: Unlikely to present acute hazard in normal use

8.4.6.3 Proposed Maragima Tagwa IPMP Matrix

To achieve effective, sustainable, and eco-friendly pest management in the proposed irrigation water project, a comprehensive IPMP is provided in the Table 8-7 below. This plan details key strategies, such as preventive and control measures, along with assigned responsibilities, timelines, and monitoring indicators.

Table 8-8: ESMMP Subplan - Maragima/Tagwa Water Project IPMP Matrix

Impact Issue / Pest & Pesticide Threat	Mitigation Measures	Implementation Tools	Expected Results	Monitoring Indicators	Responsibility	Estimated Cost (KES)
Improper storage and disposal of pesticides	Establish pesticide storage and disposal protocols; provide labeled and secure storage; train farmers on safe waste handling.	SOPs, awareness campaigns, waste pits	Reduced contamination risks and improved waste management	No. of farms with safe storage; trainings conducted	PMC, Farmers, County Directorate of Crops, NEMA	150,000
Excessive use of chemical pesticides	Promote IPM practices emphasizing biological, cultural, and mechanical control; use of bio-pesticides and resistant varieties.	Farmer field schools, demo plots, extension services	Reduced pesticide dependence	% of farmers applying IPM; trainings conducted; pesticide use volume	PMC, Farmers, Directorate of Crops, NEMA	300,000

Impact Issue / Pest & Pesticide Threat	Mitigation Measures	Implementation Tools	Expected Results	Monitoring Indicators	Responsibility	Estimated Cost (KES)
Pest resistance from repeated pesticide use	Rotate pesticide classes; integrate IPM; promote biological control.	Training, field demonstrations	Reduced pest resistance; improved control	% of farmers adopting rotation practices; pest monitoring reports	PMC, Farmers, Directorate of Crops, NEMA	150,000
Water pollution from pesticide runoff	Promote drip irrigation and buffer zones near waterways; encourage IPM.	Training on irrigation technologies; water quality monitoring	Reduced water pollution	No. of farmers using drip systems; water samples analyzed	PMC, Farmers, NEMA, Water Resources Users Association (WRUA)	250,000
Invasive pests (e.g. millipedes)	Implement early detection and rapid response; strengthen surveillance networks.	Monitoring and awareness programs	Early pest detection and control	No. of surveillance activities; awareness sessions	Farmers, Directorate of Crops, PMC	100,000
Health risks to farmers from pesticide handling	Provide PPE and training on safe handling; enforce correct use.	Farmer training; PPE supply; liaison with suppliers	Safer handling; fewer health incidents	% of farmers using PPE; reported exposure cases	DOSH, Public Health Officers, PMC	200,000

Total Estimated Cost of Implementation of the Proposed IPMP: **KES 1,150,000**

8.5 Indicative Cost Estimates for ESMMP Implementation

Indicative costs of ESMMP implementation are summarized in Table 8-8 below. These costs cover mitigation, monitoring, capacity building, and the two thematic sub-plans (GRM and IPMP).

Table 8-9: Indicative Costs of ESMMP Implementation

Component	Purpose / Description	Indicative Cost (KES)
Construction phase ESMMP	Outlines environmental and social mitigation and monitoring measures to be implemented during construction.	290,000
Operations phase ESMMP	Outlines environmental and social mitigation and monitoring measures to be implemented during operations and maintenance of the project.	235,000
Decommissioning phase ESMMP	Provides actions for safe, environmentally sound decommissioning and site restoration.	100,000
GRM	Establishes a formal system for grievance intake, resolution, and reporting for workers and community members.	70,000
IPMP	Promotes safe, efficient, and environmentally sustainable pest management practices under irrigated agriculture.	1,150,000

Total Estimated ESMMP Implementation Cost: ≈ **KES 1,845,000**

9 CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion

The ESIA Study for the proposed Maragima/Tagwa Project has been undertaken in accordance with the EMCA (Cap. 387) and the World Bank ESF requirements. The assessment systematically identified, analyzed, and evaluated the potential environmental, social, health, and safety impacts associated with the planning, construction, operation, and decommissioning of the project. Key thematic areas addressed include land use and vegetation disturbance, water resource management, occupational health and safety, community health, gender and inclusion, waste management, and potential risks related to pesticide use under irrigated agriculture.

The ESIA demonstrates that most of the potential adverse impacts are site-specific, short-term, reversible, and can be effectively mitigated through the measures outlined in the ESMMP, the IPMP, and GRM. Potential positive impacts, including improved access to irrigation water, enhanced agricultural productivity, climate resilience, food security, and local livelihoods, substantially outweigh the potential negative effects.

Subject to the full implementation and monitoring of the ESMMP and adherence to statutory and World Bank safeguard requirements, the project is deemed environmentally and socially sound and acceptable. Therefore, it is concluded that the Maragima/Tagwa Water Project should be approved and allowed to proceed to implementation, with continuous oversight by the CPCU, Maragima Tagwa/Water Project - Management Committee, and relevant regulatory bodies.

9.2 Recommendations

Based on the findings of the assessment, the following key recommendations are proposed to ensure sustainable project implementation and long-term environmental and social compliance:

- The proponent should ensure full implementation of the ESMMP and compliance with EMCA (Cap. 387), OSHA 2007, and the World Bank ESF standards throughout the project lifecycle.
- The Maragima/Tagwa PMC and other community structures supporting the project should be trained in project management, environmental and social risk management, operation and maintenance, and grievance handling to enhance local ownership and sustainability.
- Install master and sectional meters to monitor abstraction volumes for domestic, irrigation, and livestock use. Promote efficient irrigation technologies (e.g., drip and sprinkler systems) and climate-smart water use practices.

- The project proponent should develop and operationalize a maintenance and cost-recovery strategy to ensure timely repairs and long-term functionality of the irrigation infrastructure.
- Conduct annual environmental audits in line with EMCA requirements, with the first audit undertaken within one year of project completion to assess compliance and performance of implemented mitigation measures.
- Implement the proposed IPMP to reduce chemical pesticide dependence, safeguard public health, and protect aquatic and terrestrial ecosystems.
- Strengthen community participation and maintain a functional GRM at subproject- and county levels to address complaints promptly, including sensitive GBV/SEA-related grievances.
- Enforce adherence to OSHA 2007 and World Bank ESS2 standards during construction and operation. Contractors should provide appropriate PPE, safety training, and emergency preparedness measures.
- CPCU/NPCU should oversee environmental and social monitoring and submit quarterly Environmental and Social performance reports to the World Bank and NEMA.

REFERENCES

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ANNEXES

Annex 1: ESS Screening Checklist

ENVIRONMENTAL AND SOCIAL SCREENING CHECKLIST BY BENEFICIARY COMMUNITIES FOR COMMUNITY INVESTMENTS (DEMONSRATIONS, FLID, EDP etc)

The NPCU recommended for a CPR

Section A: Background Information

Name of County.....NYERI.....

Name of CPCU - Environmental /Social Safeguard Compliance Officer

(i) .....ANNE KAROKI.....

INVESTMENT LOCATION (Include GPRS Co-ordinates) ...N-9963557.27 E-287288.78.....

Name of CIG/VMG/Group .....

Postal Address: .....

Contact Persons

(i) .....STEPHEN MACHARIA.....Cell phone: 0723523203.....

(ii) .....ANNEPURITY WAKIO..... Cell phone...0701855657.....

Sub -project name...PROPOSED MARAGIMA/TAGWA IRRIGATION WATER PROJECT.....

Estimated cost (Ksh.)
18,871,166.00.....

Approximate size of land area available for the sub -project...125 ACRES to be irrigated

Objectives of the Sub – project

- Increasing the area under irrigation
- Increasing the number of farmers carrying out irrigation
- Increasing the number of farmers doing commercial farming
- Increasing the quantity of products getting to the market/commercialized
- Increase the riparian area conserved

Activities/enterprises to be undertaken (List)...

(i) Excavation and back filling of the pipelines
(ii) Conveyance of the pipeline
(iii) Conservation of the riparian area along the intake

Section B: Environmental Issues

Will the Subproject/Investment:	Yes	No	Remarks (If yes, elaborate)
Create a risk of increased soil erosion?	✓	☐	Excavation of the pipelines may increase the risk of soil erosion. With the increased number of farmers carrying out irrigation there might be risk of soil erosion
Create a risk of increased deforestation?	☐	✓	
Create a risk of increasing any other soil degradation?	☐	✓	
Affect soil salinity and alkalinity?	☐	✓	
Divert the water resource from its natural course/location?	☐	✓	
Cause pollution of aquatic ecosystems by sedimentation and agro-chemicals, oil spillage, effluents, etc.?	☐	✓	
Introduce exotic plants or animals?	☐	✓	
Involve drainage of wetlands or other permanently flooded areas?	☐	✓	
Cause poor water drainage and increase the risk of water-related diseases such as malaria?	☐	✓	
Reduce the quantity of water for the downstream users?	☐	✓	The WRA has stipulated the volumes to be abstracted to

			avoid reduction of the volumes downstream
Result in the lowering of groundwater level or depletion of groundwater?	☐	✓	
Create waste that could adversely affect local soils, vegetation, rivers and streams or groundwater?	☐	✓	
Reduce various types of livestock production?	☐	✓	
Be on monoculture cropping?	☐	✓	
Affect any watershed?	☐	✓	
Focus on Biomass/Bio-fuel energy generation?	☐	✓	
Cause accumulation of solid wastes	☐	✓	Very minimal waste will be generated
Cause accumulation of liquid wastes	☐	✓	

If the answers to any of the above is 'yes', please include an ESMP with Subproject application.

Section C: Socio-economic Issues

Will the subproject/Investment:	**Yes**	**No**	**Remarks** (*If yes, elaborate how*)
Have challenges for women farmers to benefit	☐	✓	
Target vulnerable community members such as physically challenged, Child headed household etc..?	✓	☐	The VMGs have been allowed to join the project as beneficiaries
Interfere with the normal health and safety of the worker/employee?	☐	✓	

Reduce the employment opportunities for the surrounding communities?	☐	✓	
Reduce settlement (*..no further area allocated to settlements)?*	☐	✓	
Reduce income for the local communities?	☐	✓	
Increase insecurity due to introduction of the project?	☐	✓	
Increase exposure of the community to HIV/AIDS?	☐	✓	
Induce conflict?	☐	✓	
Have machinery and/or equipment installed for value addition?	☐	✓	The proposed investment is an irrigation project
Introduce new practices and habits?	✓	☐	There will be increased number of farmers practicing irrigation and commercial farming
Lead to child delinquency (school drop-outs, child abuse, child labour, etc.?	☐	✓	
Lead to gender disparity?	☐	✓	
Lead to poor diets?	☐	✓	
Lead to social evils (drug abuse, excessive alcohol consumption, crime, etc.)?	☐	✓	
Will engage community labour	✓	☐	If yes, Community labor engagement agreement required A number of community member may be engaged in the excavation of the pipelines. Agreement to be done later.
Lead to exclusion of disadvantaged and vulnerable groups from participating and benefiting from the investments	☐	✓	
Exacerbate social exclusion of other members of the society	☐	✓	

Lead to increase GBV/SEAH issues	☐	✓	The areas as per the social office has not been flagged for such issues

Section D: Natural Habitats

Will the Subproject:	Yes	No	Remarks (If yes, elaborate)
Be located within or near environmentally sensitive areas (e.g. intact natural forests, mangroves, wetlands) or threatened species?	☐	✓	
Adversely affect environmentally sensitive areas or critical habitats – wetlands, woodlots, natural forests, rivers, etc.)?	☐	✓	
Affect the indigenous biodiversity (Flora and fauna)?	☐	✓	
Cause any loss or degradation of any natural habitats, either directly (through project works) or indirectly?	☐	✓	
Affect the aesthetic quality of the landscape?	☐	✓	
Reduce people's access to the pasture, water, public services or other resources that they depend on?	☐	✓	
Increase human-wildlife conflicts?	☐	✓	The project is not in the wildlife forest area
Use irrigation system in its implementation?	✓	☐	

If the answers to any of the above is 'yes', please include an ESMP with Subproject application.

Section E: Pesticides and Agricultural Chemicals

Will the subproject.....:	Yes	No	Remarks (If yes, elaborate)
Involve the use of pesticides or other agricultural chemicals, or increase existing use?	✓	☐	During operation stage of the project more farmers will use pesticides and other agricultural chemicals, IPM will be introduced
Cause contamination of watercourses by chemicals and pesticides?	☐	✓	
Cause contamination of soil by agrochemicals and pesticides?	☐	✓	
Experience effluent and/or emissions discharge?	☐	✓	
Involve annual inspections of the producers and unannounced inspections for Export produce?	☐	✓	
Require scheduled chemical applications?	☐	✓	
Require chemical application even to areas distant away from the focus?	☐	✓	
Require chemical application to be done by vulnerable group (pregnant mothers, chemically allergic persons, elderly, etc.)?	☐	✓	

*If the answer to the above is 'yes', please consult the **IPMF** that has been prepared for the project to help prepare **IPMP**.*

Section F: Indigenous Peoples/VMGs as per ESS7

Are there:	Y	N	Remarks
IP/VMGs living within the boundaries of, or near the project?	☐	☐	Name of the VMG community
Members of VMGs in the area who could benefit from the project?	☐	☐	
IP/VMGs livelihoods to be affected by the subproject?	☐	☐	If yes, How
Unique/specific challenges for VMGs to benefit from the project	☐	☐	Explain
VMGs minority in the community	☐	☐	If yes, Explain/name of minority VMG
Does VMG require to donate land to benefit from the project			If yes, follow Free, prior and informed consent procedure

If the answer to any of the above is 'yes', please consult the VMGF that has been prepared for the project.

Section G: Land Acquisition and Access to Resources

Will the subproject/Investment:	Yes	No	Remarks
Require that land (public or private) be acquired (temporarily or permanently) for its development?	☐	✓	If yes, elaborate the tenure type
Require that community land be acquired (temporarily or permanently) for its development?	☐	✓	If yes, elaborate the registration status and community claims. Community land agreement required following principles of FPIC.
Require more than 10 percent of the affected private land parcel	☐	✓	If yes, exclude from the project proposal
Use land that is currently occupied or regularly used for productive purposes (e.g. gardening, farming, pasture, fishing locations, forests)	☐	✓	If yes, Elaborate the current use/Prepare IRP
Complete land documents are not available for the sub- project investment?	☐	✓	If yes, what process is needed?
Is the land proposed have encumbrances?	☐	✓	If yes, elaborate the encumbrance
Physically displace individuals, families or businesses?	☐	✓	If yes, exclude from the project proposal
Cause loss of income for more than 30 days	☐	✓	If yes, how many. Exclude from the project proposal
Result in temporary or permanent loss of crops, fruit trees/fencing and pasture land/ loss of income from business activity?	☐	✓	If yes, elaborate and prepare IRP
Adversely affect small communal cultural property such as funeral and burial sites, or sacred groves?	☐	✓	If yes, avoid or exclude from project proposal
Result in involuntary restriction of access by people to legally designated parks and protected areas?	☐	✓	If yes, exclude
Be on monoculture cropping?	☐	✓	

If the answer to any of the above is 'yes', please consult the mitigation measures in the ESMF.

Section H: Proposed action

(i) Summarize the above:	(ii) Guidance

(iii) Recommended Course of Action

If there is at least one 'Yes', which course of action do you recommend?

☐ CPCU, Social services officer, labour Officer, Children Officer and NEMA - CDE will provide detailed guidance on mitigation measures as outlined in the ESMF; and

☐ Specific advice is required from CDE[1], Lead Scientist and CPCUs regarding Sub -project specific Assessment (s) and also in the following area(s)

☐ All Subproject applications/proposals MUST include a completed ESMF checklist. The NAVCDP-CPCU will review the subproject applications/proposals and the CDEs will sign off; The input from the NLC, Social Services office, Children's office, labour office and the CSSCO will be sought before the documents are presented to the CPSC.

☐ The proposals will then be submitted to CPSC for clearance for implementation by communities in the proposed Subprojects. The projects that require CPRs will be forwarded to NPCU for further analysis also may be forwarded to the World bank for approval and finally to NEMA for clearance certificate (License).

Expert Advice

☐ The Government of Kenya through the Department of Monuments and Sites of the National Museums of Kenya can assist in identifying and, mapping of monuments and archaeological sites;

☐ Expert guidance will also be provided by the land registrar on all issues related to land tenure, The children department on all issues on children, especially child labour, plus department of social services on IPs/vulnerable groups in the community, and

☐ Subproject specific Environmental and Social impact assessments, if recommended, must be carried out by experts registered with NEMA and be followed by monitoring and review. During the process of conducting an ESIAs the proponent shall seek views of persons who may be affected by the Subproject. The ESS10 requires consultation of Subproject affected groups and disclosure of ESIA's conclusions. In seeking views of the public after the approval of the Subproject, the proponent shall avail the draft ESIA report at a public place accessible to project-affected groups and local NGOs/CSO/SAIC/CDDCs.

- SPR Recommanded

Completed by: ..Anne Karoki.....

Name: .....

Position / Community: .....CESCO.....

[1]*County Director of Environment and the County Technical Team*

Date: 8/01/2025

Field Appraisal Officer (NEMA/CDE): Davy Mwira

Signature: DMA

Date: 8/01/2025

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
NEMA
COUNTY DIRECTOR OF ENVIRONMENT
NYERI
P.O. Box 83, NYERI
TEL: 061 - 2032344

Note:

Project category	Characteristics
High impact	Full and extensive ESIA needed- irreversible environmental impacts; impacts not easy to pick or isolate and mitigation cost expensive; EMP design not easily done; Must have the ESIA done and future annual EAs instituted
Medium impact	Site specific environmental impacts envisaged; mitigation measures are easy to pick, not costly and ESMP needed, design readily done; need an ESIA and future EAs
Low impact	Have minimal or occasionally NO adverse environmental & social impacts; exempted from further environmental processes save environmental audits. ESMP required
Land	Land tenure documentation needed and land resolution and consent Form needed with project affected person/community
Loss of income and assets	Income restoration plan needed
Presence of VMG/IP	Additional actions needed
Risk of Child labor/SEAH	Additional actions needed

Annex 2: Certificate of Registration for Maragima Tagwa Water Users

REPUBLIC OF KENYA

THE SOCIETIES RULES, 1968

(RULE 4)

REG NO:SOCA-77SAMP6

CERTIFICATE OF REGISTRATION

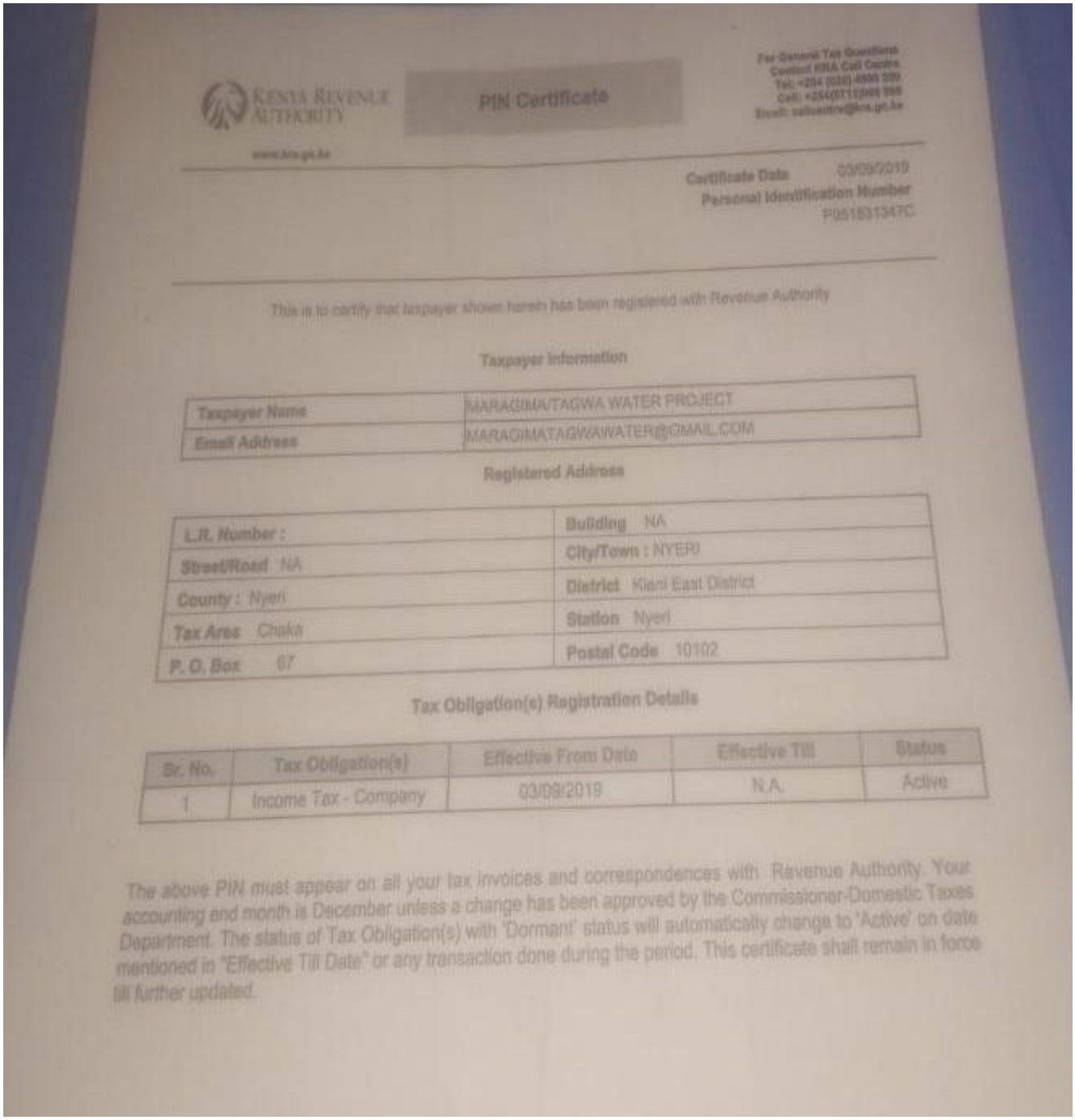
SOCA-77SAMP6

I **Janet Kabuchoru**, **Assistant** Registrar of Societies, hereby certify that I have this day registered the **MARAGIMA TAGWA WATER USERS** under section 10 of the Societies Act.

Dated at **NAIROBI** this **16** day of **January 2025**

ASSISTANT REGISTRAR OF SOCIETIES

Annex 3: Maragima/Tagwa Water Project - KRA PIN Certificate



KENYA REVENUE AUTHORITY

PIN Certificate

For General Tax Questions Contact KRA Call Centre
Tel: +254 (020) 4999 999
Cell: +254(0711)099 999
Email: callcentre@kra.go.ke

www.kra.go.ke

Certificate Date 03/09/2019
Personal Identification Number P051831347C

This is to certify that taxpayer shown herein has been registered with Revenue Authority

Taxpayer Information

Taxpayer Name	MARAGIMA/TAGWA WATER PROJECT
Email Address	MARAGIMATAGWAWATER@GMAIL.COM

Registered Address

L.R. Number :	Building NA
Street/Road NA	City/Town : NYERI
County : Nyeri	District Kieni East District
Tax Area Chaka	Station Nyeri
P. O. Box 67	Postal Code 10102

Tax Obligation(s) Registration Details

Sr. No.	Tax Obligation(s)	Effective From Date	Effective Till	Status
1	Income Tax - Company	03/09/2019	N.A.	Active

The above PIN must appear on all your tax invoices and correspondences with Revenue Authority. Your accounting end month is December unless a change has been approved by the Commissioner-Domestic Taxes Department. The status of Tax Obligation(s) with 'Dormant' status will automatically change to 'Active' on date mentioned in "Effective Till Date" or any transaction done during the period. This certificate shall remain in force till further updated.

Annex 4A: KFS Permit Allowing Construction Work at a Water Intake from the Stream in Kabaru and Hombe Forest Stations

KENYA
Forest Service

Kenya Forest Service Hqs
Karura, Off Kiambu Rd
P.O. Box 30513 - 00100
Nairobi, Kenya

Ref: No. WATER/1/KFS/VOL. XIX/9 Date: 7th March, 2022

Permit No. PER.090

Permit Holder:
Maragima/Tagwa Water Project
P.O. Box 67
KIGANJO.

PERMIT TO CONSTRUCT A WATER PROJECT IN KABARU AND HOMBE FOREST STATIONS, NYERI COUNTY AND TO REGULATE THE EXISTING WATER PROJECT

Reference is made to your request to construct a water project within Kabaru and Hombe Forest Stations in Nyeri County and to regularize the existing water project within the same forests.

Authority is hereby granted to construct the proposed water project in **Kabaru Forest Station** and to regularize the existing water project in Kabaru and Hombe forest stations. This authority is granted subject to payment of the following fees;

Payable fee	**Amount**
New water project:	
Annual fee for wayleave (3.3 km)	Kshs. 16,500
Annual forest land rent fee for intake and water reservoir	Kshs. 10,000
Annual water easement charges	Kshs. 15,000
Existing water project	
Annual fee for wayleave	Kshs. 50,000
Annual fee for large water storage tank	Kshs. 10.000

Further, do note that:

1. The fees above are exclusive of any taxes and any statutory levies payable;
2. The Service retains the right to review all the fees payable by the Permit Holder and where this occurs, the Permit Holder shall be informed in writing.

The authorization is issued **SUBJECT** to the Permit Holder meeting the following conditions:

a) Construction of the water project shall be completed within a period not exceeding **two (2) years** from the date of issue, failure to which the Service shall revoke the Permit

b) To adhere to the conditions in the water abstraction permit from the Water Resources Authority;

c) Adhere to the provisions of the Forest Conservation and Management Act, No 34 of 2016, Water Act, 2016 and any other relevant legislation;

d) Ensure that all mitigation measures contained in the EIA License are implemented;

e) To support the Service in rehabilitation of degraded areas inside Kabaru and Hombe Forests.

This authorization does **NOT** grant you the right to fell any trees in the area.

The County Forest Conservator, Nyeri County is hereby directed to oversee the implementation of the project to ensure compliance to the conditions of this Permit, provisions of the Forest Conservation and Management Act, 2016 and that no trees are cut and/or damaged.

JULIUS KAMAU, EBS
CHIEF CONSERVATOR OF FORESTS

Copy to:

1. *DCCF - FCM*
2. *Manager Finance and Accounting*
3. *Regional Forest Conservator– Central Highlands Conservancy*
4. *County Forest Conservator - Nyeri County*

EK/po

The above permit has expired, and renewal process has been initiated, as per letter in Annex 2B.

Annex 4B: Proof of Application for Renewal of KFS Permit Allowing Construction Work at a Water Intake from the Stream in Kabaru and Hombe Forest Stations

MARAGIMA/TAGWA WATER PROJECT,
P.O BOX 67,
KIGANJO
13TH JUNE, 2025

The Chief Conservator of Forests,
Karura, Off Kiambu Rd,
P.o Box 30513-00100
Nairobi

Thro'
The County Forest Conservator,
Nyeri County,
P.o Box 28,
Nyeri

Thro'
The Forest Station Manager,
Hombe Forest Station,
P.o Box 65,
Karatina

FORWARDED
highly recommended for the Project Shall Provide Water to Maragima forest Rangers Post.
FOREST STATION MANAGER
HOMBE FOREST STATION
13/06/2025

Dear Sir/Madam,

REF: **APPLICATION FOR EXTENSION OF PERMIT NO. PER 090 TO CONSTRUCT A WATER PROJECT IN KABARU AND HOMBE FOREST STATION, NYERI COUNTY.**

I am writing on behalf of Maragima/Tagwa Water Project.

We as a water project are very grateful for the Permit No. PER. 090 that was granted by your office Ref. No. WATER/1/KFS/VOL. XIX/9 dated 7th March, 2022.

The reasons behind this work having commenced but not completed was due to lack of enough funds that our members didn't manage to contribute. This was due to most of their food crop were destroyed by Elephants before the electrical fence was erected by Upper Tana Project, KFS and KWS and unreliable rainfall in the area.

We have been paying promptly all the KFS dues to Hombe Forest Station and our payments are upto date even to this new project in subject.

We humbly request your good office to grant us extension of the permit so that we can complete the construction as quickly as possible. We have also found a donor namely National Agriculture Value Chain Development Project (NAVCDP) that is willing and waiting for a valid permit to fund.
I have attached a copy of the expired permit for your ease of reference.
Thanks in advance.

I remain.

Yours Faithfully,

Simon Kinyua Kanyugi
Chairman Maragima/Tagw[illegible] Water Project
Mobile No: 0721 931613

Annex 5: Documentation of Secured Wayleave: Nyeri County Government Approval for Maragima/Tagwa Water Pipeline Works along County Roads

COUNTY GOVERNMENT OF NYERI
OFFICE OF COUNTY EXECUTIVE COMMITTEE MEMBER
TRANSPORT, PUBLIC WORKS, INFRASTRUCTURE &ENERGY

When replying please quote
Our reference no and date.

P.O. BOX 1112- 10100
NYERI
Email: cecinfrastructure@gmail.com

Ref: NCG/CEC/TPWI/CORR/1/VOL.I/210 Date: 21.10. 2025

Maragima/ Tagwa Water Project
Thegu River Ward
P.O Box 67
KIGANJO.

RE: AUTHORITY TO CROSS AND WORK ALONG COUNTY ROADS FOR THE PROPOSED WATER PIPELINE WORKS.

We refer to your letter dated 12th August, 2025 on the above subject.

Your application requesting permission and approval to cross and work along County roads within the ward at the site mentioned has been considered and approved.

You are hereby authorized to carry out the works subject to the following conditions: -

1. The installation must be carried out in accordance with the submitted and approved layout plan.
2. Upon completion of the works, you must restore the grounds and reinstate all other facilities that may have been affected to working condition and leave the site clean and tidy.
3. Notify this office prior to commencement and allow inspection to ensure compliance with the above conditions.

Eng. Abdi Hanif Hussein
County Executive Committee Member
TRANSPORT, PUBLIC WORKS, INFRASTRUCTURE & ENERGY.

Annex 6: Water Abstraction Permit

WATER RESOURCES AUTHORITY

Upper Tana Sub-Region (Muranga)
Water Resources Authority,
P.O. BOX 304-10200
Murangá Kenya

Email: wrauppertana@gmail.com
Website: www.wra.or.ke

Ref No: WRMA/40/MRG/4AA/11729/S **Date: 29th November 2021**

Maragima Tagwa Water Project
P O BOX 67-10102
KIGANJO

RE: AUTHORITY TO ABSTRACT WATER FROM RUKURUA STREAM OF SAGANA

This is to inform you that, Water Resources Authority has given you an approval to construct the proposed works based on your application dated **7th July 2021**

You have therefore been issued with an authorization letter No. **WRMA/40/MRG/4AA/11729/S** dated **26th November 2021** to enable you abstract 230m³/d for commercial irrigation. In this connection, your attention is drawn to all the authorization conditions under reference.

Please ensure that this office is informed on the following:

- When the construction work commences.
- When the works are complete so that an inspection can be carried out and a comprehensive report is filed for action and for future reference.

Kindly note that you are required to apply for water use permit after completion of construction works and payment fee of kshs.7500

Please take the necessary action accordingly.

Patricia Musau
Ag. SUB- BASIN AREA CO-ORDINATOR
Encls.

C.c The Basin Area Co-ordinator
Tana Basin Area
EMBU

Accounting for Every Drop!

WRA is ISO 9001:2015 Certified

ief Executive Officer,
er Resources Authority,
.O.Box 45250-00100.
Nairobi.

Form: WRA 004
Catchment: Tana
WRA ID: (ASSIGNED AT RO)
File: WRMA/40/MRG/4AA/11729/S

Water Resources Authority

AUTHORISATION TO CONSTRUCT WORKS

FOR THE USE OF WATER

Dear Sir/Madam;

Rule (33)

I have the honour to inform you that the Water Resources Authority has given you approval to construct the proposed works based on your application dated 07-July-2021 for a Water Permit.

Authorization No. WRMA	WRMA/40/MRG/4AA/11729/S	Dated	26-November-2021

Type Of Water use	Surface water				GroundWater		Effluent discharge	Swamp Drainage
	Diversion	Abstraction	In-stream Works	Storage	Shallow Well	BoreHole		
Tick Box		X						

PARTICULARS OF APPLICANT		DETAILS	
1. Full name of applicant(s) (In Block letters)		MARAGIMA /TAGWA WATER PROJECT	
3. Category of Applicant - Individual, Group [Association, Society], Company, Institution		Group[Association,Society]	
4. ID Number of Applicant (Individual) or Certificate of Incorporation or Registration for Groups or Companies		S.H.G/2875	
5. PIN Number (where available)		P051831347C	
Physical Address where water is to be used		**Contact of Applicant**	
6. L/R Number(s)	MEMBERS HOLDINGS	7. Box Number	67
8. Village(s)/Ward(s)	TAGWA	9. Town	KIGANJO
10. Sub-location(s)	TAGWA//	11. Post Code	10102
12. Location(s)	THEGU;;;	13. Telephone Contact (Landline)	+254726912011
14. Division(s)	central;;	15. Telephone Contact (Mobile)	+254728172715
16. District(s)	NYERI COUNTY::	17. Email Contact	maragimatagwawater@gmail.com

WATER RESOURCE DETAILS	
18. Name of Body of Water or Aquifer where water is to be diverted, abstracted or stored	RUKURUA STREAM OF SAGANA
19. Is the point of abstraction or storage in a Protected Area or a Groundwater Conservation Area? (yes/no)	NO
20. Sub-catchment Number	4AA
21. Class of Water Resource	
22. Name of Body of Water or Aquifer where effluent is to be discharged	
23. Sub-catchment Number (Effluent)	
24. Class of Water Resource (Effluent)	
25. Category of Application (Class of Permit)	B

1

The Chief Executive Officer,
Water Resources Authority,
P.O.Box 45250-00100.
Nairobi.

Form: WRA 004
Catchment: **Tana**
WRA ID: **(ASSIGNED AT RO)**
File: **WRMA/40/MRG/4AA/11729/S**

SUPPLEMENT TO PERMIT/AUTHORISATION	
26. Are there any supplements approved under Section 21 of WRMA Rules (yes/no)	**NO**
27. Supplement No.	

28. Brief Description of Project and Intended Use for Water Type of Water Use		**IRRIGATION**		
		Surface Water (m3/day)		
Type of Water Use	**Groundwater (m3/day)**	**River - Normal Condition**	**River - Flood Condition**	**Lake**
29. Public				
30. Domestic				
31. Livestock				
32. Subsistence Irrigation				
33. Commercial Irrigation			**230**	
34. Industry/Commercial				
35. Hydropower				
36. Others				
37. Sub-total			**230.00**	
38. Quantity Returned				
39. Water Abstracted (row 34 - row 35)			**230.00**	
40. Effluent Discharge				

Having filed the necessary application, maps and plans, and having complied with the provisions of the Water Act 2002, and the Rules there under relating to the applications for Water Permits *is/are hereby authorized to construct, subject to the acquisition of the necessary rights of way or easements therefore, if any, the works shown by the said applications, maps and plans in accordance with provisions of the Water Act 2002, the Rules there under, and the following conditions:

1. The construction of the works hereby authorized shall commence within a period of **0** days and shall be completed within a period of **13** months from the date of this authorization.

2. (a)Any person who erects or constructs temporary works shall be entitled to divert, abstract, impound, obstruct, store or use water to such extent only as may be necessary for the construction or erection of the works, and whenever it shall be necessary to divert, abstract or impound water during the erection or construction of the works authorized, such diversion, abstraction, obstruction, impounding, or use of water shall be made at such time and in such manner that the works of other operators are interfered with as little as possible and that no damage will be caused to property of another landholder. Provided that if any damage is caused it shall, failing agreement between the parties concerned, be settled by arbitration under the Arbitration Act.

(b)Unless empowered thereto by the Water Resources Management Authority in writing, all temporary works shall be removed within a period of three months from the date of completion of the works authorized or from the date of determination of the authorization (whichever be the earlier) and where any temporary works exist, such as quarries, burrow-pits, excavations, cuttings, tunnels or things of a like nature which cannot be economically removed, efficient precautions to the satisfaction of the Water Resources Management Authority shall be taken, by the person named in the authorization, to render and to maintain all such temporary works safe in the interest of life and property. The Water Resources Management Authority reserves the right to inspect the works authorized by this authorization, and attention is drawn to section 90 of the Act.

3. Any changes between the original proposed design and final as-constructed arrangement has been documented and such documentation submitted to the Authority.

ief Executive Officer,
ter Resources Authority,
P.O.Box 45250-00100.
Nairobi.

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*Delete words not required

CONDITIONS OF AUTHORISATION	DETAILS
Measuring device	THAT MEASURING DEVICE MUST BE INSTALLED AT THE INTAKE, AND RECORDS OF ALL WATER ABSTRACTED, DIVERTED, STORED OR DISCHARGED GIVING THE DATE, TIME, QUALITY AND QUANTITY AND METHODS OF SUCH ABSTRACTIONS, DIVERSIONS, STORAGE, OR DISCHARGE AND THE PURPOSE OR PURPOSES FOR WHICH SUCH WATER WAS USED, MA
Controlling device	THAT CONTROLLING DEVICE MUST BE INSTALLED AT THE INTAKE
Water Quality Report	THAT A TWO LITRE WATER SAMPLE MUST BE COLLECTED IN A PLASTIC BOTTLE FOR REFERENCE TO THE NEAREST WATER RESOURCES MANAGEMENT AUTHORITY TESTING LABORATORY OR ANY OTHER CREDITED LABORATORY FOR FULL PHYSICAL CHEMICAL ,BACTERIOLOGICAL ANALYSIS BEFORE THE WATER IS PUT TO ANY USE AND A COPY OF THE RESULT T
Evidence of EMCA Compliance	
Soil and Water Conservation Plan	THAT YOU MUST ENSURE THAT PROPER SOIL AND WATER CONSERVATION MEASURES ARE UNDERTAKEN.
Compensation Flow (m3/day)	THAT THE OFF TAKE STRUCTURE MUST ENSURE THE FLOW DOWNSTREAM IS GUARANTEED AT ALL TIMES
Inspection Milestones	
1	THAT THE LICENSED CONTRACTOR/PROPRIETOR MUST INFORM THE REGIONAL MANAGER TANA CATCHMENT AREA THROUGH SUB REGIONAL MANAGER TWO WEEKS BEFORE CONSTRUCTION COMMENCES IN ORDER TO MONITOR AND SUPERVISE OTHER RELATED WORKS.
2	THAT THE LICENSED CONTRACTOR/PROPRIETOR MUST INFORM THE REGIONAL MANAGER TANA CATCHMENT AREA THROUGH SUB REGIONAL MANAGER WHEN THE PROJECT IS 50% COMPLETE TO FACILITATE MIDWAY INSPECTION.
3	THAT THE LICENSED CONTRACTOR/PROPRIETOR MUST INFORM THE REGIONAL MANAGER TANA CATCHMENT AREA THROUGH SUB REGIONAL MANAGER IMMEDIATELY AFTER COMPLETION OF CONSTRUCTION OF WATER WORKS TO FACILITATE FINAL INSPECTION FOR PERMIT ISSUANCE.
4	
Notification Requirements	
1	THAT DURING THE CONSTRUCTION, YOU OR YOUR REPRESENTATIVE SHALL ABIDE BY ALL EXISTING LAWS AND REGULATIONS WITHOUT PREJUDICE TO THE AUTHORITY`S REQUIREMENT S UNDER ANY APPROVAL.
2	THAT NO EXTRA WORKS WHATSOEVER EXCEPT WHAT IS APPROVED UNDER THIS AUTHORIZATION SHALL BE MADE WITHOUT PRIOR APPROVAL FROM THIS OFFICE.
3	THAT YOU RETURN THIS AUTHORIZATION TO THIS OFFICE WITHIN 14 DAYS IF YOU DONÆT AGREE WITH CONDITIONS SET HEREIN, FAILURE TO RETURN THE SAME WILL BE DEEMED TO SIGNIFY YOUR ACCEPTANCE AND UNDERSTANDING OF THE CONDITIONS
4	
Storage	THAT YOU MUST CONSTRUCT ADEQUATE STORAGE FACILITIES /FACILITY TO STORE FLOOD WATER AT FARM LEVEL TO MEET YOUR IRRIGATION NEED DURING THE DRY SEASON.
Airline	
Test pumping	
Other Technical Details	
	THAT YOU SHALL UNDERTAKE TO MAKE GOOD ANY DAMAGE CAUSED TO ANY OTHER WATER INFRASTRUCTURE YOU SHALL ALSO TIDY UP THE SITE AND REMOVE ALL SURPLUS MATERIALS ON COMPLETION OF WORKS.OR PUBLIC UTILITY SERVICES AS A RESULT OF THE WORKS.

Effluent Discharge Requirements	

e Chief Executive Officer,
Water Resources Authority,
P.O.Box 45250-00100.
Nairobi.

Form: WRA 004
Catchment: Tana
WRA ID: (ASSIGNED AT RO)
File: WRMA/40/MRG/4AA/11729/S

4. This Authorization will be automatically cancelled, when the authorized period expires, without any further reference to you unless extension of time limit is applied for prior to date of expiry.

5. The following details/documents/fees are required to complete your application before a Permit may be issued:

(a) **PAYMENT OF WATER USE PERMITTING FEES KSH 7500**

(b) **SUBMISSION OF WORKS COMPLETION RECORDS TOGETHER WITH THE WATER QUALITY ANALYSIS REPORT FROM A RECOGNISED LABORATORY.**

(c) **FINAL INSPECTION REPORT FROM WRMA INSPECTOR**

(d)

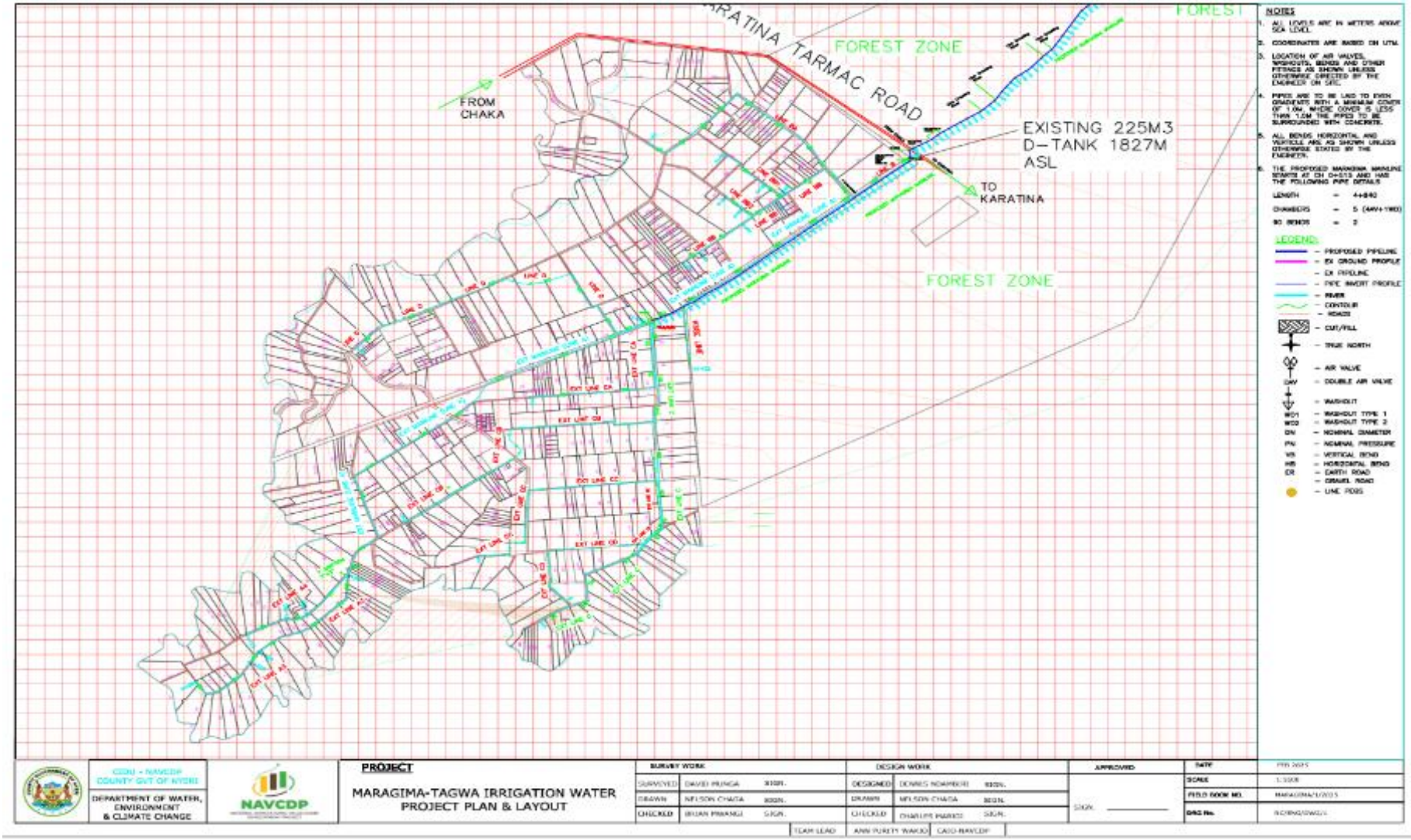
SIGNATURE

Yours faithfully,

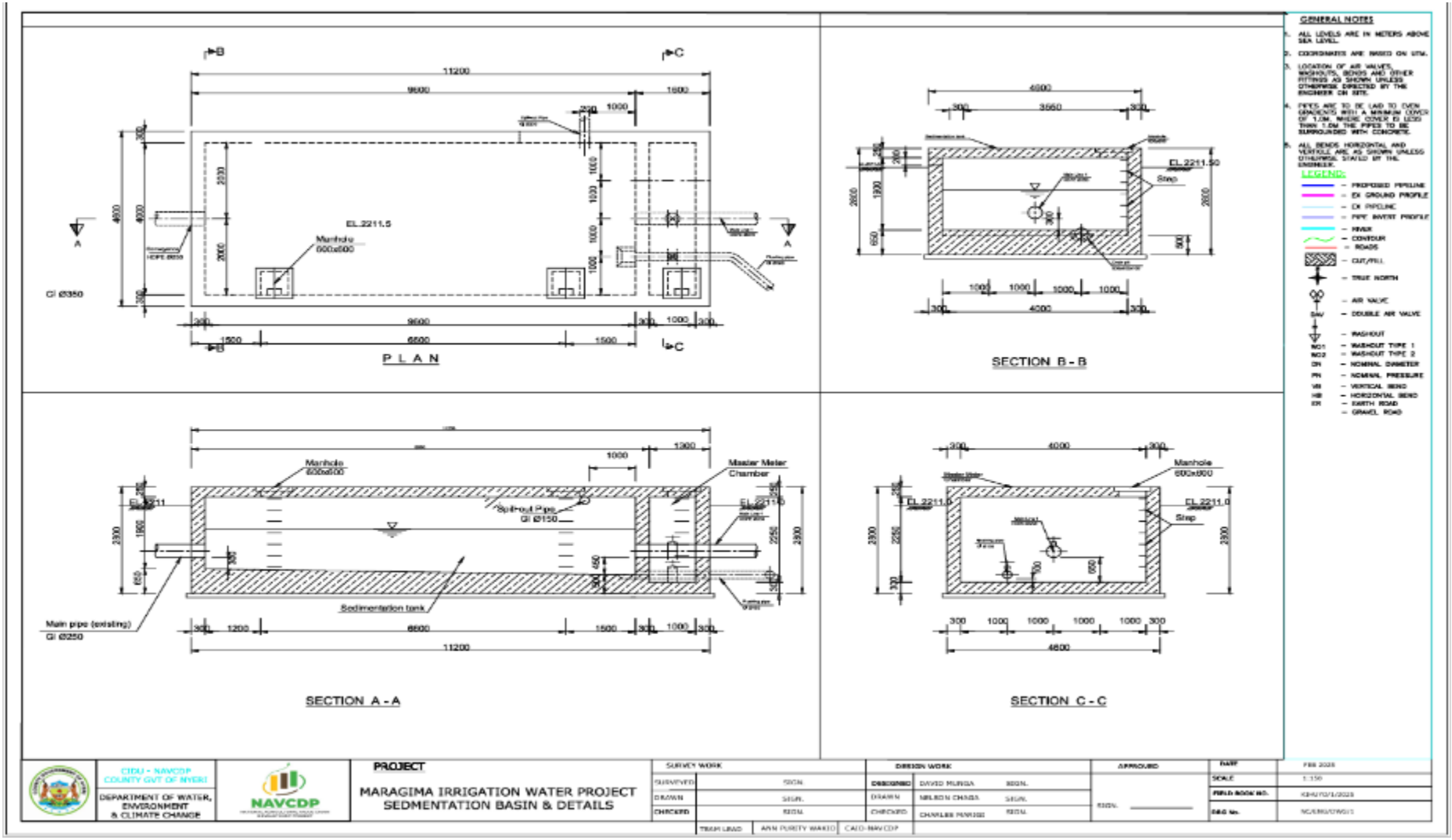
Signature of WRA Officer	Musau
Name of Officer	Patricia Musau
Position	Sub-Basin Area Co-ordinator
Date of Signature	29th November 2021

Annex 7: Topographic Map Showing the Spatial Distribution of Key Irrigation Infrastructure

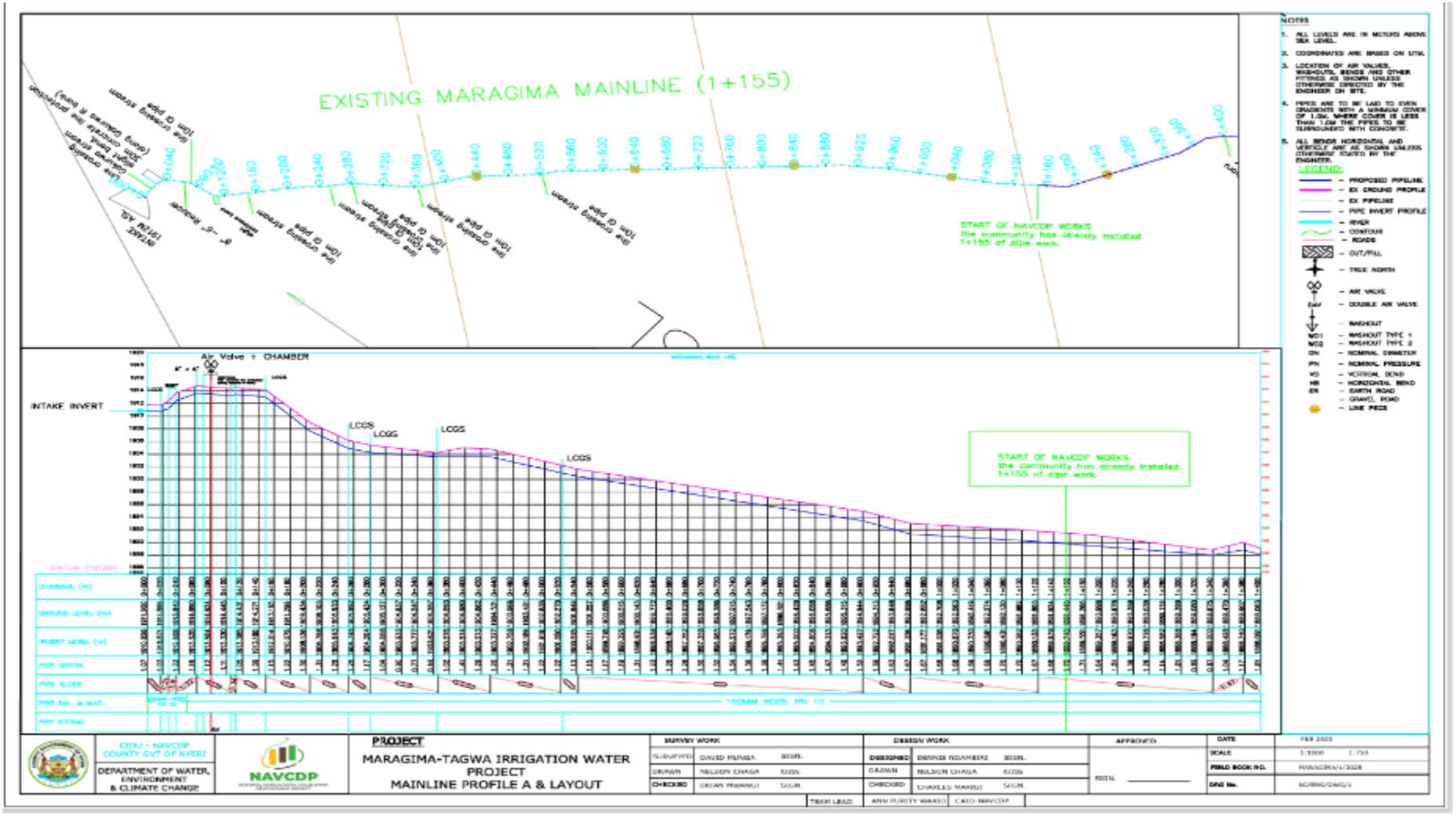
Annex 8A: Project Plan and Layout



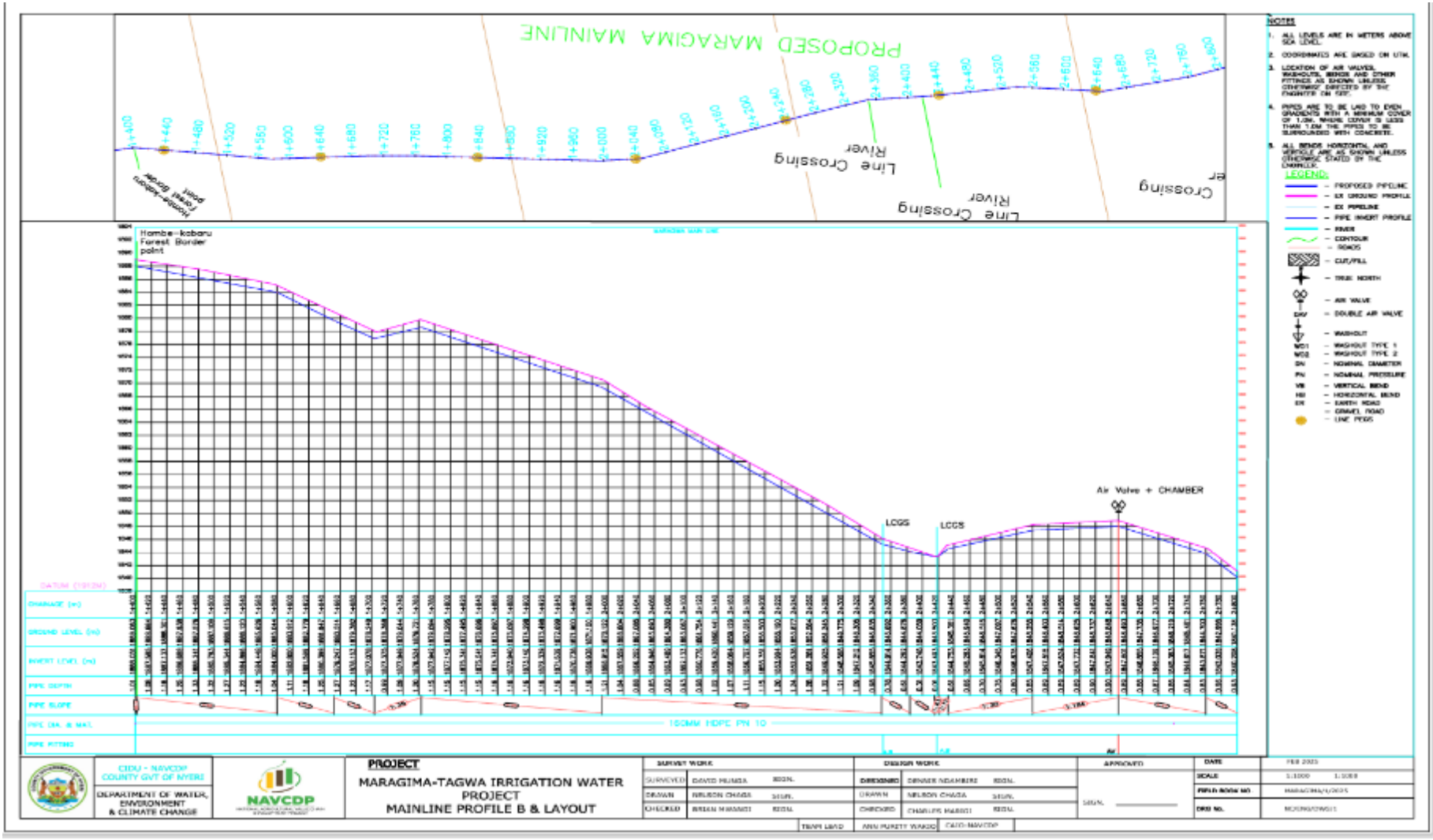
Annex 8B: Technical Design of the Sedimentation Basin

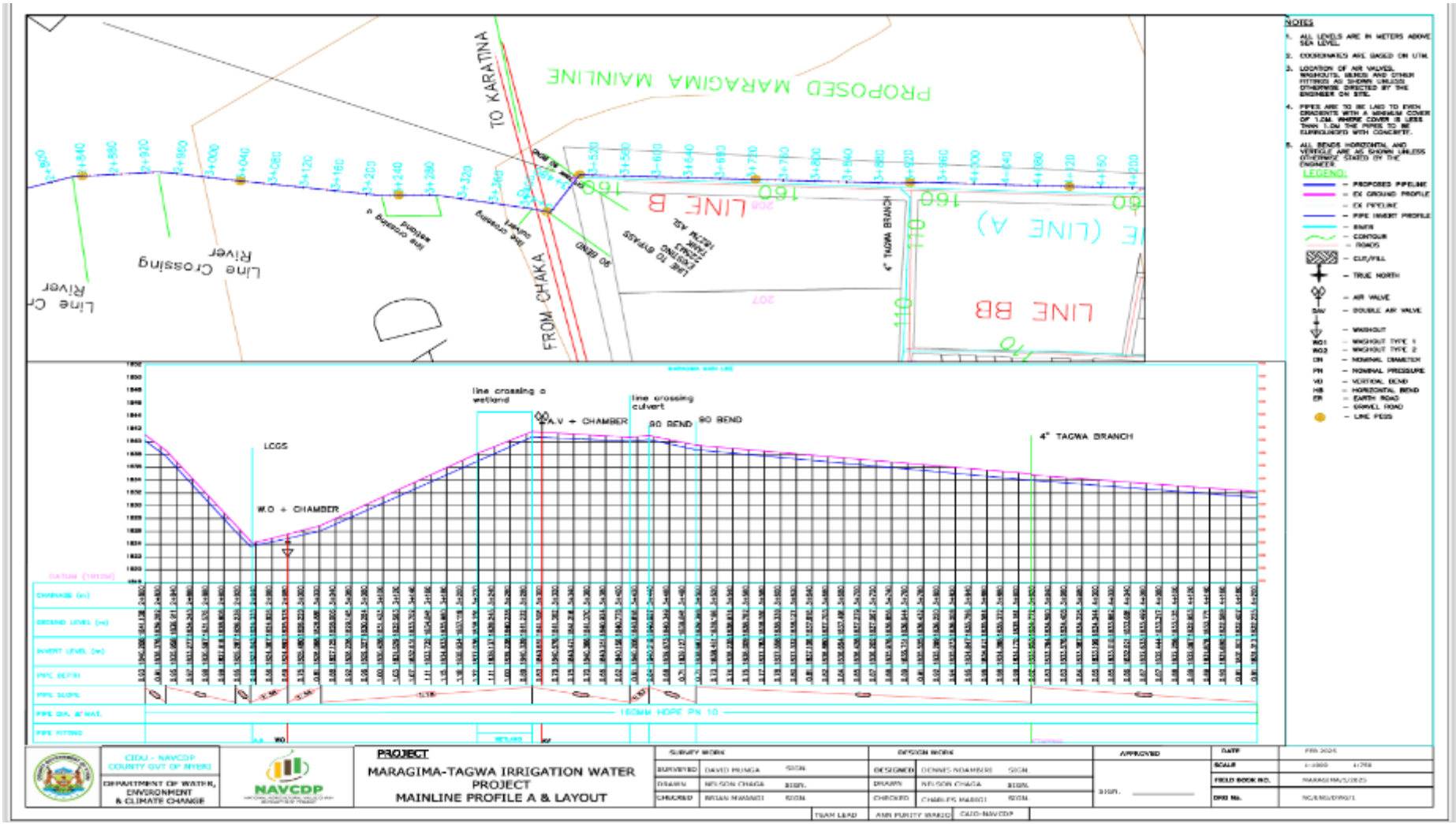


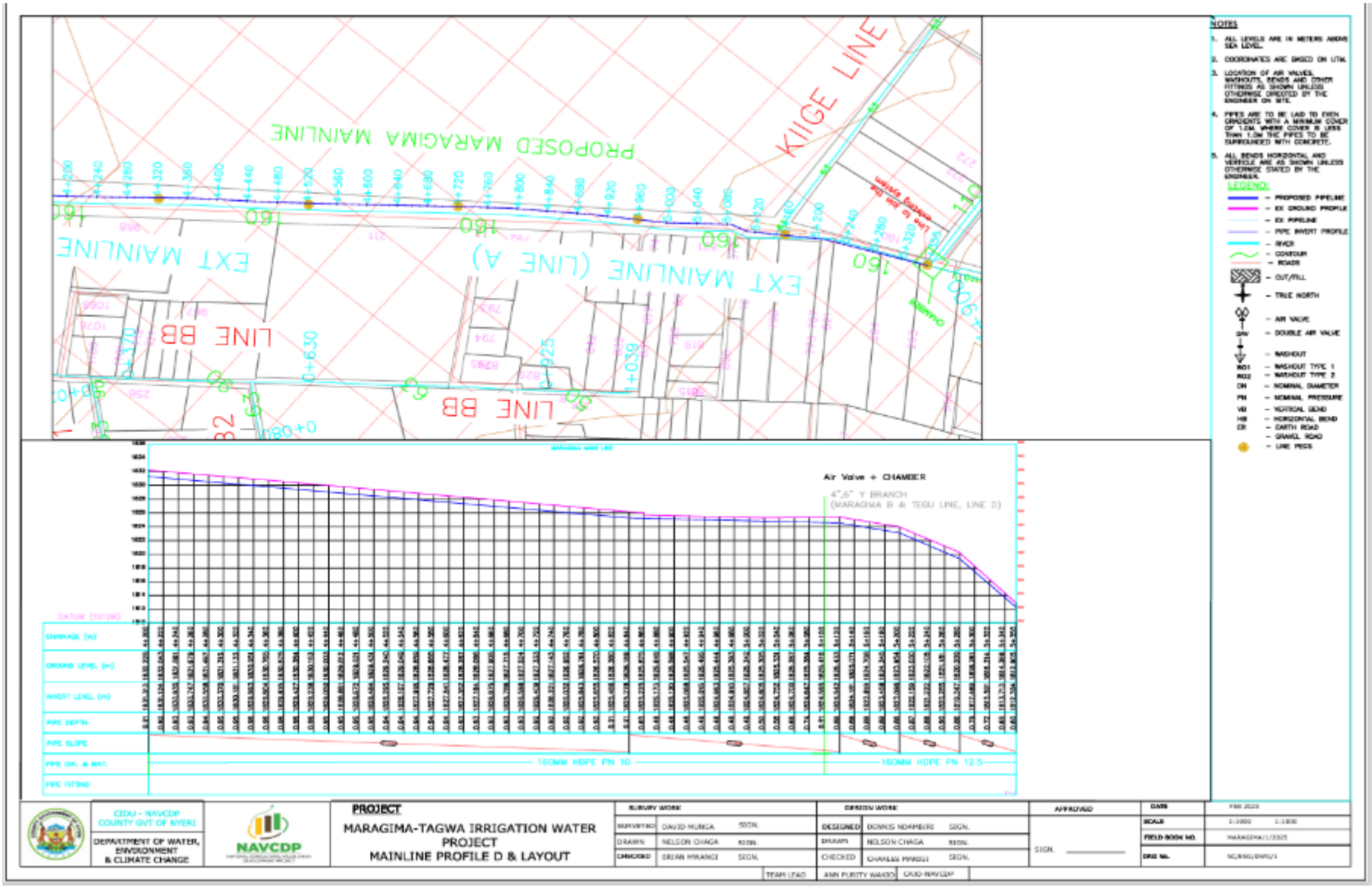
Annex 8C: Water Conveyance System: Layout of the Existing Maragima Line



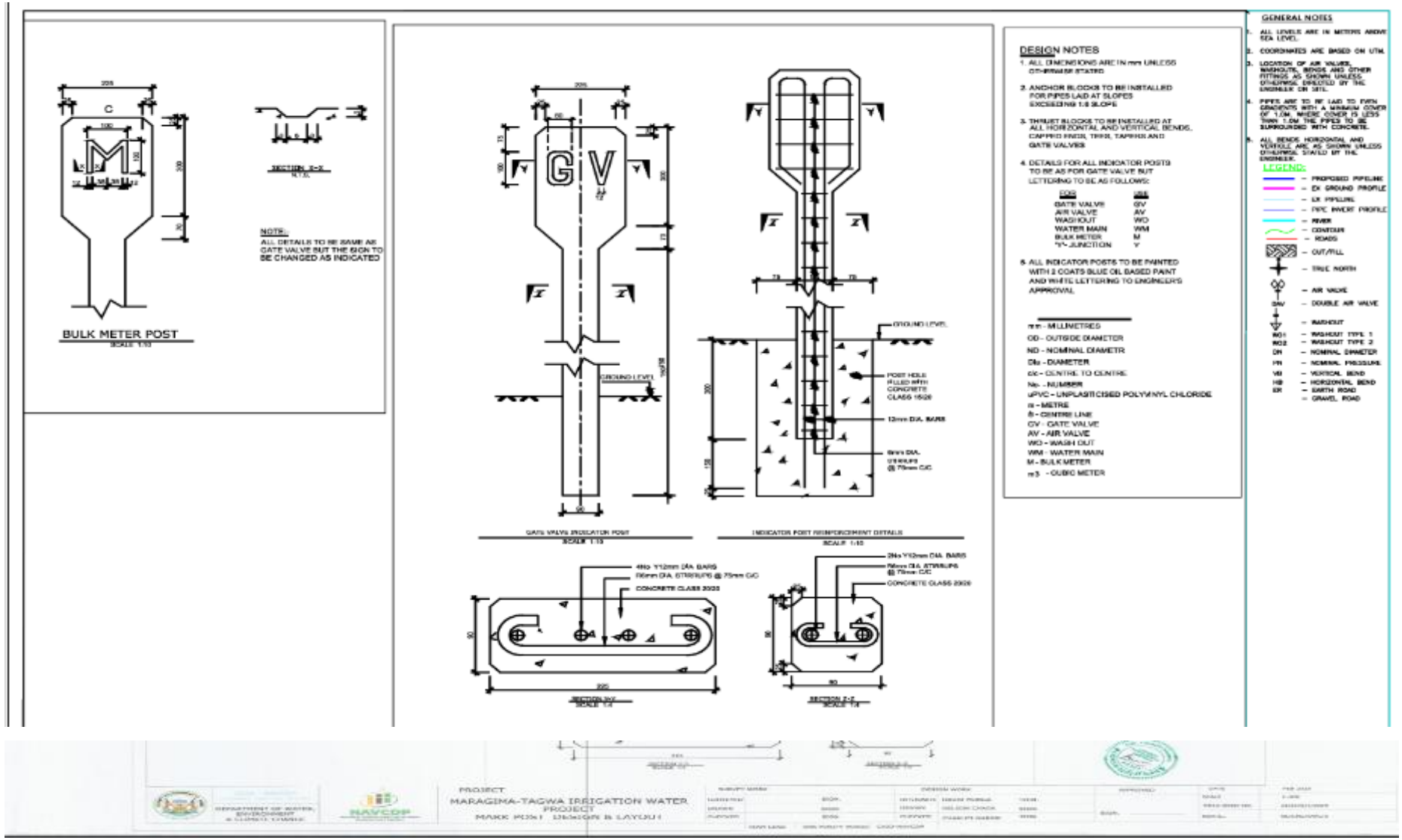
Annex 8D: Water Conveyance System: Layout of the Proposed Maragima Mainline




PROPOSED MARAGIMA MAINLINE
TO KARATINA
FROM CHAKA
LINE B
LINE (A)
LINE BB
4" TAGWA BRANCH
Line Crossing River
NOTES
LEGEND:
PROPOSED PIPELINE
EX GROUND PROFILE
EX PIPELINE
PIPE INVERT PROFILE
RIVER
CONTOUR
ROADS
CUT/FILL
TRUE NORTH
AIR VALVE
DOUBLE AIR VALVE
WASHOUT
NOMINAL DIAMETER
NOMINAL PRESSURE
VERTICAL BEND
HORIZONTAL BEND
EARTH ROAD
GRAVEL ROAD
LINE PEGS
line crossing a wetland
A.V + CHAMBER
line crossing culvert
90 BEND
90 BEND
4" TAGWA BRANCH
LCGS
W.O + CHAMBER
CHAINAGE (m)
GROUND LEVEL (m)
INVERT LEVEL (m)
PIPE DEPTH
PIPE SLOPE
PIPE DIA. & MAT.
160MM HDPE PN 10
PIPE FITTING
CEDU - NAVCOP
COUNTY GVT OF NYERI
DEPARTMENT OF WATER, ENVIRONMENT & CLIMATE CHANGE
NAVCOP
PROJECT
MARAGIMA-TAGWA IRRIGATION WATER PROJECT
MAINLINE PROFILE A & LAYOUT
SURVEY WORK
SURVEYED
DRAWN
CHECKED
DESIGN WORK
DESIGNED
DRAWN
CHECKED
APPROVED
DATE
SCALE
FIELD BOOK NO.
DWG No.


PROPOSED MARAGIMA MAINLINE
KIIGE LINE
EXT MAINLINE
EXT MAINLINE (LINE A)
LINE BB
LINE BB
Air Valve + CHAMBER
4"x6" Y BRANCH
(MARAGIMA B & TEGU LINE, LINE D)
160MM HDPE PN 10
160MM HDPE PN 12.5
NOTES
1. ALL LEVELS ARE IN METERS ABOVE SEA LEVEL.
2. COORDINATES ARE BASED ON UTM.
3. LOCATION OF AIR VALVES, WASHOUTS, BENDS AND OTHER FITTINGS AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER ON SITE.
4. PIPES ARE TO BE LAID TO EVEN GRADIENTS WITH A MINIMUM COVER OF 1.0M. WHERE COVER IS LESS THAN 1.0M THE PIPES TO BE SURROUNDED WITH CONCRETE.
5. ALL BENDS HORIZONTAL AND VERTICLE ARE AS SHOWN UNLESS OTHERWISE STATED BY THE ENGINEER.
LEGEND:
– PROPOSED PIPELINE
– EX GROUND PROFILE
– EX PIPELINE
– PIPE INVERT PROFILE
– RIVER
– CONTOUR
– ROADS
– CUT/FILL
– TRUE NORTH
– AIR VALVE
– DOUBLE AIR VALVE
– WASHOUT
– WASHOUT TYPE 1
– WASHOUT TYPE 2
– NOMINAL DIAMETER
– NOMINAL PRESSURE
– VERTICAL BEND
– HORIZONTAL BEND
– EARTH ROAD
– GRAVEL ROAD
– LINE PEGS
CIDU - NAVCDP
COUNTY GVT OF NYERI
DEPARTMENT OF WATER, ENVIRONMENT & CLIMATE CHANGE
NAVCDP
PROJECT
MARAGIMA-TAGWA IRRIGATION WATER PROJECT
MAINLINE PROFILE D & LAYOUT
SURVEY WORK
SURVEYED DAVID MUNGA SIGN.
DRAWN NELSON CHAGA SIGN.
CHECKED BRIAN MWANGI SIGN.
DESIGN WORK
DESIGNED DENNIS NDAMBERI SIGN.
DRAWN NELSON CHAGA SIGN.
CHECKED CHARLES PANGUI SIGN.
TEAM LEAD ANN PURITY WAKIDO CAIDD-NAVCDP
APPROVED
SIGN.
DATE FEB 2023
SCALE 1:2000 1:1000
FIELD BOOK NO. MARAGIMA1/2025
DRG No. NC/WKG/DWG/1

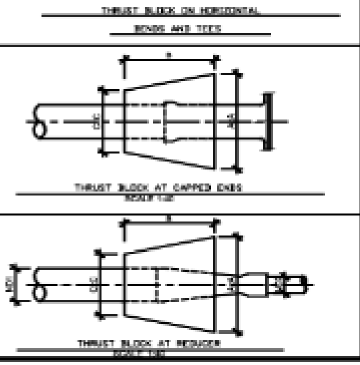
Annex 8E: Mark Post Design Layout



Annex 8F: The Anchor Block Design and Layout

(ND) NOMINAL DIAMETER (mm)	THRUST BLOCK DIMENSIONS AxBxC(m), CONCRETE VOLUME (m³)						
	11 1/4° BENDS	22 1/2° BENDS	30° BENDS	45° BENDS	CAPPED ENDS & 90° TEES	90° BENDS	REDUCERS NO=1 NOT REQ'
80	0.2x0.2x0.2 (0.01m³)	0.25x0.2x0.2 (0.01m³)	0.25x0.2x0.2 (0.01m³)	0.3x0.2x0.2 (0.02m³)	0.35x0.2x0.2 (0.02m³)	0.4x0.2x0.2 (0.02m³)	0.35x0.2x0.2 (0.02m³)
100	0.2x0.2x0.2 (0.01m³)	0.3x0.2x0.2 (0.02m³)	0.35x0.2x0.2 (0.02m³)	0.4x0.2x0.2 (0.02m³)	0.45x0.25x0.25 (0.04m³)	0.55x0.3x0.3 (0.06m³)	0.45x0.25x0.25 (0.04m³)
150	0.3x0.25x0.25 (0.02m³)	0.4x0.25x0.25 (0.03m³)	0.5x0.3x0.3 (0.05m³)	0.55x0.3x0.3 (0.06m³)	0.65x0.35x0.35 (0.12m³)	0.8x0.4x0.35 (0.16m³)	0.65x0.35x0.35 (0.12m³)
200	0.4x0.3x0.3 (0.04m³)	0.55x0.35x0.35 (0.08m³)	0.6x0.4x0.4 (0.11m³)	0.75x0.4x0.4 (0.15m³)	0.85x0.45x0.4 (0.20m³)	1.0x0.5x0.4 (0.29m³)	0.85x0.45x0.4 (0.20m³)
250	0.6x0.35x0.35 (0.07m³)	0.65x0.4x0.4 (0.12m³)	0.75x0.45x0.45 (0.18m³)	0.9x0.45x0.45 (0.23m³)	1.1x0.55x0.45 (0.38m³)	1.2x0.6x0.45 (0.60m³)	1.1x0.55x0.45 (0.38m³)
300	0.65x0.45x0.45 (0.12m³)	0.8x0.5x0.5 (0.20m³)	0.9x0.5x0.5 (0.27m³)	1.1x0.5x0.5 (0.44m³)	1.35x0.65x0.5 (0.59m³)	1.5x0.75x0.5 (0.86m³)	1.35x0.65x0.5 (0.59m³)
350	0.6x0.5x0.5 (0.16m³)	0.85x0.55x0.55 (0.26m³)	1.0x0.55x0.55 (0.38m³)	1.2x0.6x0.55 (0.53m³)	1.4x0.7x0.55 (0.80m³)	1.6x0.8x0.55 (1.20m³)	1.4x0.7x0.55 (0.80m³)
400	0.7x0.5x0.6 (0.26m³)	0.95x0.5x0.6 (0.36m³)	1.1x0.5x0.6 (0.47m³)	1.3x0.65x0.6 (0.67m³)	1.6x0.8x0.6 (1.20m³)	1.8x0.9x0.6 (1.80m³)	1.6x0.8x0.6 (1.20m³)
450	0.6x0.55x0.65 (0.36m³)	1.1x0.65x0.65 (0.63m³)	1.3x0.65x0.65 (0.86m³)	1.5x0.75x0.65 (1.0m³)	1.8x0.9x0.65 (1.7m³)	2.0x1.0x0.65 (2.2m³)	1.8x0.9x0.65 (1.7m³)
500	0.9x0.7x0.7 (0.46m³)	1.2x0.7x0.7 (0.68m³)	1.4x0.7x0.7 (0.86m³)	1.7x0.85x0.7 (1.5m³)	2.0x1.0x0.7 (2.3m³)	2.3x1.2x0.7 (3.5m³)	2.0x1.0x0.7 (2.3m³)
600	1.1x0.8x0.8 (0.74m³)	1.5x0.8x0.8 (1.2m³)	1.7x0.8x0.8 (1.6m³)	2.0x1.0x0.8 (2.3m³)	2.3x1.2x0.8 (3.6m³)	2.7x1.4x0.8 (5.6m³)	2.3x1.2x0.8 (3.6m³)

NOTE:- THE ABOVE VALUES APPLY FOR SOCKETTED uPVC AND FLANGED OR COUPLED LINED FERROUS PIPES SUBJECT TO A WORKING PRESSURE HEAD OF 16 BAR



GENERAL NOTES

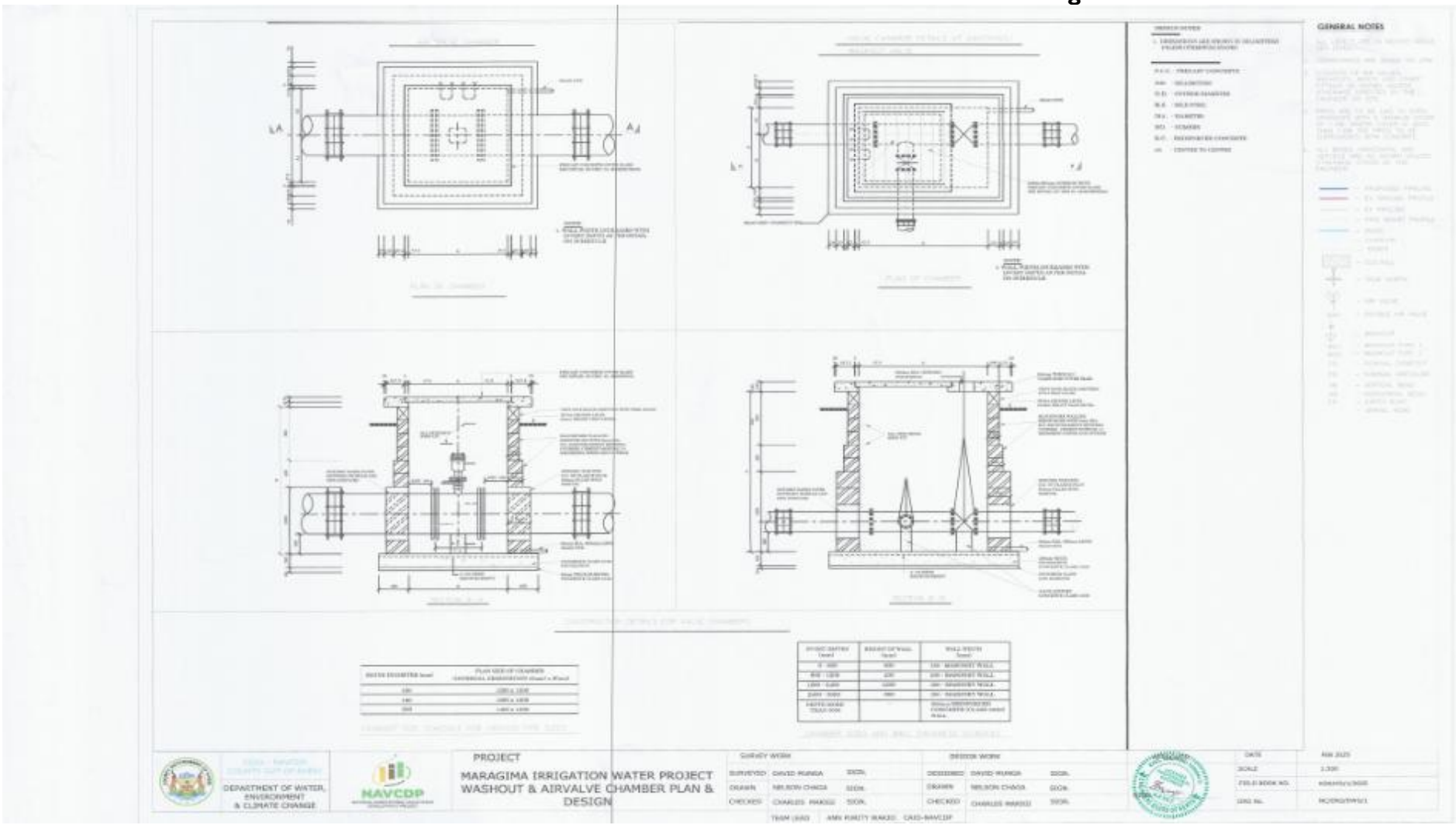
1. ALL LEVELS ARE IN METERS ABOVE SEA LEVEL.
2. COORDINATES ARE BASED ON UTM.
3. LOCATION OF AIR VALVES, WASHOUTS, BENDS AND OTHER FITTINGS AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER ON SITE.
4. PIPES ARE TO BE LAID TO EVEN GRADIENTS WITH A MINIMUM COVER OF 1.0M. WHERE COVER IS LESS THAN 1.0M THE PIPES TO BE SURROUNDED WITH CONCRETE.
5. ALL BENDS HORIZONTAL AND VERTICLE ARE AS SHOWN UNLESS OTHERWISE STATED BY THE ENGINEER.

LEGEND:

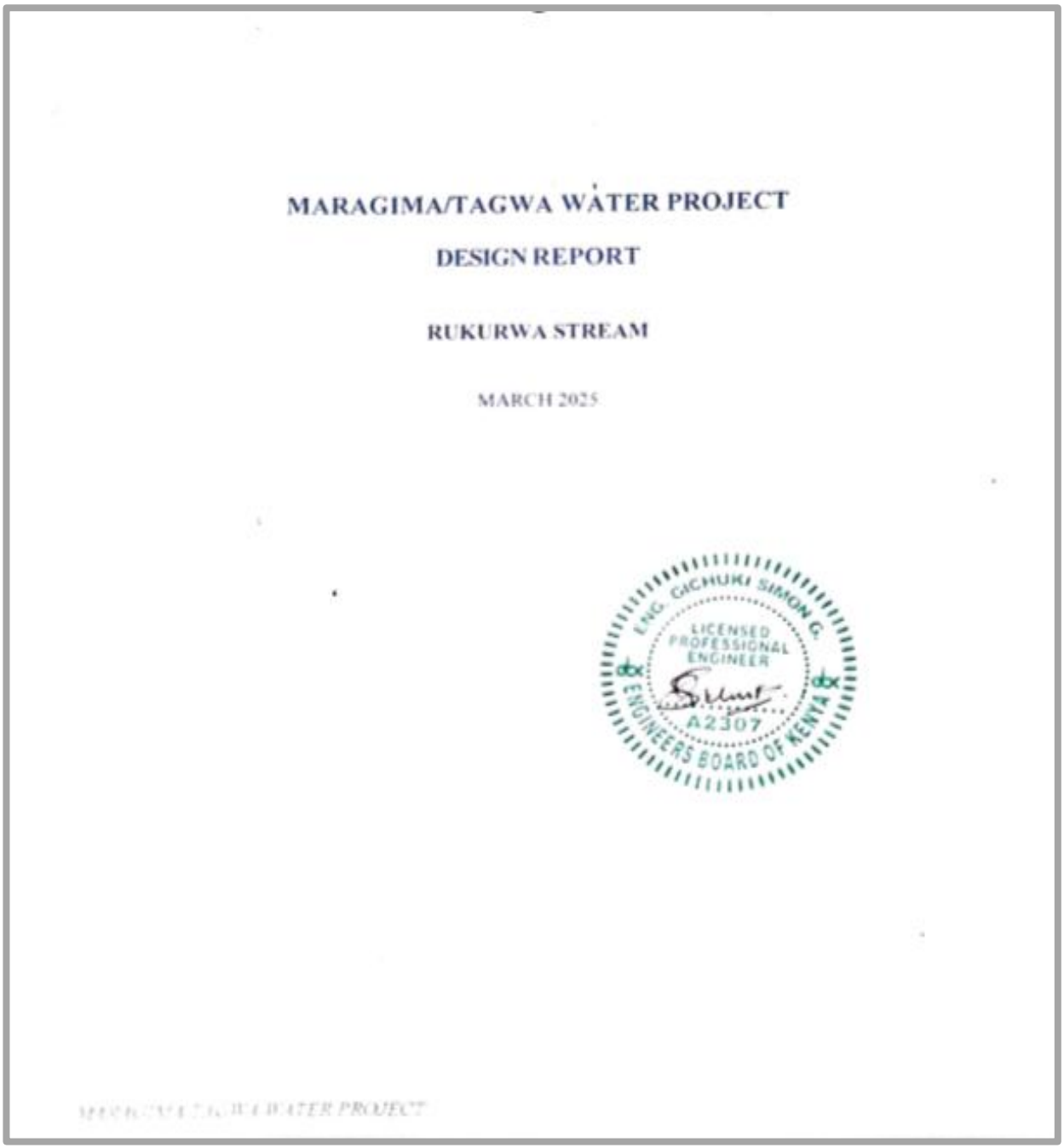
- PROPOSED PIPELINE
- EX GROUND PROFILE
- EX PIPELINE
- PIPE INVERT PROFILE
- RIVER
- CONTOUR
- ROADS
- CUT/FILL
- TRUE NORTH
- AIR VALVE
- DAV – DOUBLE AIR VALVE
- WASHOUT
- WO1 – WASHOUT TYPE 1
- WO2 – WASHOUT TYPE 2
- DN – NOMINAL DIAMETER
- PN – NOMINAL PRESSURE
- VB – VERTICAL BEND
- HB – HORIZONTAL BEND
- ER – EARTH ROAD
- GRAVEL ROAD

CIDU - NAVCDP COUNTY GVT OF NYERI; DEPARTMENT OF WATER, ENVIRONMENT & CLIMATE CHANGE	NAVCDP	PROJECT: MARAGIMA-TAGWA IRRIGATION WATER PROJECT ANCHOR BLOCKS DESIGN &LAYOUT 1	SURVEY WORK: SURVEYED – SIGN.; DRAWN – SIGN.; CHECKED – SIGN.	DESIGN WORK: DESIGNED DAVID MUNGA SIGN.; DRAWN NELSON CHAGA SIGN.; CHECKED CHARLES MARIGI SIGN.	APPROVED: SIGN.	DATE: FEB 2025; SCALE: 1:400; FIELD BOOK NO.; DWG No.
			TEAM LEAD: ANN PURITY WAKIO, CIDO-NAVCDP			

Annex 8G: Washout and Air Valve Chamber Plan and Design



Annex 9: Technical Validation of Works - Cover Page of the Approved and Stamped Detailed Design Report (Dated March 2025)



MARAGIMA/TAGWA WATER PROJECT

DESIGN REPORT

RUKURWA STREAM

MARCH 2025

ENG. GICHUKI SIMON G.
LICENSED PROFESSIONAL ENGINEER
A2307
ENGINEERS BOARD OF KENYA

MARAGIMA/TAGWA WATER PROJECT

Annex 10: Approved Bills of Quantity for the Proposed Maragima/Tagwa Water Project

MARAGIMA TAGWA SUMMARY			
BILL NO	ITEM DESCRIPTION		AMOUNT Kshs
1	Preliminaries and Generals		1,837,676
2	Sedimentation Basin		3,718,000.00
3	Intake Wingwalls		689,600
4	Pipe Work/ laying		11,010,920
5	Conservation of the catchment area.		750,080
6	Provisional sums		475,000
	SUB TOTAL		**18,481,276**
	16% VAT		2,957,004
	GRAND TOTAL		**21,438,281**

Annex 11: Minutes of the Public participation and ESIA Consultation Meeting

MINUTES OF THE PUBLIC PARTICIPATION MEETING FOR MARAGIMA / TAGWA WATER PROJECT

Scope of Works Proposed: Construction of Water Intake Walls, pipeline, and Riverine Conservation

Venue: Maragima Chief's Camp

Date: 27th May 2025

Time: 11:30 A.M. -1:30 P.M.

Facilitator: EIA/EA Lead Expert - Dickson Kimathi Muthaura

Recording Secretary: Anne purity Wakio

MEMBERS PRESENT

Upper Tagwa Zone

Lower Tagwa Zone

Thegu Zone

Maragima Zone

OPENING REMARKS

The meeting started at 10.30 a.m. after prayers from Madam Pauline, the treasurer. The meeting was held with all zone's members represented: Upper Tagwa Zone, Lower Tagwa Zone, Thegu Zone and Maragima Zone. The three water officers from Kieni East sub county. The consultant highlighted the agendas of the meeting and invited members present to air their views on the project and the expected impacts.

The following issues arose from the consultations.

POSITIVE IMPACTS

a. Provision of irrigation water

The members agreed that the irrigation scheme project would bring access to reliable and clean water for their irrigation requirements, livestock.

b. Installation of water management structures

The water management structures will aid to better manage the activities and to support the increasing population in the area and guarantee the sustainability of the project and the community in general.

c. Creation of employment opportunities

The irrigation scheme project will bring about a need for both casual and skilled labor and thus create employment for residents of the neighborhood.

d. Promotion of secondary businesses

More opportunities for business will be created by this irrigation scheme project as the demand for other products sold by vendors and other business entities.

e. Enhancement of security

The project site will enhance incomes hence idle youth who would have engaged in crimes will be busy hence enhance security in the area. During the operation more youth will be engaged in different activities in the value chain nods.

f. Conservation of the Rukurwa Stream

From the activities presented by the water officer, there will be planting of bamboos which will help reduce erosion of the river bank, thus enhancing the quality of water at the intake and to the pipes.

g. Increase in income

The promotion of businesses and employment opportunities will bring about an increase in incomes for residents.

NEGATIVE IMPACTS

a. Risk of accidents and other occupational hazard risks during excavation

The risk of accidents and other occupational hazards may occur during the excavation process and will be minimal since machinery will be used for a short period of time and the management plan against these risks will be fully implemented during this construction stage.

b. Air Pollution from dust

The contractor committed to maintain the machinery to guarantee minimal emissions from the machinery. Further the technique to be used does not generate dust save for the heavy machinery used during the commissioning to and from site which however is minimal and for a very short duration of time.

c. Generation of solid waste

Solid waste is expected during the excavation and developmental phase ranging from plastic water bottles and other expected wastes. This is also minimal given the short period of time that the drilling team will be at the site and if the ESMP will be implemented to mitigate this impact

Conclusion

The expert thanked all attendees for their participation and valuable input. The SubCounty Water Officer assured the community that all views and concerns would be incorporated into the final ESIA report to be submitted to NEMA. He reaffirmed NAVCDP's commitment to supporting community-driven, environmentally sustainable development.

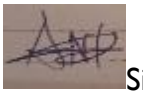
There being no other business, the meeting was closed at 1:30 PM

Attendance List

(Attached separately — includes names, ID numbers/contacts, affiliations, and signatures.) Total number of participants = 63 (43 Men 20 Women)

Photographic Evidence

Minutes prepared by

 Signed on **27th May 2025**.

Anne Karoki.

Annex 12: Public participation and ESIA Consultation Meeting - Attendance List

Committee Members Present and Zonal Representatives

S.NO	NAME	DESIGNATION	GENDER
1.	Fredrick Mwai	Vice Chair	M
2.	Simon Kinyua	Chair	M
3.	Pauline Mutitu	Treasurer	F
4.	Susan Wanjiru	Committee member	F
5.	Zipporah Mwenje	Vice Secretary	F
6.	Mercy Njeri	Committee Member	F
7.	Simon Muchemi	Committee Member	M
8.	Charles Karugi	Zonal Rep Tagwa B	M
9.	Daniel Kibango	Zonal Rep Maragima B	M
10.	Simon Mahinda	Zonal Rep Tagwa B	M
11.	James Mureithi	Zonal Rep Tagwa A	M
12.	Isaac Mathenge	Zonal Rep Thegu	M
13.	Ricanda Nyawira	Maragima B	F
14.	Biscoti Jacinta Wanjohi	Tagwa A	F
15.	Stanley Ndirangu	Assistant Chief - Maragima Sub-Location/Member	M

Total Number of participants = 15 (9 Men 6 Women)

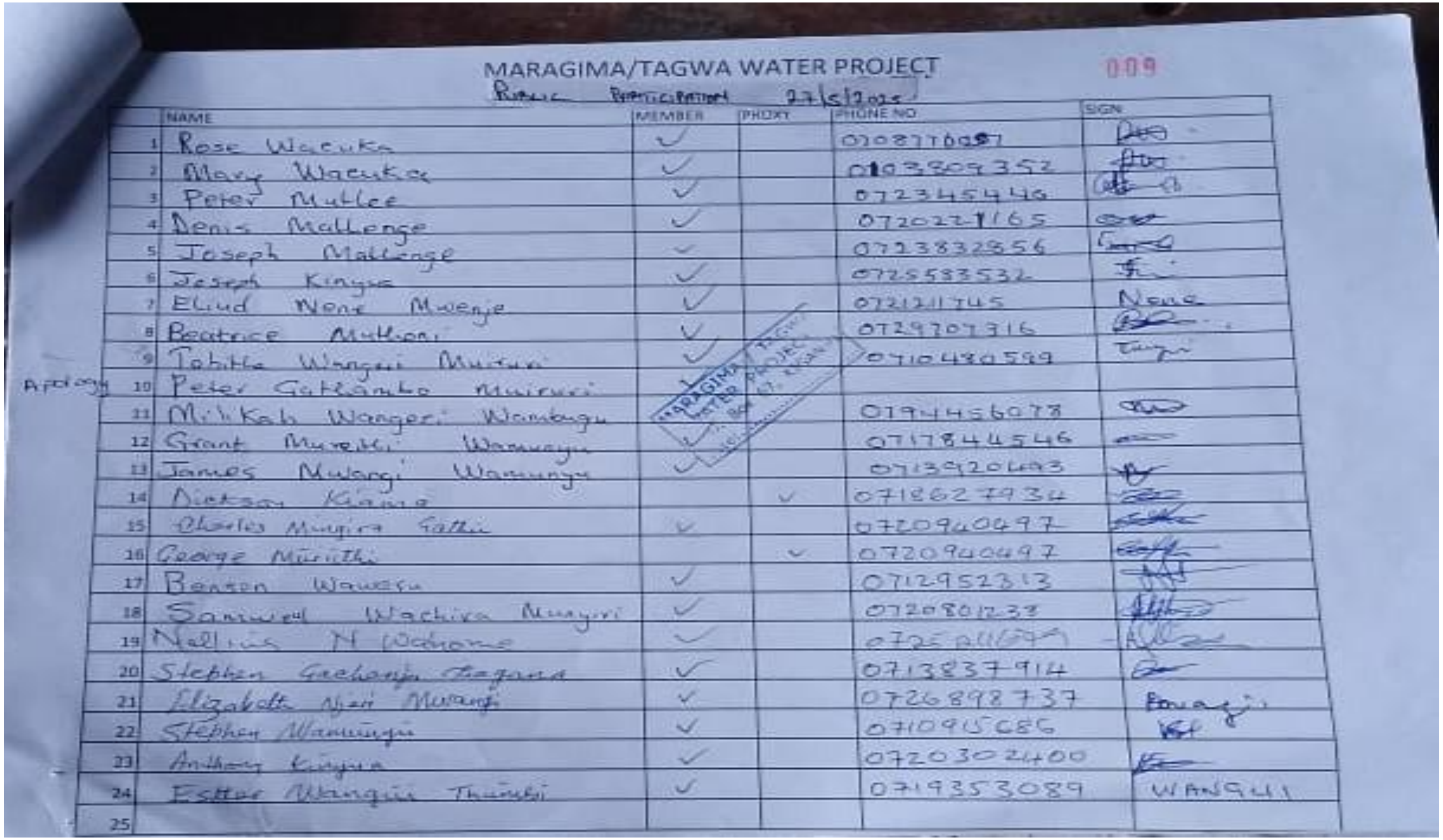
MARAGIMA/TAGWA WATER PROJECT

PUBLIC PARTICIPATION 27/5/2025

	NAME	MEMBER	PROXY	PHONE NO	SIGN
1	Joseph Maina Muiehi	✓		0722595222	
2	Nancy Muthoni Kaviti	✓		0729226089	
3	Francis Muthigani	✓		0723511763	
4	Lydiah Gathoni Kibutha	✓		0722417912	
5	Wawera Ndegwa	✓		0718788208	
6	James Nguna	✓		0722502953	
7	Martha Wanjiru	✓		0714714020	
8	Peter Maina Nyoro	✓		0728142455	
9	Daniel Maina	✓		0701784143	
10	John Gatonu	✓		0703197322	
11	Esther Wambui	✓		0727035405	
12	Isaac Mubangi	✓		0722505844	
13	Mariam Gachambi	✓		0725597353	
14	Martin Wachira	✓		0780022575	
15	Joseph Kibuchi	✓		0720303968	
16	Millicent Mumbi	✓		0711836575	
17	Samson Kamau	✓		0711840258	
18	Alexander Wathinji	✓		0711836093	
19	Bernard Kamwaro	✓		0710493697	
20	Daniel Githaiga	✓		0724458226	
21	Michael Maina Muthigani	✓		0728129455	
22	Patrick Kamunya	✓		0712787693	
23	George Muturi (Chief)	✓		0726747731	
24	Joseph Kamau	✓		0711604971	
25	Martin Macheria Ndanga	✓		0725857332	

MARAGIMA/TAGWA WATER PROJECT P.O. BOX 61 KIGANJO DATE

Number of participants = 25 (19 Men 6 Women)



MARAGIMA/TAGWA WATER PROJECT 009

Public Participation 27/5/2025

	NAME	MEMBER	PROXY	PHONE NO	SIGN
1	Rose Waceuka	✓		0708770097	[illegible]
2	Mary Waceuka	✓		0103809352	[illegible]
3	Peter Mutlee	✓		0723454446	[illegible]
4	Denis Mathenge	✓		0720221165	[illegible]
5	Joseph Mathenge	✓		0723832856	[illegible]
6	Joseph Kinyua	✓		0725583532	[illegible]
7	Eliud Nene Mwenje	✓		0721211745	Nene
8	Beatrice Muthoni	✓		0729707316	[illegible]
9	Tabitha Wangui Muriuki	✓		0710480599	[illegible]
Apology 10	Peter Gathambo Muiruri	✓			
11	Milkah Wangeci Wambugu	✓		0794456078	[illegible]
12	Grant Mureithi Wamunyu	✓		0717844546	[illegible]
13	James Mwangi Wamunyu	✓		0713920493	[illegible]
14	Dickson Kiama		✓	0718627934	[illegible]
15	Charles Mugira Gathi	✓		0720940497	[illegible]
16	George Muriithi		✓	0720940497	[illegible]
17	Benson Waweru	✓		0712952313	[illegible]
18	Samwel Wachira Muriuki	✓		0720801238	[illegible]
19	Nellius N Wahome	✓		0725 [illegible]	[illegible]
20	Stephen Gachanja Gagana	✓		0713837914	[illegible]
21	Elizabeth Njeri Murangi	✓		0726898737	[illegible]
22	Stephen Wamunyu	✓		0710915686	[illegible]
23	Anthony Kinyua	✓		0720302400	[illegible]
24	Esther Wangui Thuita	✓		0719353089	WANGUI
25					

Number of participants = 23 (15 Men 8 Women)

Annex 13: Questionnaire Samples (Dated 21st May 2025)

Nyeri County Department of Agriculture is one of the counties implementing National Agricultural Value Chains Development Project (NAVCDP) in Kenya. The NAVCDP County project coordinating unit (CPCU) is mandated to ensure that all the supported investments within the county comply with the commitments under the Environmental and Social commitment Plan of NAVCDP, Environmental and Social Management Framework (ESMF), the World Bank Environmental and Social Standards (ESS) and the national environmental and social safeguards regulations under the EMCA 1999.

The NAVCDP CPCU in Nyeri county has identified Farmer Led Irrigation Projects (FLID) to be supported. The CPCU has engaged the services of a consultant to help develop Environmental and Social Impact Assessment (ESIA) as per the world bank requirement for such projects and in compliance with Environmental Management and Co-ordination Act (1999).

As a member of the local community to be served by this investment we request your comments on the expected social economic and environmental impacts of the proposed project.

(Please note that the feedback you give will be held in confidence and will only be used to enrich the E&S recommendations given by the consultant in the ESIA report.)

1. Are you familiar with the proposed project, its objectives and proposed activities?

Yes [✓] No [ ]

2. Will your source of livelihood / income be negatively affected by the proposed project?

Yes [ ] No [✓]

3. Do you think the proposed project is compatible with the surrounding developments?

Yes [✓] No [ ]

4. What positive social and environmental impact do you anticipate during construction and operation stages of this project?

I will anticipate that we set aside some amount of the money to the project so that we can plant more trees.

5. What negative social and environmental impact do you anticipate during construction and operation stages of this project?

- Let the Contractor be keen when digging trenches along the road, to avoid soil erosion & land degradation.
- Avoid Deforestation.

6. What do you think the developer should do to mitigate negative social economic impacts of this project?

(A) Planting of Cover Crops.
(B) Planting of trees where need be.
(C) Use of gabbions to avoid soil erosion.
(D)

7. Is there any other comment or suggestion you would like to make with regard to environmental and social safeguards?

- During Construction Lets use of protective gears. Give seeds to Farmers.
- To avoid accident where road is cut lets use signs that can be seen from far.
- Lets use Labour based so that youths can benefit.

Name: STANLEY M. NDIRITU Date: 21/05/2025

Residence: MARAGIMA Designation: ASST. CHIEF

Contact: 0728962236 Signature

MARAGIMA SUB LOCATION
ASST. CHIEF
P.O. Box 29 - 10105 NAROMORU

THANK YOU FOR YOUR RESPONSE

Nyeri County Department of Agriculture is one of the counties implementing National Agricultural Value Chains Development Project (NAVCDP) in Kenya. The NAVCDP County project coordinating unit (CPCU) is mandated to ensure that all the supported investments within the county comply with the commitments under the Environmental and Social commitment Plan of NAVCDP, Environmental and Social Management Framework (ESMF), the World Bank Environmental and Social Standards (ESS) and the national environmental and social safeguards regulations under the EMCA 1999.

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(Please note that the feedback you give will be held in confidence and will only be used to enrich the E&S recommendations given by the consultant in the ESIA report.)

1. Are you familiar with the proposed project, its objectives and proposed activities?

Yes [✓] No [ ]

2. Will your source of livelihood / income be negatively affected by the proposed project?

Yes [ ] No [✓]

3. Do you think the proposed project is compatible with the surrounding developments?

Yes [✓] No [ ]

4. What positive social and environmental impact do you anticipate during construction and operation stages of this project?

- We get adequate water
- Job opportunity.
- Increase of products
- Health upgrade

5. What negative social and environmental impact do you anticipate during construction and operation stages of this project?

1. If not maintained well may lead to Landslide
2. Risk of wild animals killing at work in forest
3. In case of Chinese, may lead to Language difficulties ie miscommunication.
4. May at times cause sexual harassment

6. What do you think the developer should do to mitigate negative social economic impacts of this project?

1. To be guarded by K.W.S if possible
2. Should retain inner clothing in case of sex harassment for evidence (full)

7. Is there any other comment or suggestion you would like to make with regard to environmental and social safeguards?

- May require demonstration
- May require seminar of office bearers
- Drip irrigation - Education to be given (trained)

Name: BEATRICE Date: 21/5/2025

Residence: IGWA A Designation: PROJECTS MEMBER

Contact: 0728172715 Signature

THANK YOU FOR YOUR RESPONSE

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(Please note that the feedback you give will be held in confidence and will only be used to enrich the E&S recommendations given by the consultant in the ESIA report.)

1. Are you familiar with the proposed project, its objectives and proposed activities?

Yes [✓] No [ ]

2. Will your source of livelihood / income be negatively affected by the proposed project?

Yes [ ] No [✓]

3. Do you think the proposed project is compatible with the surrounding developments?

Yes [✓] No [ ]

4. What positive social and environmental impact do you anticipate during construction and operation stages of this project?

The project will be able to sustain the beneficiary with enough water for farming so as to reduce poverty.

5. What negative social and environmental impact do you anticipate during construction and operation stages of this project?

only wild animals and the contracter

6. What do you think the developer should do to mitigate negative social economic impacts of this project?

We should be taken carecaff by the game officess and a good contracter

7. Is there any other comment or suggestion you would like to make with regard to environmental and social safeguards?

In case of the road cuts it should be well taken careafe to avoid any means of transport Also to have a trained artsan

Name: Isaac mathenge Date: 2/1/5/25

Residence: Thega Designation: Member

Contact: 0710546290 Signature: Isaac

THANK YOU FOR YOUR RESPONSE

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(Please note that the feedback you give will be held in confidence and will only be used to enrich the E&S recommendations given by the consultant in the ESIA report.)

1. Are you familiar with the proposed project, its objectives and proposed activities?

Yes [✓] No [ ]

2. Will your source of livelihood / income be negatively affected by the proposed project?

Yes [ ] No [✓]

3. Do you think the proposed project is compatible with the surrounding developments?

Yes [✓] No [ ]

4. What positive social and environmental impact do you anticipate during construction and operation stages of this project?

Positive - They are good - Labour, Poverty eradication, good Health, increase Farming, clean business

5. What negative social and environmental impact do you anticipate during construction and operation stages of this project?

- Thieves will have things to steel.
- unskilled labour from different areas
- Sexual Harassment

6. What do you think the developer should do to mitigate negative social economic impacts of this project?

- Youth to be given work of unskilled labour
- ~~To be~~ sexual Harassment to be reported to Police, Health Hospitals do not work or change clothes

7. Is there any other comment or suggestion you would like to make with regard to environmental and social safeguards?

- Training of the environment condition.
- Train on good working condition.
- To be issued with some seeds, eg maize seeds bean seeds all activities done

Name: F. Mwai Date: 21/5/2025

Residence: Jagwa B Designation: Vice chairman

Contact: 0723983832 Signature: [signature]

THANK YOU FOR YOUR RESPONSE

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(Please note that the feedback you give will be held in confidence and will only be used to enrich the E&S recommendations given by the consultant in the ESIA report.)

1. Are you familiar with the proposed project, its objectives and proposed activities?

Yes [✓] No [ ]

2. Will your source of livelihood / income be negatively affected by the proposed project?

Yes [ ] No [✓]

3. Do you think the proposed project is compatible with the surrounding developments?

Yes [✓] No [ ]

4. What positive social and environmental impact do you anticipate during construction and operation stages of this project?

→ The farming will increase like milk will increase and fruits

→ The youth will have an opening to work with the project

→ The income will increase

→ We will minimize the deviations in our Society

5. What negative social and environmental impact do you anticipate during construction and operation stages of this project?

- Contractor may work with the merchine so the young generation may lack the opportunity to work
- language burrier may be a challenge
- Diseases may occur

6. What do you think the developer should do to mitigate negative social economic impacts of this project?

- Contractor should let the work to be worked mainly be the youth
- There should be an interpreter between the two parties the contracor and the society
- It will be nesasary for the counseling to the society

7. Is there any other comment or suggestion you would like to make with regard to environmental and social safeguards?

I educated on how to - Record and book keeping

Name: Pauline Muthu Date: 21/5/2025

Residence: Tagkia A Designation: Tresure

Contact: 0711253867 Signature [signature]

THANK YOU FOR YOUR RESPONSE

Annex 14: Proposed Maragima/Tagwa Water Project - List of Targeted Beneficiaries

S/NO	NAME	Gender	ID No.	CONTACT	LR No.
1	Ephraim Wahome Mathenge	M	5510378		Mureri /94
2	Michael Kahuthu Gathungu	M	0235047	0722955544	9681
3	Richard Thogo Warugu	M	30719694	0719295672	Mureri/148
4	Prof Godfrey Muriuki	M	4829394		Mureri/89
5	Cyrus Maina Kabuthi	M	3378146	0713817022	Mureri/298
6	Ceciliah Nyaguthii Gitonga	F	20065043	0723819413	Mureri/92
7	Charles Wanjau Gathugu	M	14122824		9683
8	Edward Maina Mukururo	M	2350639	0702465835	Mureri/252
9	Paul Ngechu Mahugu	M	3415766	0702672777	Mureri/112
10	Millium Gachambi	F	29041180	0725599883	Mureri/107
11	Joseph Muriithi Gaturuku	M	3421121	0716195797	Mureri/159
12	Stephen Wamunyu Gitahi	M	3378790	0702731501	Mureri/132
13	James Waithaka Mugo	M	0811198	0721571204	Mureri/221
14	Joseph Ndegwa Ndungu	M	11179728	0720275883	Mureri/105
15	Francis Macharia Kiboi	M	0810754	0723523203	Mureri/145
16	Ruth Wamuyu macharia	F	22058528	0723047463	Mureri/145
17	Stanley Nguru Ikobo	M	5510631		Mureri/81
18	Daniel Kibango Gachau	M	3419602	0723346334	Mureri/101
19	Mudia Miano	M	3377305	0721143496	Tagwa/741
20	James Ngumo Kiragu	M	3377174	0722502956	Mureri/68
21	Lydia Wairimu Kinyoe	F	3376133	070505086	Mureri/78
22	Michael Mutahi Mwaniki	M	3376209	0721436456	Mureri/123
23	Charles Wakaritu Kinyua	M	10134563	0720365302	Mureri/95
24	Moses Kariungi Warutere	M	11565386	0722913583	Tagwa/41
25	Phelishinah Gakure Kagure	F	14521417	0725275514	Mureri/146
26	Fredrick Mwai Thuumbi	M	1411681	0782971007	Tagwa/228
27	James Wamae Githogonde	M	11320060	0726912011	Tagwa/197
28	Simon Muchemi Gichohi	M	05558989		Mureri/130
29	Miti Michugu	M	5508451		Mureri/32
30	Timothy Mathege Wahome	M	23119116	0726706773	Tagwa/198
31	Gerald Ngujiri Maina	M	1412343	0720339534	Mureri/147
32	Samuel Wachira Kibiri	M	3378129	0727638717	Mureri/77
33	Paul Mwangi Kariuki	M	1883116	0726347965	Mureri/114
34	Alice Wachira Waitherero	F	25316869	0729609228	Tagwa/709
35	Isaack Mwangi Kiragu	M	0317452	0714190746	Mureri/229
36	James Kamweti Mathege	M	1412253	0720221165	Tagwa/199
37	Mercy Njeri Karagita	F	5557823	0724652265	Tagwa/377
38	David Kagomo Munuhe	M	6817535	0723820322	Mureri/64
39	David Ndiragu Wakaritu	M	11179663	0727352134	Mureri/95
40	Ann Njambi Kahuthu	F	8813290	0722569440	9681
41	Peter Wambugu Keratai	M	0236058		Mureri/124
42	Peter Theuri Wanjau	M	8152341		Mureri/129
43	Shadrack Wamugi Kamuya	M	1252662		Mureri/99
44	Daniel Wachira Ndiragu	M	11773885		Mureri/157
45	James Muita Wandu	M	0810749		Mureri/143
46	Patrick Mwangi Kiige	M	3377588	0727065405	Mureri/14

S/NO	NAME	Gender	ID No.	CONTACT	LR No.
47	Stanley Maina Kinyua	M	21274777		Mureri/14
48	Dickson Kiama Kioni	M	3496164	0723393292	Tagwa/676
49	Wilfred Wanjau Muiriithi	F	21964859	0725867178	Tagwa/823
50	Richard Wachira Nderitu	M	7323828	0710706934	Mureri/129
51	Edward Mingira	M	11773801	0723346377	Tagwa/206
52	Isaack Nderui Mwaniki	M	11449721	0723846658	Tagwa/787
53	Eliud Nene Mwenje	M	22508437	0723553071	Mureri/149
54	Jackson Ndirangu Kariungi	M	26674772	0713210039	Mureri/117
55	Samul Wabichi Kiboi	M	20398719	0728891101	Mureri/144
56	Tabitha Wangui Muiruri	F	9380903	0710480599	Mureri/98
57	Stephen Warugu Macharia	M	23540777	0723523203	Mureri/59
58	Simon Kinyua Kanyugi	M	5100891	0721931613	Tagwa/265
59	Daniel Maina Muriuki	M	0563922	0723629747	Tagwa/299
60	Duncan Muriithi Muriuki	M	0830756	0719850556	Tagwa/738
61	Francis Munyiri Ndiragu	M	6412020	0722725432	Tagwa/367
62	Jelioth Muthoni Thagana	F	1412728	0726564658	Mureri/217
63	Rose Wanjiru Mathege	F	23158821		Tagwa/742
64	Simon Gichoru Muya	M	10188309		Tagwa/260
65	Isaack Kiuri Karungi	M	3378699		Mureri/117
66	Joseph Maina Mutahi	M	8648425	0722895722	Tagwa/40
67	Stephen Githaiga Munuhe	M	29970910		Mureri/73
68	John Wahome Munjari	M	3378483	0727612439	Mureri/74
69	Joram Kingori Macharia	M	21463591		Mureri/59
70	Stanley Wachira Muchori	M	1031855	0722852048	Mureri/225
71	Samuel Kabiru Kinyua	M	12778992	0724868816	Tagwa/745
72	Peter Githaiga Githinji	M	28027162	0743361239	Mureri/100
73	Benard Kariuki Muita	M	6831764	0723870711	Mureri/33
74	Margaret Wangari Mwangi	F	9117582	0720303426	Mureri/33
75	James Wachira Wagura	M	23523048		Mureri/139
76	Stephen Gachanja Thagana	M	29035440	0720134755	Mureri/6
77	Waweru Ndegwa	M	550704		Mureri 152
78	Simon Maina Mukora	M	1824713	0729017785	Mureri/82
79	Ann Wangui Gachengo	F	1828380	0720368734	Mureri/215
80	Peter Njine Wahome	M	1828372	0729250523	Mureri/149
81	Mary Wanjiku Njaramba	F	9553934	0717462909	Mureri/157
82	Eunace Kabuti Muhuri	F	1410063	0720982751	Mureri/13
83	David Kiboi Macharia	M	11411269	0729378171	Mureri/52
84	Stephen Waweru Karaguri	M	0811261		Mureri/15
85	Peter Mutitu Kariungi	M	20902956	0726812858	Tagwa/238
86	John Kariuki Kibango	M	9075973	0720538694	Mureri/101
87	Wathirinje Mwitua	M	3378315		Mureri/92
88	Millicent Ndegwa Mumbi	F	1827541	0711836575	Mureri/17
89	Ephantus Githaiga Kariuki	M	3376478	0723440137	Mureri/79
90	Eliud Kariuki Ndirangu	M	20180433	0728543682	Mureri/11
91	Wangombe Muriuki	M	7878835	0714001704	Mureri/90
92	Peninah Wangui Githogonde	F	11320060	0726912011	Tagwa/197
93	Stephen Kiama Githinji	M	27569946	0712740879	Mureri/103

S/NO	NAME	Gender	ID No.	CONTACT	LR No.
94	George Mutahi Ndiragu	M	3378111	0712951897	Mureri/27
95	Charles Kiriithi Kibango	M	1412985		Mureri/5
96	Charles Muhoro Wanderi	M	1410739	0724902379	Tagwa/238
97	James Gathungu Kahuthu	M	0235055	0722821866	9681
98	James Ngamau Gathogo	M	30294450	0707155669	Mureri/109
99	David Wachira Wahome	M	22838646	0718881510	Mureri/98
100	Richard Gichohi Kiige	M	10966145	0769250871	Mureri/14
101	John Ndungu Wanjohi	M	0086874		Mureri/116
102	James Mwenje Gitahi	M	22468114	0726723051	Mureri/132
103	Moses Wachira Mahugu	M	14521891		Mureri/168
104	Beatrice Nyambura Mugo	F	5482781	0736293373	Tagwa/200
105	Simon Mukangu Muriuki	M	11807420	0728543770	Mureri/248
106	George Ndonga Muriuki	M	11179085	0710203522	Mureri/96
107	Isaack Mathenge Gakure	M	23504296	0710546290	Mureri/147
108	Mercy Wangechi Muiga	F	0532101		Tagwa/222
109	Luka Warutere Mathenge	M	5795532		Tagwa/199
110	Micahel Ndanga Gikandi	M	0022059	0718571478	Tagwa/210
111	Jesee Mwaniki Wamugunda	M	7029836	0722811577	Tagwa/694
112	George Muriithi Mingira	M	11773801	0723346377	Tagwa/207
113	Raphael Kabethi Murage	M	0939988	0729645999	Tagwa/655
114	Joseph Kibuchi Muraguri	M	13101942	0720303963	Tagwa/102
115	Stanley Ndirangu Thagana	M	29035440	0728962286	Mureri/216
116	Peter Kariithi Kuria	M	9262197	0735176706	Tagwa/238
117	Paul Mwangi Gikiaru	M	21731920	0725577404	Tagwa/458
118	Geoffrey Muiruri Githongo	M	13803796	0724590486	Mureri/98
119	Samuel Muriuki Maina	M	11630263	0728332875	Tagwa/59
120	James Muhara Wamae	M	1411711		Tagwa/737
121	Hildah Nyambura Kamweti	F	0434879	0714640260	Tagwa/211
122	John Mwangi Mwenje	M	26401716	0728572821	Mureri/19
123	Robert Ndiragu Ndegwa	M	3329862	0769121834	Tagwa/120
124	Kihiu Wanjohi	M	1409519	0722398184	Tagwa/739
125	Joseph Mathege Mithamo	M	17247590	0723383856	Tagwa/238
126	Rose Wanjiru Theuri	F	22413218		Tagwa/800
127	James Mwenje Wamuyu	M	21723419		Mureri/19
128	Mary Mugure Mwangi	F	11321278	0728587729	Mureri/10
129	James Gakui Kingori	M	38181952	0716237906	Tagwa/48
130	Munyiri Muriuki	M	3712277		Tagwa/43
131	Stephen Maina Ndiragu	M	14521911	0710535954	Tagwa/33
132	Charles Maina Mathenge	M	3376298		Tagwa/595
133	Beatrice Muringo Kibara	F	3377454	0725099805	Mureri/185
134	David Ngari Kiige	M	7028315	0720975691	Mureri/169
135	Catherine Wachira Watiri	F	1413354	0719302120	Tagwa/64
136	Harrison Mathege Wanjohi	M	2770064	0725538115	Mureri/45
137	Richard Maina Ngunyi	M	3712183		Tagwa/632
138	Elijah Wagura Karigi	M	22517036		Mureri/138
139	Samuel Gathu Ndegwa	M	30117592	0721614043	Tagwa/486
140	Kinyua Macharia	M	410657		Tagwa/374
141	Timothy Kigundu Muhuri	M	6831871		Tagwa/756

S/NO	NAME	Gender	ID No.	CONTACT	LR No.
142	Samuel Gikonyo Nguru	M	4131072		Tagwa/728
143	Ruth Waruguru Ngunjiru	F	13454867	0721454647	Mureri/25
144	Joseph Muraguri Wakiuru	M	3376196		Mureri/266
145	Samuel Kibiru Maina	M	759090		Tagwa/200
146	Joseph Mutahi Kiige	M	13538921	0711701213	Mureri/14
147	Esther Wangui Thumbi	F	3376206	0719353089	Mureri/60
148	Thomas Muita Ndiangui	M	1277106	0729847222	Mureri/84
149	Peter Mathenge Karige	M	0423812		Tagwa/382
150	Peter Mwangi Maina	M	22182933		Mureri/273
151	James Maina Mwangi	M	25316869	0729609228	Tagwa/1064
152	Simon Ndirangu Mururui	M	34877879	0740479509	Mureri/82
153	Stephen Mwangi Muita	M	3379089	0723936646	Mureri/3
154	Richard Wagura Mwangi	M	13319091	0726000774	Mureri/62
155	Veronicah Wangari Kiragu	F	3418955	0727044464	Mureri/39
156	Margaret Nyambura Mwangi	F			Mureri/85
157	Wilfred Maina Kariuki	M	23936526		Tagwa/189
158	Peter Maina Munyiri	M	11629055	0710278419	Tagwa/675
159	John Githui	M	2834476		Tagwa/259
160	Josphat Ngatia Gachanja	M	13322878	0721756132	Mureri/118
161	Robert Munjari Wahome	M	10502381	0710170655	Mureri/74
162	Dumuscus Mzumari	M	7441220	0728285087	Tagwa/464
163	David Maina Mathenge	M	9858036		Tagwa/682
164	David Kioho Thagana	M	8649078		Tagwa/687
165	Joseph Githinji Wamweya	M	1425483		Tagwa/680
166	Joseph Mwai Mugo	M	3377335	0724646041	Tagwa/713
167	Charles Mwangi Ruita	M	7013657		Tagwa/231
168	John Macharia Muthui	M	10488752	0727929260	Tagwa/1070
169	James Ngunyi Mahu	M	12777696	0717620953	Tagwa/652
170	Cyrus Odiek Young	M	22776731	0723221451	Tagwa/254
171	Jackson Mugo Muhuri	M	1410380		Mureri/13
172	Charles Gathu Mingira	M	3200740	0720940497	Tagwa/207
173	Simon Gakuu Theuri	M	0340583		Tagwa/190
174	Benson Wambugu Kamwaro	M	22661923	0794456078	Mureri/155
175	Esther Njeri Murage	F	13724391		Mureri/87
176	Samuel Mugo Gakumbi	M	13799062	0759947210	Tagwa/712
177	Charles Kahariri Mariga	M	2571228		Tagwa/212
178	Fredlick Mwai Munyu	M	21618467	0727926502	Tagwa/49
179	James Ndirangu Muchiri	M	11033980		Tagwa/188
180	Eustace Mwangi Theuri	M	0428178		Tagwa/806
181	Harrison Kahumbu Mwangi	M	10503279	0100757456	Mureri/96
182	Joram Kamau Muchemi	M	23540791	0723008604	Mureri323
183	James Mutahi Kiige	M	5507166	0705003419	Mureri/14
184	Esther Wambui Mwangi	F	3377588	0727005405	Tagwa/697
185	Ajelikah Wanjiku Kanyari	F	5516190		Tagwa/579
186	Nderitu Kamuya	M	1413237		Mureri/292
187	Samuel Maina Munene	M	8649512		Tagwa/115
188	Mwangi Gathogo	M	0762152		Tagwa/468

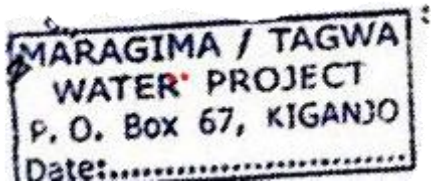
S/NO	NAME	Gender	ID No.	CONTACT	LR No.
189	Eliud Njiru Njua	M	13338665	0728053857	Tagwa/189
190	David Wachieni Gakinya	M	33006725	0728560404	Mureri/61
191	Mwangi Warutere	M	23676003	0721601360	Tagwa/665
192	Geofrey Muiruri Gathambo	M	3379026	0759682428	Mureri/141
193	James Mwai Miano	M	7012379		Tagwa/681
194	Peter Gakunya	M	21480236		Mureri/55
195	Samuel Wachira Munyiri	M	0752076		Tagwa/635
196	Loise Muringo Muruthi	F	9263220		Tagwa/766
197	Faith Wanjiru Waithaka	F	23523104		Mureri/54
198	Benard Kamweti Munuhe	M	10683771	0710493697	Mureri/56
199	Joseph Gitonga Wanjohi	M	8812733	0728425784	Tagwa/583
200	Joseph Waithaka Wanjohi	M	7020435	0784158855	Mureri/275
201	Thomas Gathogo Ngetha	M	3188065		Tagwa/988
202	Wilfred Ndoria Karangi	M	0268008	0723395180	Tagwa/668
203	Phillip Mwai Muriuki	M	8979723		Tagwa/217
204	David Maina Waweru	M	13992253	0721746129	Mureri/24
205	Ephraim Wachira Wangombe	M	0758320		Tagwa/399
206	Martha Wanjiru Mwangi	F	13724394		Mureri/14
207	Stephen Nderitu Nduhiu	M	6828774	0741922630	Mureri/75
208	Sarah Wangui Nguini	F	0248321	0741685812	Tagwa/187
209	Mary Wangechi Gachanja	F	10682608	0725839052	Mureri/128
210	Pharis Gitonga	M	1503873	0724997631	Mureri/97
211	James Macharia Maina	M	1565092	0727302287	Tagwa/299
212	Patrick Kiragu Ngumo	M	3377174	0722502955	Mureri/68
213	Jane Wagaki Maguta	F	1828660		Mureri/61
214	Duncan Mbuthia Kariuki	M	41220478		Tagwa/211
215	Robertson Wanjau Muriithi	M	3379107		Tagwa/200
216	Pharis Muriithi Ngima	M	13333840	0721663317	Mureri/277
217	Antony Wachira Wanjau	M	22478132		9683
218	Joseph Mwangi Nderitu	M	14521922		Mureri/83
219	Denis Mathenge Kamweti	M	1412255		Tagwa/1067
220	Fidelis Wambui Ndungu	F	53210467		Mureri/25
221	Isaack Mwangi Munyiri	M	22412623	0722505844	Tagwa/1057
222	Waruguru Muriuki	F	10894876		Mureri/69
223	Micahel Wahome Wanjiku	M	21320461		Tagwa/786
224	Ruth Muthoni Karanja	F	1420129		Tagwa/194
225	Irungu Muriuki	M	42217412		Mureri/80
226	John Gikonyo Ruria	M	0473906		Tagwa/711
227	Eunice Wanjiru Muriithi	F	44278128		Tagwa/207
228	Joshua Kimata	M	0412267		Mureri/91
229	Wachira Reriani	M	0269498		Tagwa/237
230	Eraustus Wanjohi Wahome	M	0805650		Tagwa/196
231	Patrick Ndiritu Kioni	M	4669869		Tagwa/577
232	Wilfred Wambugu Ndegwa	M	13471071		Tagwa/208
233	James Simpson Ndegwa	M	13542805	0720629949	Tagwa/669
234	Peter Muriuki Mingira	M	10118378		Tagwa/206
235	George Zefaria Maina	M	3690031		Tagwa/721

S/NO	NAME	Gender	ID No.	CONTACT	LR No.
236	Patrick Wahome Muita	M	10503577		Mureri/184
237	William Wahome Ndiragu	M	13724435	0740164478	Mureri/107
238	Michael Maina Ngunjiri	M	11565340	0727554152	Mureri/147
239	James Muriithi Mwangi	M	8649086		Tagwa/720
240	Stephen Macharia Waweru	M	21420467		Tagwa/571
241	Benard Githua Ndirangu	M	23576974		Mureri/316
242	Loise Wanjiku Maina	F	11320733		Tagwa/1042
243	Ann Wairimu Mwaniki	F	24332610		Mureri/284
244	David Maina Mahugu	M	13724352		Mureri/112
245	Antony Kariuki Muchemi	M	1422888		Mureri/36
246	Samuel Gathungu Wanjau	M	27415805	0727115558	Mureri/261
247	Stephen Maina Muturi	M	14688971		Mureri/313
248	Mary Wairimu Waiganjo	F	21460821		Tagwa/792
249	Denis Kiruga	M	9553977	0794302085	Tagwa/209
250	Paul Muriithi Maina	M	31514308		Tagwa/1072
251	Geoffrey Gakuru Karani	M	3378178		Mureri/106
252	Simon Macharia Gichuru	M	3378178		Tagwa/746
253	Daniel Wachira Wakaritu	M	11773885	0725838207	Mureri/50
254	Joseph Kinyua Weru	M	22845670	0786995677	Tagwa/989
255	Wachira Ndiritu	M	124071		Tagwa/814
256	John Karue Ndiritu	M	9142748		Tagwa/709
257	Lydiah Wanjira Ngunjiri	F			Tagwa/259
258	Ann Njenga	F	30428941		Mureri/70
259	Peter Karichu	M	22412372	0710915686	Mureri/34
260	Mary Wambui Muchemi	F	22135546		Mureri/106
261	Eunice Nyambura Mugo	F	24697885		Mureri/256
262	Peter Mwangi Kiragu	M	12627355		Mureri/325
263	John Wanjohi Maina	M	22008376	0714604253	621
264	Richard Macharia Waithaka	M	22665749		Mureri/280
265	Joshua Kamwere Wanjiku	M	24041381		Mureri/61
266	Titus Irenyu	M	22814239	0720718853	Mureri/111
267	Hannah Njamiu Maranga	F			Tagwa/263
268	Brenda Wangui Gathu	F	22183051	0721614043	Tagwa/699
269	John Kamau Murere	M	7551779	0713101036	Tagwa/208
270	Samuel Kanyari Wanjiru	M	22486214		Tagwa/723
271	Susan Wanjiku Gakure	F	14521517		Mureri/46
272	Joseph Muturi Wachira	M	24327146		Mureri/31
273	Micahel Maina Muthigani	M	23652843	0728944198	Tagwa/793
274	Zacharia Maina	M	21412748		Tagwa/199
275	Marium Cheptai Arusi	F	1141816		Tagwa/662
276	Michael Mathenge Njoroge	M	21426491		Tagwa/255
277	Francis Kaguamba	M	1411711	0726355711	Tagwa/255
278	John Gichubi Wakaritu	M	23314871		Mureri/50
279	James Mwai Wambugu	M	11773675	0712146651	Mureri/65
280	Francis Mwangi Munuhe	M	22745329	0713535229	Mureri/73
281	Peter Ngutheru Wakaritu	M	22745329		Mureri/95

S/NO	NAME	Gender	ID No.	CONTACT	LR No.
282	John Gatamu Munuhe	M	9668535	0703187322	Mureri/73
283	Joseph Muriuki Mundia	M	13537196	0742932088	Mureri/66
284	Robert Karume Mahui	M	2172381		Tagwa/1060
285	Benard Ndirangu Mutahi	M	20751815		Mureri/27
286	David Mwihuri Mwangi	M	9455144		Mureri/62
287	Gerald Wanjohi	M	4835417	0714923423	Tagwa/850
288	Patrick Wahome Kingori	M	4132781		Tagwa/836
289	Julius Muchemi	M	23540791	0723008604	Mureri/325
290	Benard Karue Wambugu	M	48720471		Tagwa/822
291	John Wahome Kingori	M	29408343		Tagwa/907
292	Duncan Magana Mwangi	M	31428472	0711372246	Mureri/299
293	Onesmus Muriithi Mwaniki	M	23510421	0726335872	Mureri/335
294	James Peter Maina	M	9137136		Tagwa/636
295	Bonface Muita Mwangi	M	27983672	0728607966	Mureri/204
296	Stephen Ngunyi Mingira	M	21384155		Tagwa/207
297	David Mwariri Gathu	M	21724126		Mureri/192
298	Alice Wangechi Mwangi	F	11075715		Mureri/300
299	Peter Nguo Njigua	M	555201		Tagwa/745
300	Simon Chege Kabethi	M	22465497	0727837667	Tagwa/636
301	Prisicillah Njambi Wamugunda	F	12943719	0722890921	Tagwa/694
302	Edward Muraguri Wanjohi	M	31474211		Tagwa/765
303	John Wahome Muraguri	M	8648298	0721117686	Tagwa/753
304	Rose Wanjiku Mbai	F	0491078		Tagwa/259
305	George Nginga Maina	M	7441936	0718190980	Tagwa/932
306	James Mwangi Mundia	M	10682856	0728554103	Tagwa/375
307	James Macharia Thuo	M	41724217		Tagwa/724
308	Arnest Muraya Mutahi	M	14625185	0712951897	Mureri/27
309	Jane Mumbi Wamai	F	11411680	0723159249	Tagwa/670
310	Gladys Wambui Wachira	F	14521891	0701782943	Mureri/77
311	Joseph Kamau Mwenje	M	28416247	0711604971	Mureri/90
312	Esther Wanjiru Muraya	F	24625218		Tagwa/980
313	Patrick Kamunya Karugi	M	22438751	07127887675	Tagwa/978
314	Titus Kinyua Muriithi	M	116308882	0729664598	Tagwa/724
315	Simon Mwangi Ndoria	M	1045957		Tagwa/823
316	Ibrahim Karuingi Kiuri	M	29416912		Mureri/117
317	Stanley Mwangi Muriuki	M	31426871		Tagwa/968
318	Samuel Maina Kiige	M	24370280	0724287209	Mureri/169
319	Joseph Munene Karagita	M	5557823	0724652265	Tagwa/377
320	James Mwangi Kingori	M	6831011		Mureri/86
321	Simon Mathenge Nguru	M	71488845		Mureri/8
322	Peter Muthee Gichuru	M	21970577		Tagwa/1070
323	Pual Kariuki Wari	M	11320657	0714523226	Tagwa/939
324	Peterson Muriuki Maina	M	47214281		
325	Lydiah Nyambura Ndirangu	F	33416212	0727352134	Tagwa/256
326	Julius Wahome Maina	M	27161132		Tagwa/199
327	Jackson Mathenge Maina	M	22384817		Mureri/61
328	Jecintah Nyawira Kibira	M	23972155		Tagwa/823

S/NO	NAME	Gender	ID No.	CONTACT	LR No.
329	David Ndiritu Kingori	M	3418474		Mureri/282
330	James Muriuki Makangu	M	11507420	0728543770	Mureri/248
331	Samuel Ndiritu Murage	M	5495066		Tagwa/209
332	Wamuguda Kinyua	M	1411783	0726112661	Tagwa/256
333	Phoeby Wanjiru Kingori	F	32412246		Tagwa/938
334	Mary Mumbi Wachira	F	24685174		Mureri/196
335	Samuel Mwaniki Kingori	M	426175174		Mureri/28
336	Antony Nduru Kinyua	M	38336372		Mureri/194
337	Jane Wanjiru Dishon	F	19486895		Tagwa/807
338	Simon Maina Makotha	M	13684841	0729017785	Tagwa/931
339	Amos Itegi Gichuhi	M	3377335	0799946653	Tagwa/757
340	Camelinah Wambui Wachira	F	11412250	0713316952	Mureri/103
341	Joseph Muthigani	M	3187159		Tagwa/264
342	John Wachira Warugu	M	33494268	0722575363	Mureri/293
343	Boosty Mutiso Musyoka	M	21523147		Tagwa/245
344	Eva Wanjugu Muchemi	F	33415812		Tagwa/800
345	Athiambo Kingori	M	24497022		Mureri/144
346	Antony Mwihu Fatua	M	21996378		Tagwa/256
347	Lusoi SangareLTD	M			Tagwa/191
348	Moses Mwithe Gitonga	M	20065043	0723819473	Mureri/92
349	Eliud Nene Wamunyu	M	22508437	0712548483	Mureri/150
350	Loise Wanjiru Wameu	F	32045671		Tagwa/915
351	Derick Mwangi Muriithi	M	23556247		Tagwa/206
352	Michael Mari	M	32472168		Tagwa/749
353	John Mugondo	M	87224614		Tagwa/208
354	Muriuki Njogu	M	523112567		Tagwa/795
355	Peter Macharia Waithira	M	34278171		Tagwa/1062
356	Mary Wambui Mwai	F	30426871		Tagwa/802
357	Nancy Muthoni Kariuki	F	3373101	0729226089	Tagwa/209
358	Richard Gatoto	M	24682504	0711495036	Tagwa/520
359	Beatrice Wanjiku Maina	F	23652843	0728944198	Tagwa/566
360	Grant Muriithi Wamunyu	M	235128715	0729173641	Mureri/19
361	Benson Karuri Waweru	M	23426814		Mureri/24
362	David Kamuya Gathambo	M	35714371	0795223851	Mureri/141
363	Martha Wanja Kamau	F	23416248		Mureri/5
364	James Mwenje Wamunyu	M	22468114	0726941174	Mureri/188
365	Richard Ruria Gikonyo	M	20471218		Tagwa/911
366	James Maina Ndanga	M	25316869	0729609228	Tagwa/705
367	Martin Macharia Danga	M	22417026	0725859333	Tagwa/705
368	Peter Waiguru Kamuhia	M	25351727	0729380376	Tagwa/823
369	Jackson Maina Ngamau	M	25624717		Mureri/109
370	Wambui Nyaga	F	38427152		Tagwa/1071
371	George Waweru MuiTA	M	22384782		Mureri/184
372	Daniel Wambugu Irenyu	M	127741024	0728515127	Mureri/111
373	James Mwangi Macharia	M	11486256	0755110614	Tagwa/978
374	Joseph Mathenge Wahome	M	23283402	0721923530	Mureri/94
375	Ann Wamunyu Kinyua	F	22699470	0727746012	Tagwa/256
376	Edwin Mutahi Mwangi	M	8648425	0722895722	Tagwa/824

S/NO	NAME	Gender	ID No.	CONTACT	LR No.
377	Alice Mumbi Mwangi	F	11773845	0711196390	Mureri/300
378	Joseph Kanyiri Wamunyu	M	121486256		Mureri/19
379	Charles Wambugu Wachira	M	23540489		Tagwa/765
380	Irene Mumbi Maina	F	13882165	0700859409	Tagwa/592
381	Peter Maina Mathenge	M	10379469	0759234684	Mureri/28
382	James Wahome Kinyua	M	31426892		Mureri/285
383	Jane Nyaguthii Maina	F	22384981		Mureri/376
384	Hellen Waithiegeni Kariuki	F	38215409		Mureri/211
385	Joseph King'ori Kinyoe	M	20714015	0723270746	Mureri/78
386	Margaret Wangeci Mwangi	F	23049921		Mureri/300
387	Kevin Mundia Mwangi	M	14162821		Tagwa/375
388	Samuel muriuki munyiri	M	10595927	0726967623	Tagwa/1072
389	Godfrey Thumbi Maina	M	37375143		Mureri/60
390	Nancy Mumbi Gaturuku	F			Mureri/273
391	Ian Charlse Wajau	M	20488498	0722469104	Mureri/261
392	Faith Ndhambi Kimeu	F	29408843	0712004059	Mureri/57
393	John Ndiragu Mututo	M	24764528	0703184852	Mureri/150
394	Martin Wachira Ngatia	M	32052421	0702762582	Mureri/251
395	Peter Maina Muhoro	M	3377485	0701453248	Tagwa/584
396	Beatrice muringo muturi	F		0711839912	Mureri/291
397	Kennedy Gacia Mwangi	M	27338117	0790886254	Tagwa/909
398	Paul Gakuo Gachanja	M	37486221	0725631046	Mureri/6
399	James Maina Gichohi	M	25316869	0729609228	Mureri/324
400	Grace Wairimu Gatei	F	22556218	0720830700	Tagwa/1057
401	Antony Magore Ongera	M	31793302	0727331437	Mureri/291
402	Alexander Wathinji Gathirwa	M	9116030	0711686093	Mureri/93
403	John Mwangi Muraya	M	31426921		Mureri/87
404	Purity Nyaguthii Wambugu	F	5506547	0716863380	Mureri/86
405	Alice Wambui Gathumbi	F	23582102	0729798143	Tagwa/813
406	Judith Kinui	M	33416822	0722667747	Tagwa/850
407	Charles Wahome Githinji	M	24113582	0728884000	Tagwa/562
408	Daniel Githaiga Kariuki	M	61483282		Tagwa/947
409	Michael Muriithi Ndugo	M	24324812		Mureri/46
410	Thomas Thimbara Muriuki	M	23540818	0720591552	Mureri/185
411	Jackson Muchiri Wahome	M	25624812		Mureri/208
412	Jackson Kiimata	M	30248954		Mureri/4
413	Reuben Mwangi Wachira	M	30170790	0727303116	Tagwa/990
INSTITUTIONS / COMMUNITY ASSETS					
1	A.I.P.C.A Maragima	Place of Worship			Mureri/246
2	P.E.F.A Church Maragima	Place of Worship			Mureri/245
3	Full Gospel Church Maragima	Place of Worship			Tagwa/570
4	Agape Fellowship Church Maragima	Place of Worship			Tagwa/580
5	Maragima Primary School	Learning Institution			Mureri/181
6	Maragima Secondary School	Learning Institution			Mureri/181
7	P.C.E.A Tagwa Church	Place of Worship			Tagwa/257
8	Full Gospel Church Tagwa	Place of Worship			Tagwa/255
9	A.I.P.C.A Tagwa Church	Place of Worship			Tagwa/254

S/NO	NAME	Gender	ID No.	CONTACT	LR No.
10	Tagwa Cattle dip	Community Asset			Tagwa/259
11	Maragima cattle dip	Community Asset			Mureri/183
				Men: 330 (80%) Women: 83 (20%) Total: 413 Institutions / Facilities: 11 Learning Institutions: 2 Places of Worship: 7 Cattle dip: 2	

Annex 15: Hydrological Survey Report – Rukurwa Stream (Dated 18th August 2020)

HYDROLOGICAL ASSESSMENT REPORT

MARAGIMA TAGWA.
P.O. BOX 67-10102, KIGANJO.

LOCALITY:
HOMBE VILLAGE, KABARU LOCATION, KIENI EAST DIVISION,
IN
NYERI COUNTY.

INVESTIGATED SITES COORDINATES.

S 0.3387653513, E, 37.076788845, Alt 1839m asl.

MAP SHEET: KARATINA 121/3

REPORT PREPARED BY:

STEPHEN OKOTH OWUOR - WD/WRP/208
LIFE WATERS DRILLING LIMITED.
(Consulting hydro geologists, hydrologists and EIA/EA Experts)
P. O. Box 10670-30100,
ELDORET.
Cell-phone: 0734770000

LWD/SW/019/006/20

18TH AUGUST 2020

EXECUTIVE SUMMARY

Maragima Tagwa (Herein after referred to as the Client) has an intention of abstracting water from Rukurua Stream for a Community Weir/intake within **HombeVillae, Kabaru Location, Kieni East Division in Nyeri County**. It is with this consideration that the Client engaged Life Waters Drilling Ltd (Herein after Referred to as the Consultant) to carry out a hydrological assessment at the proposed stream to determine its hydrological characteristics and the ability to sustain the construction of a Weir/intake to serve the community residents.

This report presents the hydrological assessment carried out at the proposed abstraction point/of the stream to determine the viability of the project in reference to the availability of the quantity of water vis a vis the proposed Weir/intake construction. The assessed point of the stream is defined by GPS Coordinates: **S 0.3387653513, E, 37.076788845, Alt 1839m asl**. The assessment at the Weir/intake's inlet with the assumption that the rates of evaporation from theWeir/intake is negligible.

A site visit and assessment was conducted on 15thAugust 2020. The purpose of the visit was to determine the scope of development for the stream. In order to assess the supply potential of the stream; an assessment needs to be done appraising the physical characteristics and hydrology to determine among others issues, the viability of the water supply project. The assessment considered the following areas, assessment of the site physiography, catchment characteristics and flow data.

The assessment was followed by a desk review of the existing hydrological and other relevant data relating to the stream and its Catchment area. This describes both the surface and subsurface water conditions of the project area. Hydro meteorological data were also analyzed and a report prepared as stipulated by the water regulations 2007.

PROPOSED PROJECT SUMMARY

CONTRACTOR/CLIENT	MARAGIMA TAGWA
PROJECT DESCRIPTION	The project report presents the findings for the proposed water abstraction project from Hombe Village, Kabaru Location, Kieni East Division in Nyeri.
OBJECTIVES	The objective of the project is to hydrological characteristics of the stream; an assessment needs to be done appraising the physical characteristics and hydrology to determine among others issues, the viability of the water to sustain its supply to the community.
INVESTIGATED SITE COORDINATES	S 0.3387653513, E, 37.076788845, Alt 1839m asl
MAPSHEET	Scale: 1:1500 Survey of Kenya, Topo sheet No: Karatina 131/3
SUMMARY	From the data collected, the recommended water abstraction can only be determined once the reservoir's technicalities such as storage capacity has been determined. The site had an instantaneous peak discharge of 449,657.63m^3/day during the low peak flow season and 2,6116,189.84m^3/day during the high peak flow season. Assuming that the evaporation rates are negligible and does not have an impact on the discharge of theWeir/intake, it is therefore assumed that the input into theWeir/intake equals the output.

INTRODUCTION

Maragima Tagwa (Herein after referred to as the Client) has an intention of constructing a weir/intake across Rukurua Stream and upgrading within **Hombe Village, Kabaru Location, Kieni East Division in Nyeri County**.

Objectives

The objectives of the assessment were to Evaluate the hydrological characteristics for Rukurua stream and its Catchment, establish the availability of water and advice on the viability of constructing the intake and future considerations for abstraction.

Scope of the study

A site visit was conducted on 15th August 2020. The purpose of the visit was to determine the scope of development of the stream. In order to assess the supply potential of the Stream; an assessment needs to be done appraising the physical characteristics and hydrology to determine among others issues, the viability of the water supply project. The assessment considered the following areas, assessment of the site physiography, catchment characteristics and flow data. The assessment was followed by a desk review of the existing hydrological and other relevant data relating to the stream and its Catchment area. This describes both the surface and subsurface water conditions of the project area. Hydro meteorological data was also analyzed and a report prepared as stipulated by the water regulations 2007.

In the assessment of water supply potential at a site, the first step is to select and study potential intake positions, pipeline routes and suitable reservoir sites. This assessment is guided by several factors, which may include,

- Ease of Construction and access Altitude
- of the site.
- Environmental and Visual impact. Existing
- infrastructure, etc.

Some of the important catchment characteristics that may need consideration include topography and general catchment layout, drainage pattern, type and nature of vegetation cover and land use practices.

To assess the water available in a source, an estimation flow must be made using available/historical flow data for the source in question; for this case, The Investigated Stream. Time series flow data are generally used to create a flow duration curve (FDC), which is a standard way of understanding the flow regime of a watercourse. For increased accuracy gauged or measured flow data can be used from a monitoring station installed at or near the proposed intake point. This study notes that there are no installed gauging stations or any other measuring devices from the source. This study carried out a one off measurement and used the data collected during the exercise for purposes of writing this report.

BACKGROUND INFORMATION

Location

The project site is located at Rukurua spring within **Hombe Village, Kabaru Location SubLocation, Kieni East Divisionin Nyeri County**.

It is defined by GPS Coordinates: **S 0.3387653513, E, 37.076788845, Alt 1839m asl**

Catchment Characteristics and Drainage

The area lies along the R. Sagana/Thagana sub-catchment a part of the Upper Tana River catchment. This is part of the larger abandares drainage systems. The stream drains its waters to R. Sagana which in turn drains into R. Tana.

Details of climate & Rainfall

The area lies on 1800m above sea level. The climate here is mild, and generally warm and temperate. There is significant rainfall throughout the year. Even the driest month still has a lot of rainfall. This location is classified as Cfb by Köppen and Geiger. The average annual temperature is 17.1 °C | 62.8 °F. Precipitation here is about 1004 mm | 39.5 inch per year. Precipitation is the lowest in June, with an average of 33 mm | 1.3 inch. Most precipitation falls in April, with an average of 192 mm | 7.6 inch. At an average temperature of 18.2 °C | 64.8 °F, April is the hottest month of the year. In July, the average temperature is 15.7 °C | 60.3 °F. It is the lowest average temperature of the whole year. between the driest and wettest months, the difference in precipitation is 159 mm | 6 inch. The average temperatures vary during the year by 2.5 °C | 36.5 °F.

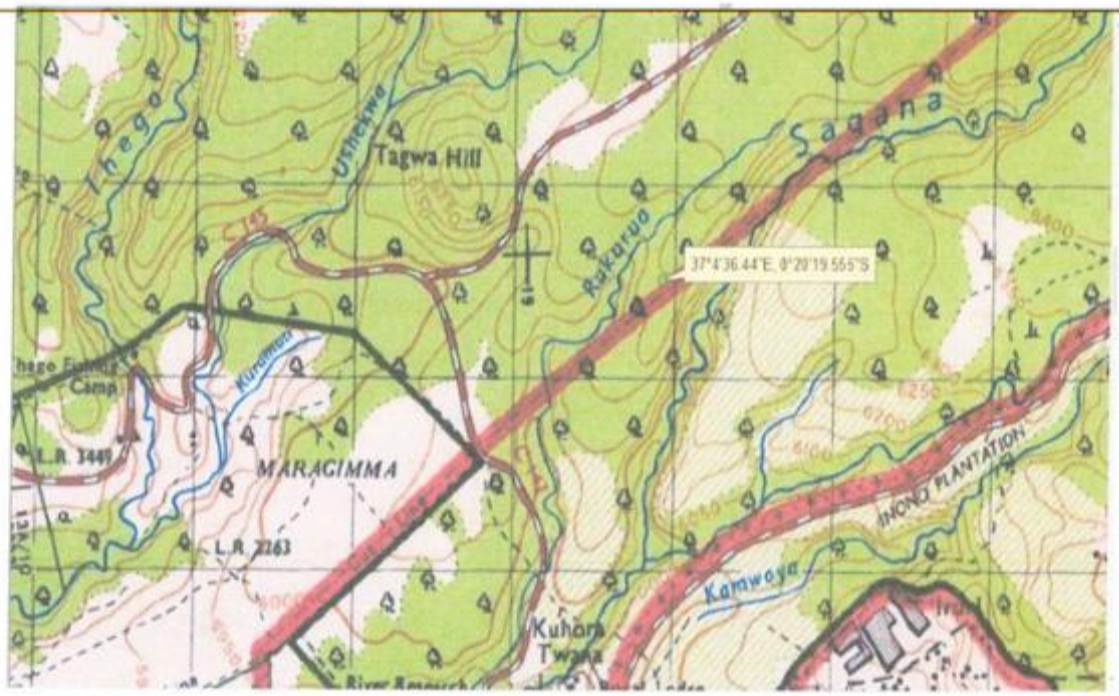
It may however be noted that climate change influence has not left this place unaffected. In many occasions, long rains come early by mid-March then subsequently disappear early only to appear again towards end of May. This has had bad effects on crops and such sensitive crops such as maize cannot withstand the change and often go dry which results in low food crop production in most areas.

The rates of both evapotranspiration and evaporation could be considered low (negligible) though actual figures could not be established for this report.

Vegetation

The vegetation cover can be described as extensive, with both indigenous and planted forests in the vicinity. Human settlement has greatly affected vegetation cover.

Figure 1. Topographical map of the area, Map sheet No: Karatina 121/3



GEOLOGY

Pleistocene and Recent Deposits

Post-Tertiary deposits are superficial made of semi-consolidated gravels and sands, **impure** surface limestone, lateritic iron stones and extensive areas of black cotton and sandy soils.

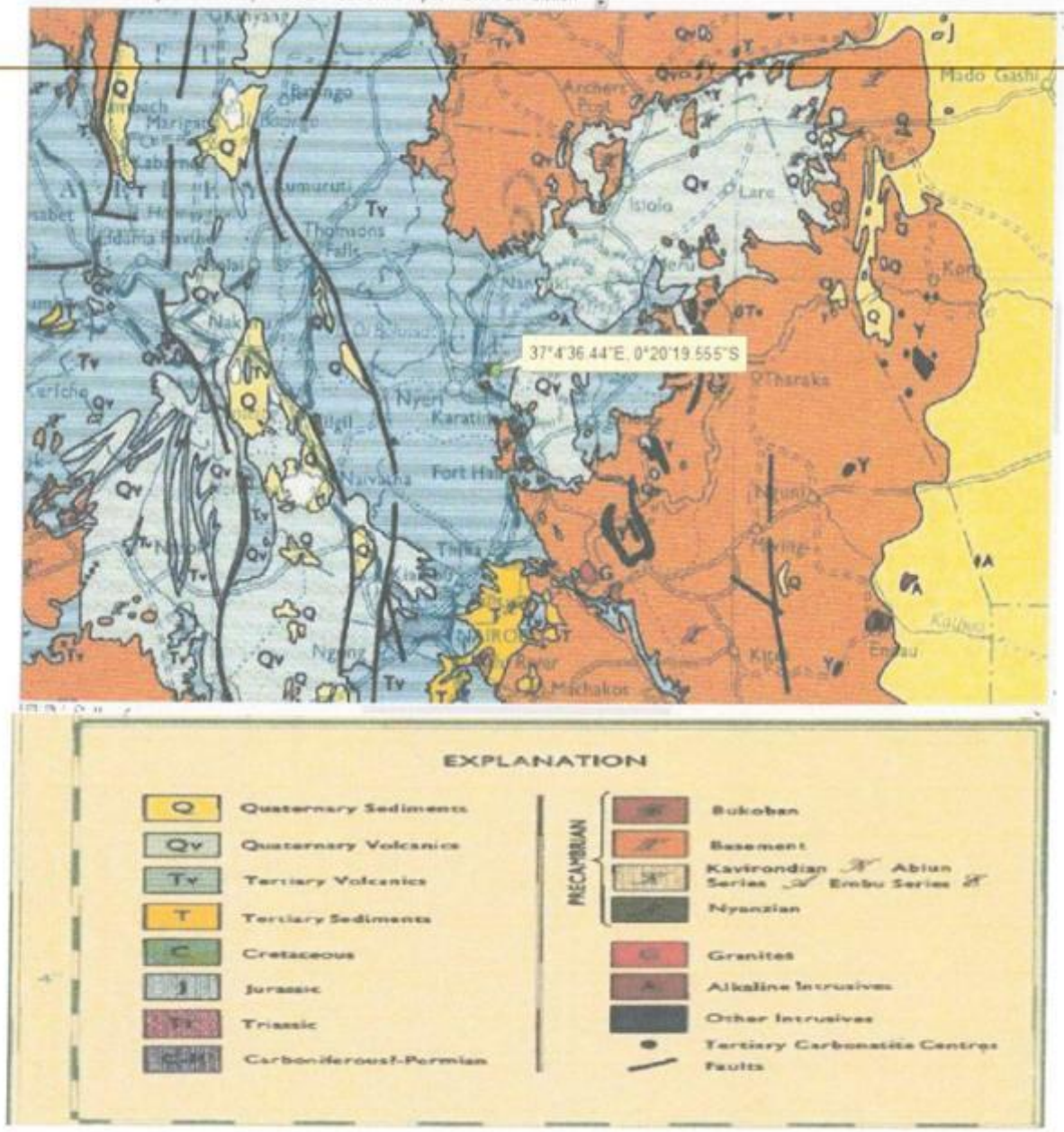
Tertiary Volanics

The area is made of the Mt. Kenya volcanics overlying the basement system of Rocks. The rocks are made of the Kenytes, agglomerates, tuffs and phomolites.

Basement System

The basement system of rocks in the area consists of a wide variety of calcerous rocks, gneisses and schists. Other rocks have been formed by granitization and pneumatolysis responsible for formation of granites, migmatites and the sporadic development of minerals.

Figure 2: Geological map of the investigated site



HYDROLOGICAL CHARACTERISTICS AND ANALYSIS

Introduction

The hydrology of a region depends primarily on its climate, topography and its geology. The climate of the catchment is influenced by its position and altitude within the lake basin. The low pressure belt which shifts with the apparent movement of the overhead sun, the inter-tropical convergence zone (ITCZ) is the main factor and cause of seasons in Africa. It is the major line of convergence of winds leading to the creation of rain and drought generating air flows. The two most important climatic elements for engineering hydrological studies are precipitation, its mode of occurrence and evapo-transpiration. Humidity, temperature, radiation and wind directly affect evapotranspiration.

Rainfall Analysis

Rainfall impacts greatly on human activities, natural vegetation, surface run off and groundwater recharge. The period of seasonal rainfall in the study area is characterized by spatially erratic short duration and very high intensity rains. The rainy season spans parts and for this reason, the total annual rainfall is calculated on the basis of calendar years. The following analysis considers rainfall received in the catchment of the proposed site. From the results it is indicative that the catchment receives an annual long term rainfall amounts ranging from 1500mm-1800mm.

Data Collection Discharge Analysis

Discharge measurements were carried out on 15th August 2020. The gauging was carried out at the proposed abstraction site. The discharge/resurgence was measured float method. In this method, discharge is directed to an open ditch/channel. This method requires measurement and calculation of the cross-sectional area of the channels as well as the time it takes an object to "float" a designated distance within the channel. From the instantaneous discharge measurement carried out, the stream had a discharge of 30.279975m^3/s. This method is advantageous over the others because it is highly sensitive, has little interference with flow and it is least affected by upstream flow disturbances. Since it gives reliable information it is the most commonly used method.

Flow Analysis

When evaluating sites to assess availability of water resources, it is important to determine the probability that the source will have sufficient flow to meet the need for the proposed project and sustenance of the ecological environment. While instantaneous maximum discharges are used for flood frequency analyses, low frequency analyses usually specify low flow duration.

The difference between low-flow and flood analyses is that data for low flow analyses consist of annual events that have the lowest average flow of the required duration „D, each water year of record. Thus the records of the flow for each water year are evaluated to find the period of „D" days during which the average flow was the lowest; these annual values are used as sample data. The record of „n" years is then evaluated using frequency analysis. The log-normal distribution is commonly selected for low-frequency analyses.

A flow duration curve (FDC) for a particular point on a source/stream/river shows the proportion of time during which the discharge equals or exceeds certain values. Flow duration curves for long periods of runoff are useful for deciding what proportion of flow should be used for a particular purpose, since the area under the curve represents the volume.

For many rivers and streams the ratio of peak to minimum discharges may be two or more orders of magnitude and FDCs for points on them are more often more conveniently drawn with the ordinate (Q) to a logarithmic scale and normal probability scale used for the frequency axis. The slope of the line of the FDC gives an indication of the character of a river. A gentle slope indicates a river with few floods that is extensively supplied from groundwater, while a steeply sloping curve indicates a river with frequent floods and low flow periods having little ground water flow and being supplied mainly by runoff.

The proposed site at the stream does not have a regular gauging station; as such the long term flow record for the stream could not be accessed and could only be estimated.

Cumulative Peak Daily Flow

Statistical analysis was performed on the data in order to determine the general pattern of stream flow for the river at the project site. This was done by calculating average hourly flow multiplied by the no of hours in a day (24hrs). At the proposed site The Stream had an instantaneous peak discharge of 2,616,189.84m^3/day. Note that the study was carried out during a time of rainy season hence the high discharge.

Cumulative peak monthly

The cumulative peak monthly flow can be estimated by finding the product of Cumulative daily flow and the no of days in a month given as (30days). The Cumulative monthly discharge is given at 78,485,695.2 m^3 monthly.

Low Flow Frequency Analysis

Information on low flow characteristics provides threshold values for different water-based activities and is necessary for water resource management issues such as water supply, irrigation and water quality and quantity estimates. Knowledge of groundwater flow or other delayed sources is also essential in studies of catchment response. A low flow frequency analysis evaluates probability of flows occurring and remaining below a specified (low) design threshold for a given length of time. Customarily the analysis is carried out with regard to the minimum discharge aggregated over a period of „D" days in each year derived from daily flow series.

In this study, low frequency assessment was derived as the ratio of the lowest recorded monthly mean to the highest recorded mean monthly rainfall. Whereas the high frequency assessment was derived as the Instantaneous discharge recorded at the time of study. The highest mean monthly rainfall is recorded in August at 192mm while the lowest recorded monthly rainfall is recorded in

January at 33mm. The Low flow was estimated to be 449,657.63m/^{3}day and 13,481,728.86m^3 monthly.

FLOW STATISTICS

Flow statistics for individual flow records / gauging stations are calculated to aid selection and analysis of river flow data. Unless otherwise stated all flows statistics are calculated using the period of record Gauged Daily Flow series

Below is a list of major stations

Gauge ID	River Name	Longitude	Latitude	Years of Record
4AA01 -------	37	°03'44''E 0	°21'16''S	1947-1992
4AA04 -------	36	°58'08''E 0	°20'38''S	1949-1998
4A B05	Amboni 36	°59'20''E 0	°21' 00''S	1949-1996
4A C03	Sagana 37	°02'35''E 0	°26'57''S	1948-1999
4AC04 -------	36	°57'12''E 0	°25'56''S	1952-1988
4A D01	Gura 37	°04'35''E 0	°31'02''S	1951-1996
4AC05	Chania 36	°47'28''E 0	°25'55''S	1959-1998

River gauge station in the area

NB: Rukurua Stream has no RGS and thus the data we collected was scanty consequently compute a comprehensive analysis.

River gauging density

For a scientific study of a catchment to be possible, there are certain thresholds pertaining to the amount of rain gauging presents and their subsequent destiny in the catchment.

STATIONS ANNUAL MEAN (M)	mm $*10^{-3}$ m	INFLUENCE AREA (A)Km^2 $*10^6$ m^2	PRODUCT OF(M)*(A) $*10^3$ m^3
NAROMORU FOREST STATION	82.74	148.476	2.284.904
NAROMORU SETTLEMENT SCHEME	52.19	146.260	7.633.309
SAGANA STATE LODGE	66.12	175.069	11.575.562
KAGUMO HIGH SCHOOL	67.24	121.883	8.056.466
NYERI FOREST STATION	67.24	128.532	8.637.350
MWEIGA HQ	64.56	35.457	2.289.104
TREETOPS GATE	75.08	115.235	8.651.844
NYERI BAPTIST HIGH SCHOOL	62.47	70.914	4.432.125
NYERI METEREOLOGICAL STATION	79.4	239.335	19.003.199
NYERI HILL STATION	74.37	101.939	7.581.203
KIANDONGORO GATE	160.50	281.440	45.171.12
RUHURUINI GATE	121.4	26.593	3.228.026
GATARAKWA CHIEF'S OFFICE	72.49	35.457	2.570.278
	TOTALS	**1,626.591**	**141,114.490**

Figure 2: Thiessen polygon method

Mean annual rainfall =total (product (M*A)/Total area

$=141114490*10m^3/1626.591*10^6$

=86.75mm

Mean Flow

Period of record mean gauged flows at gauging stations are calculated by the average, weighted to account for the different number of days per month, of the mean monthly flows for the period of record.

Flow Percentiles

Percentiles are computed using gauged daily flow data only for those years with five days, or less, missing.

- Q10 (the 90 percentile flow): The flow in cubic meters per second which is equaled or exceeded for 10% of the specified term – a high flow parameter which, when compared with the Q 95 flow provides a measure of the variability, or „flashiness", of the flow regime.
- Q50 (the 50 percentile flow): The flow in cubic meters per second which is equaled or exceeded for 50% of the flow record.
- Q70 (the 30 percentile flow): The flow in cubic metres per second which is equalled or exceeded for 70% of the flow record.
- Q95 (the 5 percentile flow): The flow in cubic metres per second which is equalled or exceeded for 95% of the flow record. The Q 95 flow is a significant low flow parameter particularly relevant in the assessment of river water quality consent conditions. Q95 values should be used with caution in view of the problems associated with both the measurement of very low discharges and the increasing proportional variability between the natural flow and the net impact of artificial influences, such as abstractions, discharges, and storage changes as the river flow diminishes.

Mean Annual Catchment Runoff

The mean annual catchment runoff is used as a catchment descriptor. The mean annual runoff is the notional depth of water in millimetres over the catchment equivalent to the mean annual flow as measured at the gauging station. It is computed using the relationship:

Runoff in mm = Mean Flow (m^{3s-1}) x 86.4 x 365 Catchment Area (km^2)

The mean annual runoff is rounded to the nearest millimetre.

As a consequence of missing data there will not be full equivalence between the mean annual rainfall and the mean annual runoff for some catchments. Runoff statistics and the corresponding mean flow are computed on the basis of naturalised flows for the small minority of catchments where sensibly continuous daily, or monthly, naturalised data are held. The uncertainty in the magnitude of the necessary adjustments to the gauged flows may be considerably greater than the uncertainty associated with the gauged flows themselves.

The net impact of abstractions and discharges may result in unrepresentative mean annual runoff figures. More commonly, a lack of coincidence between the topographical catchment divide and the true extent of the contributing area (which may be substantially different for permeable catchments) can produce anomalous mean annual runoff totals. Note also that measurement limitations – especially precipitation assessments in very wet upland catchments – may give rise to runoff which approaches, or even exceeds, the corresponding catchment rainfall.

Mean Annual Loss

The mean annual loss is the difference between the mean annual catchment rainfall and the mean annual catchment runoff. Entries are confined to catchments where there is good agreement between the periods for which rainfall and runoff are held. The mean annual loss provides a guide to average annual evaporative losses but limited precision in the rainfall and runoff figures, the net effect of artificial influences on the mean runoff and, particularly, a lack of congruency between the topographic and the true catchment areas may all combine to produce unrepresentative mean losses.

Base Flow Index

The Base Flow Index (BFI) may be thought of as a measure of the proportion of the river runoff that derives from stored sources; the more permeable the rock, superficial deposits and soils in a catchment, the higher the baseflow and the more sustained the river"s flow during periods of dry weather. Thus the BFI is an effective means of indexing catchment geology. For instance, rivers draining impervious clay catchments (with minimal lake or reservoir storage) typically have base flow indices in the range 0.15 to 0.35 whereas most Chalk streams have a BFI greater than 0.9 as a consequence of the high groundwater component in the river discharge.

BFI values computed using less than five years of flow data should be regarded as provisional.

Percentage Data Complete

The percentage completeness of the daily gauged flow time series over the given period of record. For some stations, a relatively low percentage completeness may reflect large gaps in the record (e.g. where a station has been recommissioned after several years without active monitoring).

Period of Record

These are the „Daily flow data" for each station, the month and year for which daily river flow records start and end. They are often available from Measuring Authorities or other sources. Areal rainfall data may not be available for the full period of record.

WATER QUALITY

The quality of water essentially determines the extent to which water can be used for various purposes. Water quality is influenced by three main factors within the catchment, namely agriculture and related activities, settlements and urban centres. The quality of drinking water is different from requirements for livestock and irrigation purposes while research and certain process requires water of higher quality. The examination of the physical, chemical and biological constituents in water and the determination of the extent to which a particular water resource can be utilized for variety of purposes.

Water from the stream will be sampled for quality analysis by a registered laboratory upon confirmation of its viability to meet the required water demand. The parameters are to be tested to ensure that it meets WHO and Kenya standards acceptable limits for domestic uses.

Impact of proposed project on water resources

During construction of the Weir/intake, there will be minimal impact on flow regime. This means that there will be adequate environmental flow is available to the main stream channel and other abstractors will still be able to access the flow in the river without much hindrance. The water quality is not expected to change much from its current status except there may be a slight change in turbidity until the process is done.

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

Basing on the data collected, sufficient water is expected from the stream. Due to data limitations on the technical characteristics of the reservoir such as the storage capacity the expected abstraction per day cannot be recommended. The abstraction from a stream/ a river should not exceed 30% of the measured discharge per day. This is to allow the downstream ecological characteristics of a river are not affected.

The results provided are only as reliable as the data they have been derived from and several factors could cause the scheme described in the document to differ from what a scheme installed on site could produce. Flows may also be affected by climate change or land use changes in the catchment areas.

RECOMMENDATIONS

It is therefore recommended as follows:

- The Weir/intake construction process should continue only after the analysis of the reservoir characteristics such as the storage capacity and the expected area. This is to ensure that the expected abstraction per day does not have an impact on the downstream ecological characteristics.
- In case of future abstraction, controlled abstraction should take place as may be advised from time to time by the water Resources Management Authority (WRMA) office. Note a master meter should be installed at the abstraction point to measure the amount of water abstracted. This will help to monitor flows and enforcement of restriction of abstraction of water as may be necessary.
- Conservation of The catchment should be encouraged to protect the source from pollution (erosion and agro-chemical input) and sustenance of the quantity to meet both human and ecological demand.

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4

APPENDICES

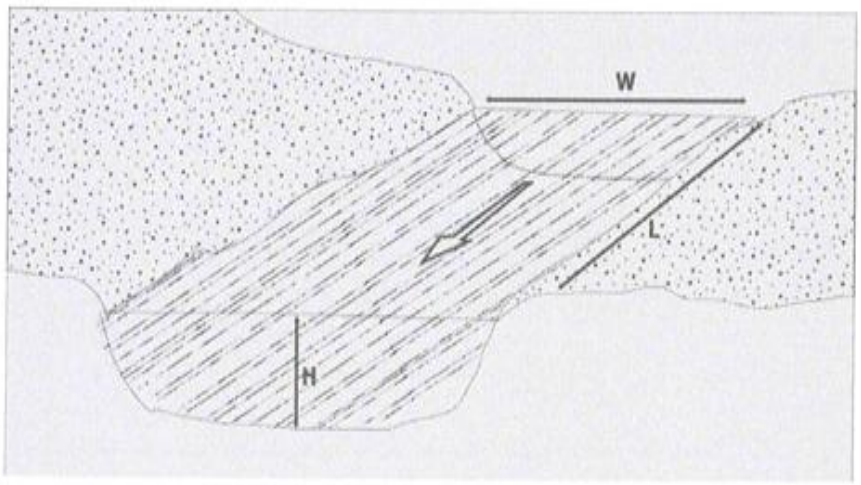
Appendix 1: Discharge Estimation Methods

Float Method.

In this method, discharge is directed to an open ditch/channel. This method requires measurement and calculation of the cross-sectional area of the channels as well as the time it takes an object to "float" a designated distance within the channel.

Requirements are a measuring tape, markers, Stop watch, Floats, Waders, paper and pencil for record keeping.

Fig 5: Schematic Design for Float Method



Appendix 2: Data Collected

Average Channel Length

25m

Average Channel width **3.3528m**

Average channel depth

0.4572m

Average time taken by the float object

58.82s

Velocity

$$= \frac{\text{Average Distance covered}}{\text{Average Time}}$$

$$= \frac{25\text{m}}{58.82\text{s}}$$

0.425m/s

Cross Section Area

= Average Length ×Average Channel width

=25×3.3528

$=83.82\text{m}^2$

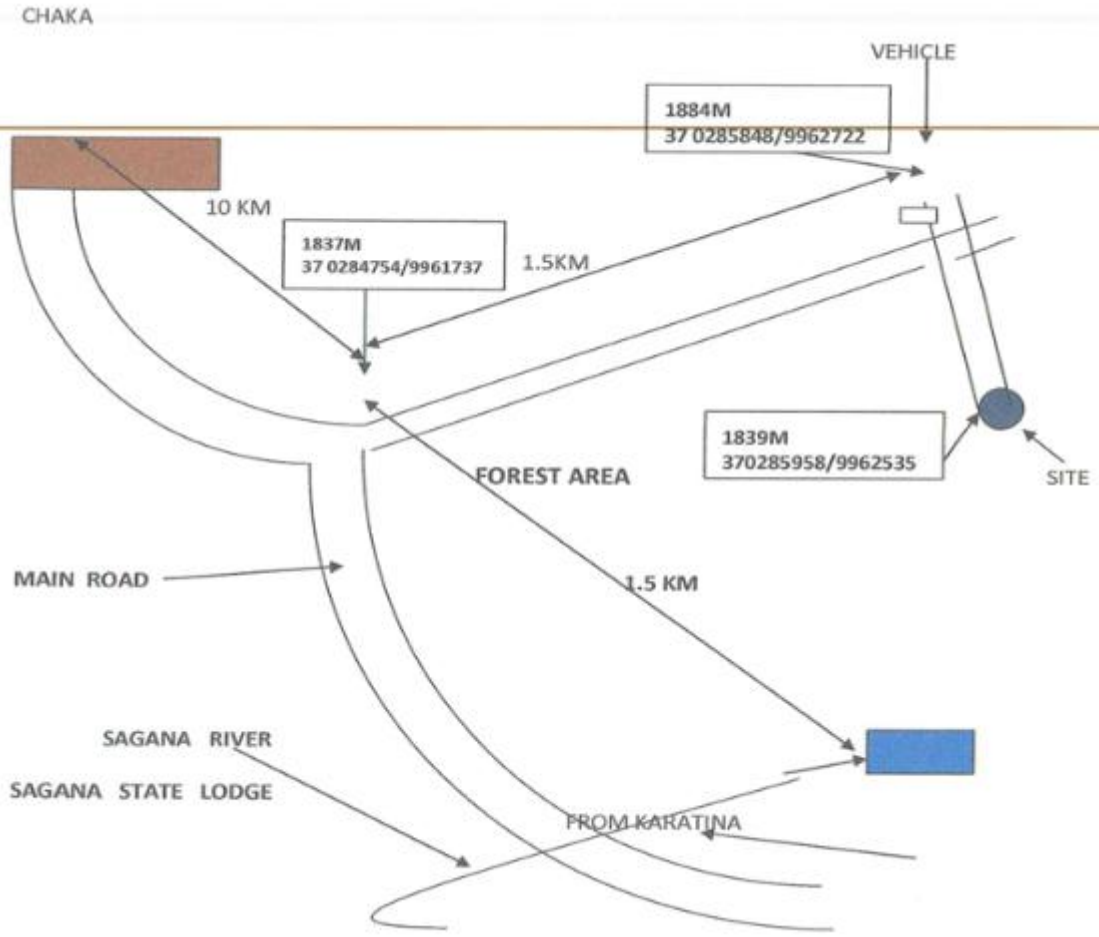
To estimate the discharge of the spring, = Cross-section area×Velocity×0.85(correction factor)

=83.82×0.425×0.85

$=30.279975\text{m}^3/\text{s}$ $= 2{,}616{,}189.84\text{m}^3/\text{day}$

Project Site Layout Plan

NOT DRAWN TO SCALE



UPPER STREAM; 1839M 37 0285958/9962535

UPPER STREAM 1839M 37 0285958/9962535

ITS 11FT WIDE AND 1.5FT DEEP

DOWN STREAM 1837M 37 0285823/9962412

DOWN SREAM 1837M 37 0285823/9962412

ITS 12 FEET WIDE AND 2 FEET DEEP

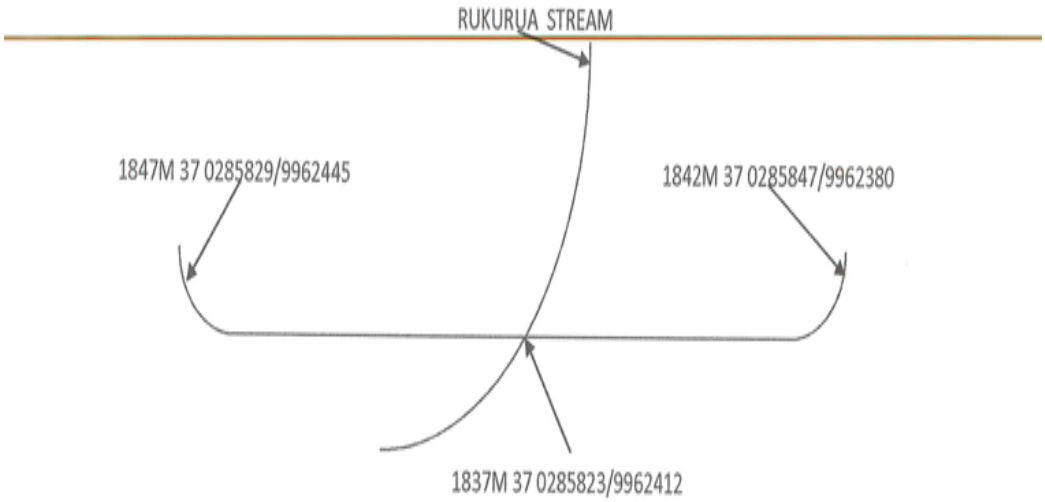
LOWER SIDE –RIGHT HAND SIDE OF THE WEIR.

1842M 0285847/9962380

LOWER SIDE – LEFT HAND SIDE OF THE WEIR

1847M 37 0285829/9962445

LOWER SIDE OF THE PROPOSED WEIR



REPUBLIC OF KENYA

(THE WATER ACT) Licence No. WD/WP/208

LICENCE

QUALIFIED WATER RESOURCE PROFESSIONAL
(HYDROGEOLOGY & HYDROLOGY)

Rule 134

Mr. Steven O. Owuor,
P.O. Box 33350-00600n Nairobi.

Dear Sir,
I have the honour to inform you that the Ministry of Water and Sanitation has given you a licence to operate as a Qualified Water Resource Professional in the following category:

DETAILS OF QUALIFIED WATER RESOURCE PROFESSIONAL:

Name:	***STEVEN OKOTH OWUOR***
Town:	*Nairobi*
Post Office Box:	*33350*
Postal Code:	*00600*
Pin Number:	*A004376018L*
Telephone Contact (Land Line):	****
Telephone Contact (Mobile):	*0711384748, 0737541260*
Email Contact:	***okothanumo@yahoo.com***

DETAILS OF LICENCE: HYDROGEOLOGY AND HYDROLOGY

CONDITIONS OF LICENCE:

- *This licence is issued subject to annual gazettement/renewal until further notice.*
- *Licence replaces licence No. WD/WRP/208 dated 27/06/2014 until further notice.*

Yours Faithfully,

MINISTERIAL TECHNICAL ADVISORY COMMITEE
6 DEC 2018

Signature:

Name: ENG. S.A.O. ALIMA

Position: *Ag. DIRECTOR WATER SEWERAGE & SANITATION DEVELOPMENT*
Chairman Ministerial Technical Advisory Committee

Date of Issue: 6th December, 2018

**This licence is issued without any erasures whatsoever.* (MTAC-P-12/2018)

Annex 16: Chance Finds Procedure

Proposed Chance Finds Procedure for the Maragima/Tagwa Water Project

1. Introduction and Purpose

This Chance Finds Procedure provides the formal protocol to be followed if archaeological, paleontological, historical, or culturally significant materials are unexpectedly encountered during construction of the Maragima/Tagwa Water Project.

The CFP ensures full compliance with:

- World Bank ESS8: Cultural Heritage, which requires projects to identify, protect, and manage cultural heritage and maintain a mandatory chance finds procedure for all excavation works; and
- National Museums and Heritage Act 2006, which establishes legal obligations for the discovery, reporting, and protection of heritage resources and mandates immediate notification to the National Museums of Kenya (NMK).

The procedure applies to all contractors, subcontractors, field personnel, and supervision teams engaged in earth-moving, excavation, trenching, or land disturbance activities.

2. Definition of a Chance Find

A *chance find* is any unanticipated discovery of material with potential cultural, historical, scientific, or spiritual significance. This includes, but is not limited to:

- Archaeological objects (ceramics, bones, beads, tools, metals);
- Structural remains (foundations, walls, cairns);
- Fossils or paleontological materials;
- Burial sites or human remains;
- Sacred sites, shrines, ritual spaces, or culturally significant natural features.

3. Objectives of the Procedure

The CFP aims to:

1. Prevent damage to cultural heritage discovered during project works;
2. Ensure lawful and respectful handling of any finds in accordance with ESS8 and National Museums and Heritage Act, 2006;
3. Provide clear steps for reporting, securing, and managing discoveries;
4. Establish coordination with the NMK, the legally mandated authority; and
5. Allow safe resumption of works only after clearance is issued by NMK.

4. Roles and Responsibilities

Contractor

- Stops work immediately upon discovery of a potential cultural object.
- Secures the site to prevent disturbance or interference.
- Notifies the Supervising Engineer immediately.
- Ensures workers follow this procedure and are trained accordingly.

Supervising Engineer

- Verifies the report and secures the area.
- Notifies the Proponent within two hours.
- Ensures the Contractor does not resume work until clearance is received.

Project Proponent

- Notifies the National Museums of Kenya within 24 hours, as required by the National Museums and Heritage Act, 2006.
- Facilitates NMK access to the site for inspection and assessment.
- Maintains documentation and ensures records are archived.

NMK

- Assesses the significance of the find.
- Determines required safeguarding measures.
- Provides written instructions on removal, preservation, or protection.
- Issues clearance for works to resume.

5. Chance Finds Procedure

Step 1: Stop Work Immediately

The moment a potential find is discovered, all construction and excavation activities must stop within at least 50 m of the find. Machinery is shut down and the area is isolated.

Step 2: Secure and Protect the Site

- Erect a temporary barrier or fence.
- Restrict access to authorized personnel only.
- Do not touch, remove, clean, or disturb the find in any way.

Step 3: Internal Reporting

Contractor notifies the Supervising Engineer, who informs the Proponent. Basic documentation should include photographs, GPS location, and a short description, without disturbing the find.

Step 4: Notification of NMK

The Proponent reports the discovery to NMK within 24 hours, fulfilling the legal obligations under the National Museums and Heritage Act, 2006 (Sections 30 - 33).

Step 5: Assessment by NMK

NMK specialists assess the find and decide whether it:

- Has no heritage significance;
- Requires salvage and documentation;
- Must be preserved in situ; or
- Requires redesign of project works to avoid impact.

Step 6: Guidance and Clearance

NMK issues written instructions.

The Contractor may only resume work after formal written clearance is received and all instructions have been implemented.

6. Special Provisions for Human Remains

If human remains are encountered:

- Stop work and secure the site immediately.
- Treat the discovery with utmost respect and confidentiality.
- Notify NMK and local authorities without delay.
- Follow NMK and cultural protocols for assessment, removal, or reburial.

No work may resume until NMK provides written authorization.

7. Training and Awareness

All workers must receive training on:

- Recognizing potential heritage materials;
- Immediate steps to take upon discovery;
- Prohibitions against tampering or unauthorized removal;
- Penalties under National Museums and Heritage Act (2006) for damaging heritage resources.

Refresher briefings ("toolbox talks") will be integrated into excavation-related activities.

8. Record Keeping

The Proponent will maintain a Chance Finds Register including:

- Date, location, and nature of find;
- Photographs and GPS coordinates;
- Reports submitted to NMK;
- NMK assessment and correspondence;
- Clearance documentation.

These records will form part of the project's ESMMP and monitoring reports.

9. Integration into Contractual Obligations

This Chance Finds Procedure will be:

- Included in all construction contracts and tender documents;
- Reflected in the Contractor's ESMP;
- Enforced through supervision and compliance audits;
- Linked to penalties for non-compliance.

10. Conclusion

The Chance Finds Procedure ensures that any unexpected cultural heritage discoveries are handled lawfully, respectfully, and in accordance with national legislation and international best practice. Its implementation will safeguard cultural values while ensuring responsible project delivery for the Maragima/Tagwa Water Project.

Annex 17: Ownership of the 225m3 tank document

MARAGIMA TAGWA WATER USERS
P.O Box 67
KIGANJO
25/Nov/2025
TO:
National Agricultural
Value Chain Development
Program (NAVCDP)
Nyeri County
P.O Box 1112-10100
NYERI
Dear Sir/Madam

RE: ACKNOWLEDGEMENT OF OWNERSHIP of 225m³ WATER STORAGE TANK

We are writing to acknowledge that the existing 225m³ water storage and distribution tank is owned by Maragima tagwa water users members. The tank is managed and maintained by us i.e Maragima Tagwa water users.

To prove this, below are names and signatures of management committee of Maragima Tagwa water users.

1 Simon Kinyua K. 5100891 0721931613
2 Stephen Warugu .m 23540777 0723523203
3 Pauline Wangui M 26336236 0711283867
4 Fredrick Mwai 14116811 0723983832
5 Zepporah Murugi 25185548 0726947174
6 Simon Muchemi 05809891 0790557954
7 Susan wanjiru 14521517 0725275514
8 Patrick kamunya 22438751 0727 7673
9 Elizabeth Njeri 5557823 0724652265

Yours Sincerely

MARAGIMA / TAGWA WATER PROJECT P. O. Box 67, KIGANJO Date:.....

Simon Kinyua K.
Project Chairman

Annex 18: formal written consent/resolutions from the PCEA and Thegu Line Water Users

MARAGIMA TAGWA WATER USERS

P.O Box 67
KIGANJO

25/Nov/2025

TO:

National Agricultural
Value Chain Development
Program (NAVCDP)
NYERI County
P.O.BOX 1112-10100 NYERI.

Dear Sir/Madam,

RE: MEMBERSHIP OF THEGU & PCEA LINE.

We are writing to acknowledge that thegu line and PCEA line's members are part of existing Maragima tagwa water users members. The members are also beneficiaries of the existing water line and will benefit from the new additional water from Rukurua intake through the proposed designed water line for NAVCDP funding.

To prove that they are aware and support the proposed works, below are signatures of the Thegu line and PCEA line members showing that they are in agreement and support additional water in their areas.

Representative Thegu line

1. ALICE WANJUGU 0726904303 26460425
2. ONESMUS MURIITHI 24471928 0726335872
3. BEATRICE WAKONYU 22341712 0727762188

Representative PCEA line

1. ROSE WANGARI 29259629 0722854181
2. BEATRICE WANJIRA WAMUYU 0720277265
3. RACHEL NJAMBIRA KIAMA 0712740879

Margima tagwa water users manangement committee

1. SIMON KINYUA 5100891 0721931613
2. STEPHEN WARUGU 23540777 0723523203
3. PAULINE KIHENGU 26336236 0711283867

Assistant -chief maragima sub-location

STANLEY N NDIRITU 0728962286.

MARAGIMA SUB-LOCATION
ASST. CHIEF
27 NOV 2025
P. O. Box 29 - 16105, NAROMORU

Chief thegu location

CHIEF
THIGU LOCATION
P. O. Box 29,
NAROMORU

0726747731
26/11/2025

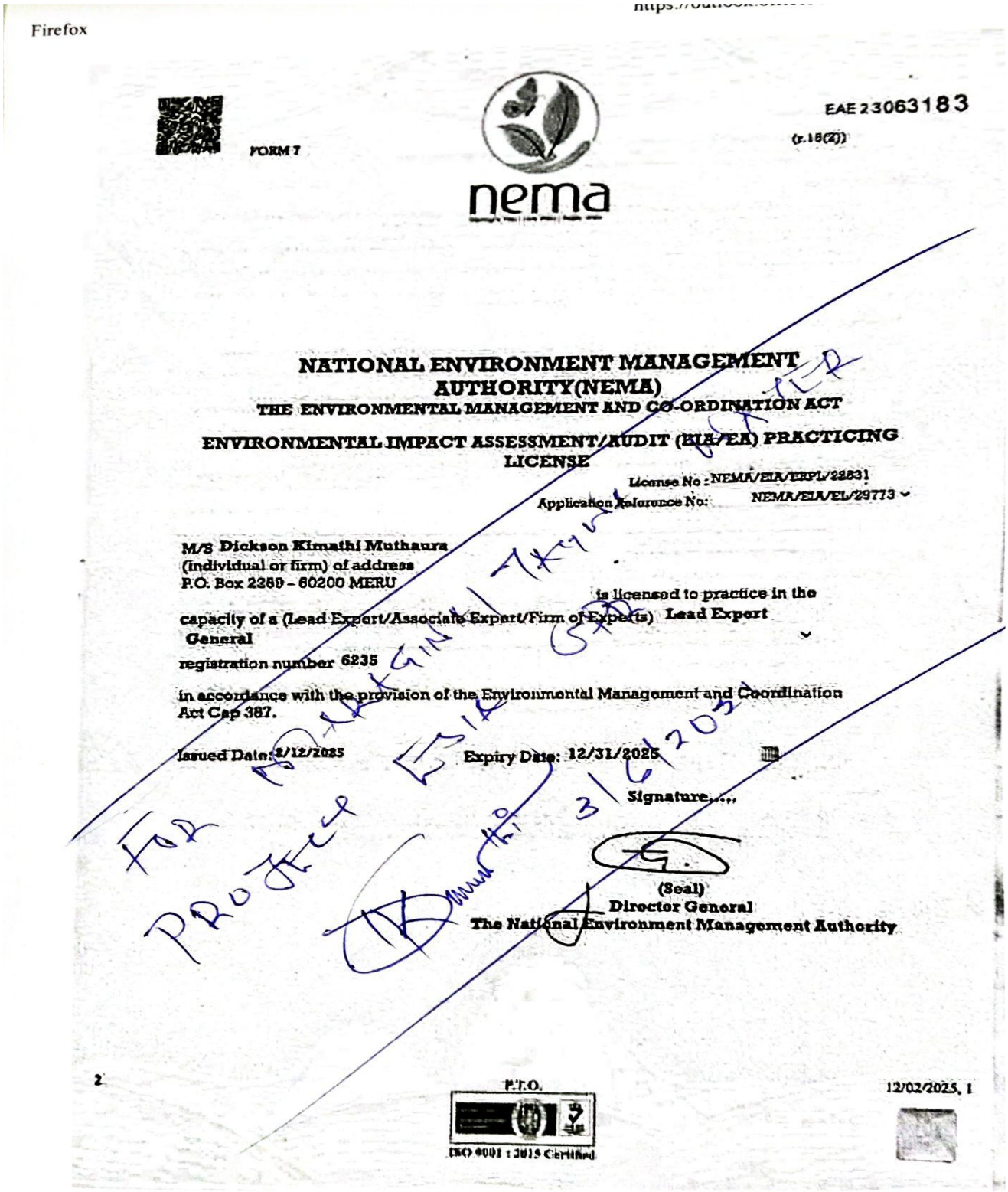
Yours faithfully,

MARAGIMA / TAGWA
WATER PROJECT
P. O. Box 67, KIGANJO
Date:

Simon kinyua k

Project chairman

Annex 19: EIA/EA Lead Expert Practicing Licence 2025



Firefox

FORM 7

EAE 23063183

(r.18(2))

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/22831

Application Reference No: NEMA/EIA/EL/29773

M/S Dickson Kimathi Muthaura
(individual or firm) of address
P.O. Box 2359 – 60200 MERU

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

registration number 6235

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

Issued Date: 2/12/2025 Expiry Date: 12/31/2025

Signature.....

(Seal)
Director General
The National Environment Management Authority

2

P.T.O.

ISO 9001 : 2015 Certified

12/02/2025, 1