ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED BOREHOLE SOLARIZATION AT BARAKA, NANYUKI



CONSULTANCY SERVICES FOR ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED INTERVENTIONS FOR NANYUKI & MANDERA WATER SERVICE

FEBRUARY , 2025

INTERNAL QUALITY CONTROL

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CERTIFICATION

We hereby certify that the content of this Environmental and Social Impact Assessment Report for proposed ***Baraka borehole solarisation*** in Nanyuki County is factual and that the content conforms to the provisions of the Environmental Management and Coordination Act Cap. 387 and the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2003.

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ABBREVIATIONS

ACC	Assistant County Commissioner
ASAL	Arid and Semi-Arid Lands
CECM	County Executive Committee Member
CBO	Community Based Organization
CSR	Corporate Social Responsibility
CC	County Commissioner
CP-ESMMP	Construction Phase-Environmental & Social Management and Monitoring Plan
DOSHS	Directorate of Safety and Health Services
DWC	Double Wall Corrugated
EMCA	Environmental Management Coordination Act
EHS	Environmental Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
GDP	Gross Domestic Product
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Virus
NAWASCO	Nanyuki Water & Sanitation Company
KMD	Kenya Meteorological Department (KMD and
LPG	Liquefied Petroleum Gas
MCA	Member of County Assembly

MD	Managing Director
MP	Member of Parliament
MoWSI	Ministry of Water, Sanitation & Irrigation
NEMA	National Environment and Management Authority
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
O & M	Operation and Maintenance
OSHA	Occupational Safety and Health Act
PAPs	Project Affected Persons
PPE	Personal Protective Equipment
RC	Reinforced Concrete
RCC	Roller Concrete Compacted
SGR	Standard Gauge Railway
SOPs	Standard Operating Procedures
SSHP	Site Safety Health Procedures
STIs	Sexually Transmitted Diseases
ToR	Terms of Reference
WASREB	Water Services Regulatory Board
WHO	World Health Organization
WRA	Water Resources Authority
WRUA	Water Resources Users Association
WTP	Water Treatment Plant

0 EXECUTIVE SUMMARY

0.1 Introduction

This Environmental Social Impact Assessment Report is prepared in line with the Terms of Reference (TOR) for Consultancy Services for undertaking Environmental and Social Impact Assessment for the proposed interventions for Nanyuki, Nanyuki and Mandera Water Service Providers (WSP). It is also prepared as per the Environmental Management Coordination Act CAP 387 provisions for submission to National Environment Management Authority so as to obtain an EIA license before the project commences. The key objective of the assignment is to undertake Environmental and Social Impact Assessment (ESIA) that will identify key environmental and social issues that could emanate from the proposed project and develop appropriate mitigation measures. This will support approval of the proposed intervention by the National Environmental Management Authority (NEMA).

The Baraka Water solarisation project is part of CLSG-11 program where the Ministry of Water, Sanitation and Irrigation (MoWS&I) is implementing Water and Sanitation Development Project (WSDP) with a credit from the International Development Association (IDA) that aims at improving water supply and sanitation services in selected regions in Kenya through the Water Service Providers (WSPs).

The project site is located in Laikipia County where water scarcity in Nanyuki is a major problem caused by rapid urbanisation due to exponential population growth, deforestation, conversion of naturally vegetated land to agricultural land and high rise buildings and also climate change impacts.

The proposed project involves solarisation of an existing borehole in located at Baraka land number *Nanyuki/Marura Block 1/52*. The borehole has been providing water to the residents but they have been incurring high electricity power bills. This has resulted to rationing of water and they are capable of providing 40 litres per person per day against a WASREB recommended 60 litres per person per day.

0.2 Project Description

The project involves solarisation of an existing borehole which is adjacent to Baraka dispensary and just separated by a fence that serves the local community. The borehole is equipped with an elevated 150,000 litres steel tank and the water is reticulated to the community using an existing piping system. The solar components include a 335W Dayliff solar, a solar power control unit, sunverter and an alarm system.

To improve the water supply in the area NAWASCO in collaboration with the Laikipia county government developed the existing borehole in august 2020. Nawasco through the utilization of internally generated funds successfully constructed a 15 meters high water tower, installed water tanks of 15 m^3 capacity, and fenced off the borehole area.

Objectives of the ESIA

The specific objectives of the ESIA study include:

- ✓ To establish the baseline conditions in the project area so as to determine the likely impacts of the project on existing resources and infrastructures
- ✓ Ensuring compliance with relevant environmental and social regulations, policies, and standards at local, national and international level
- ✓ To identify both positive and negative environmental impacts associated with the project and provide for mitigation measures
- ✓ Identification and analysis of stakeholders for purposes of stakeholder consultation
- ✓ Evaluating the significance and magnitude of identified impacts to determine their potential importance and consequences.
- ✓ Developing appropriate mitigation measures and management strategies to avoid, minimize, or offset adverse impacts on the environment and affected communities.
- ✓ Preparation of an Environmental and Social Management and Monitoring Plan (ESMMP) and an Environmental and Social Monitoring Plan
- ✓ Providing recommendations to enhance the project design and planning to maximize positive impacts and reduce negative impacts on the environment and communities.

- ✓ Creation of awareness about the project and obtain opinions and concerns regarding the proposed project
- ✓ Providing decision-makers with comprehensive information

0.3 Project Methodology

The ESIA team conducted Project Screening and Scoping that identified all the environmental impacts associated with the proposed project. A Stakeholder Engagement Plan was developed as per the mapped stakeholders. A household survey was undertaken targeting 15 respondents. Key Informant Interviews were conducted. Two (2) public meetings were also held to create awareness about the project and obtain their views.

0.4 Policy Legal and Regulatory Framework

The following policies and regulatory frameworks were reviewed by the consultant:

- ✓ National Water Policy, 2024
- ✓ Water Act 2016,
- ✓ Water Quality Regulations, 2006, (Legal Notice No.121),
- ✓ National Environment Action Plan Framework,
- ✓ Environment Management & Coordination Act Cap 387
- ✓ The Environmental (Impact Assessment and Audit) Regulations, 2003/Legal Notice 31 & 32
- ✓ Environmental Management and Coordination (Conservation of Biological Diversity) Regulations 2006
- ✓ Environmental Management and Coordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations 2009
- ✓ Environmental Management and Co-ordination (Controlled Substances) Regulations, 2007
- ✓ Environmental Management and Co-ordination (Waste Management) Regulations, 2006
- ✓ Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006

- ✓ Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Control Regulations, 2009

0.5 Public Participation and Stakeholder Engagement

The assessment involved mapping and identification of key stakeholders in water supply and generally water resource management. The aim was to inform them of the proposed project, seek their opinion and expertise and develop an environmental management and Monitoring plan based on this input. The key stakeholders engaged include: Department of Water, Environment & Natural Resources; National Government Administration; State Department of Gender & Social Services; State Department of Early Learning & Basic Education; National Government Administration Office-Nanyuki. Public consultation also involved conducting community meeting with the host community. Additionally, it involved household data collection to establish individual household concerns and opinions with regard to the project. The outcome of these meetings are discussed in chapter 5 while the outcomes of household survey are discussed in chapter 4 of this report.

0.6 Potential Project Impacts and Proposed Mitigation Measures

Construction Phase	The activities during this phase includes: ✓ Preparation of solar panel mounting structures including fixing the concrete bases or metal frames for solar panels, assembly and mount solar panels on the prepared structures. ✓ Align panels to maximize sunlight exposure for optimal efficiency. ✓ Connecting the solar system with the borehole infrastructure. ✓ Testing and commissioning to verify the functionality of the solar-powered pump. ✓ Site restoration and cleanup.	
	Positive Impacts	Negative Impacts

	I. Job opportunities for the local community especially the youth II. Skill transfer to the local communities III. Improved livelihoods in the area as a result of increased business activities and employment	• The borehole is adjacent to Baraka dispensary and movement of construction workers will disturb the patients attending the hospital. • Accumulation of packaging materials, metal scraps, and construction debris may occur. • Increased interaction between construction workers and local communities can lead to risky behaviors that may involve casual sexual encounters. Occupational health and safety concerns include: ✓ Electrical Hazards during wiring and connection of solar panels, inverters, and batteries. Use proper insulation, grounding, and circuit protection devices. Conduct safety inspections before energizing the system ✓ Risk of falls while mounting solar panels on elevated structures. • Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH) may occur due to power imbalances leading to exploitation, particularly of women and vulnerable groups. Sexual harassment can occur among workers or between workers and the community. Direct and Indirect Child Labour

		• Solarisation takes a very short time and needs specialised labour therefore child labour incidences may only occur indirectly through offering family labor as the parents work in the project site or being sub-contracted to do menial jobs like ferrying materials to the site.
Mitigation Measures	✓ To avoid disturbing the patients, the workers should not use the same entrance with the patients to avoid disturbances. ✓ Sorting Waste and putting it in separate bins for different types of waste (plastic, metal, paper) to facilitate recycling; ✓ During procurement, request for minimal use of packaging materials; ✓ Recycle and reuse the packaging material. ✓ Dispose that waste materials responsibly ✓ To avoid birds deaths the solar panels can have anti-Reflective Coatings to reduce glare that may confuse birds making them mistake the panels for water bodies (a phenomenon known as the "lake effect"); textured Surface or patterned surfaces on solar panels can help break up reflections that might otherwise attract birds. *For Increase in HIV infections, the following should be done:* ✓ Conduct regular sensitization sessions for workers and the community on prevention,on HIV /AIDs ✓ The contractors will partner with local health facilities to provide voluntary HIV testing and counseling. ✓ A non-discriminatory approach to HIV-positive workers and support access to medical care. Mitigation of GBV, SEA, and SH. ✓ Code of Conduct: Require all workers to sign and adhere to a strict Code of Conduct prohibiting GBV, SEA, and SH.	

	✓ The contractor should conduct mandatory training for workers and supervisors on acceptable workplace behavior with a provision for anonymous reporting Mechanism. Child Labour Mitigation ✓ Conduct regular inspections to monitor labor conditions and enforce compliance. ✓ Community Awareness: Educate local communities on the risks of child labor and encourage reporting of violations. Occupational Health and safety mitigation measures ✓ Use proper insulation, grounding, and circuit protection devices. Conduct safety inspections before energizing the system ✓ Provide workers with Personal Protective equipment (harnesses, helmets, and scaffolding). ✓ Train workers on safe working procedures when handling elevated installations. ✓ Ensure ladders and scaffolding are stable and properly secured.	
Operation Phase	Positive Impacts	Negative Impacts
	Direct Impacts i. Regular supply of quality water residents of Baraka Improved access to portable water ii. Reduction of operation & maintenance costs as a result of solarisation iii. Increased revenue to NAWASCO *Cumulative Impacts*	*Direct Impacts* • Risk of disrupted services during low sunshine months • Bird Mortality: Solar panels,can pose a threat to birds. Birds can be killed by flying into the panels; • Waste Management: At the end of their life cycle, solar panels generate electronic waste (e-waste). If not properly recycled, this waste can contribute to environmental pollution

	iv. Reduced cases of water borne diseases among the locals v. Establishment/Improvement of livelihoods vi. Improved local economic development vii. Institutional strengthening & Capacity building for the water company viii. Increased tree cover in Baraka ix. Improved nutrition due to availability of vegetables in kitchen gardens	Cumulative Impacts • Continuous abstraction may lead to lowered water tables, impacting local ecosystems and vegetation.
Mitigation Measures	• For solar panels generating e waste, use panels with longevity reducing the frequency of replacement and disposal; using panels with modular design that can be easily disassembled to allow for the recovery of valuable materials and components; and use of Recyclable Materials: Prioritize the use of materials that are easier to recycle, such as certain metals and plastics, to ensure a higher recovery rate. • Buy panels from manufacturer who have a "Take-Back Program" where they to take back and recycle their products at the end of their life cycle.	

	• Regular testing and monitoring of water quality by NAWASCO and WRA to ensure it meets safety standards • Installation of appropriate water treatment systems to address contamination issues. • Implementation of institutional /community awareness programs on water hygiene and safe usage practices. • Implementing sustainable groundwater management practices to prevent depletion, such as recharge projects or water conservation measures. • Establishing a regular maintenance schedule for boreholes, pumps, and treatment facilities. • Training Baraka residents and neighbouring community on borehole safety protocols e.g. access control, emergency response in case of contamination and environmental protection • Promoting integrated water resources management that includes rainwater harvesting, groundwater recharge, and use of alternative water sources. • Request community to invest in storage structures to provide water during the low sunshine hours • Implementing effective billing systems and revenue collection mechanisms to enable continued operation and maintenance
Recommendations	• Ensure public participation in all project stages • NAWASCO should involve all relevant stakeholders from the planning, design, construction to commissioning • NAWASCO should institute a continuous sensitization program on the project

Summary of ESMP

The ESMP provides a summary of mitigation actions to be implemented during the construction and operation of this proposed water project. To ensure successful implementation, NAWASCO will ensure that the ESMP is adhered to through communicating the ESMP to the contractor and other stakeholders and monitoring compliance. NAWASCO will identify an officer within the company who is trained in environment and social issues. With the help of WSTF, the identified person will be capacity built on how compliance to ESMP should be assessed during the project cycle to ensure the ESMP is well implemented. The contractor (s) will be required to develop and execute the ESMP, conduct regular monitoring, and report on compliance with mitigation measures on a weekly basis to NAWASCO. Both NAWASCO and contractor will need to engage with the local communities, listen to their concerns and provide guidance including a feedback mechanisms to address concerns related to the project.

The contractor adherence to ESMP will be audited by the identified NAWASCO E&S officer. The contractor will also be required to report fortnightly to NAWASCO on ESMP implementation. Monthly audit reports and incident reports especially on grievances should be reported to both the contractor and NAWASCO.

1 INTRODUCTION

1.1 Project Background

Water scarcity in Nanyuki is a major problem caused by rapid urbanization due to exponential population growth, deforestation, conversion of naturally vegetated land to agricultural land and high-rise buildings and also climate change impacts. Dilapidated water Infrastructure leads to inadequate water supply and inefficient water provision patterns. Nanyuki town as a cosmopolitan town with an ever-growing population which besides the locals, include settlers, local military men, British Army and an all-year-round presence of guests and tourists has worsened the water scarcity crisis.. Nanyuki has also become a popular town with many investors in the real estate market growing exponentially. Nanyuki is also a popular destination for domestic and overseas tourists who visit for vacations and getaways. The town is surrounded by game parks and reserves, world class hotels and the beautiful Mt. Kenya which offers a majestic view. The town is also hosts a range of Military men ranging from the Kenya Air force, Kenya Army and the British Army Training Unit in Kenya (Batuk).

The Conditional Liquidity Support Grant (CLSG) from the World Bank is a mechanism designed to provide financial assistance to countries in need, particularly during economic crises or other significant challenges that affect liquidity. In Kenya, this grant could be instrumental in stabilizing the economy, ensuring that essential services and development projects continue even during times of financial strain. The focus of CLSG-2 is to support the financial recovery of WSPs to pre-COVID levels or better. Only WSPs with potential to achieve financial recovery within a period of less than 12 months were eligible to receive the support. Under CLSG-1, the Water Services Regulatory Board (WASREB) developed criteria that was agreed to by the MoWSI, Water Sector Trust Fund (WSTF) and the World Bank for the selection of WSPs to benefit from CLSG-2. Among the WSP that benefited from the funds was Nanyuki water and Sewerage Company which falls under cluster 3 projects along with Mandera and Nanyuki.

1.2 Project Components

The borehole that is in existence has a depth of a 200 meters with an average yield of 30.91 m3/hr ; borehole diameter 152mm and a designed output 22m3/hr cubic meters per hour.

Solar Panels: The solar components include: 335W Dayliff solar modules and 51 no crystalline solar power control unit , Dayliff sunverter 3 SV2/11T for controlling of the pump system, monitoring the operating states, and an alarm system. The accessories include inter-panel wiring for input/output current or power voltage.

1.3 Project Justification

In Nanyuki area water scarcity is a real problem to the people living in Nanyuki and impacting negatively on their livelihoods. Nanyuki town is rapidly growing and the current water demand is 18000m^3 per day. The current production capacity is 14000m^3 per day during the wet season and this drastically reduces during the dry season to production level of 8000m^3 per day. Water losses are at 30% due to the poor state of the pipes and the meters.

In the project site there is severe water scarcity for four months per year mainly in the months of January to March and August to September. NAWASCO is not able to meet the WHO guidelines of water provision which is 100 litres per person per day. WASREB recommends 60 litres per person per day but even that one has been hard to meet. The current amount of water provided by NAWASCO is 40 litre per person.

1.4 Purpose of the Study

The implementation this project provides multiple benefits to both the targeted community and the country as well. These benefits include increased water supply, reduction of operational and maintenance cost, enhanced public health and economic development. More specifically, solarisation of Baraka borehole will be instrumental in improving accessibility to clean water for the residents, ensuring consistent water supply and improved sanitation among residents. Minor negative impacts of solarisation can be mitigated with ease.

In an attempt to ensure that development provides optimal benefits without creating a significant social and environmental burden, the Government of Kenya has put in place wide range of policy, institutional, and legislative framework to address major causes of environmental degradation and negative impacts on ecosystems deriving from development programs. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. It is an obligation of the Kenya Government to conduct an Environmental and Social Impact Assessment (ESIA) on development projects such as the proposed one. The ESIA assesses the impacts of a proposed project before commencement of implementation. In addition to helping formulate environmental management framework, ESIA provides for public participation in the decision-making process within the proposed project.

1.5 Objectives of the Study

The specific objectives of the ESIA study include:

- ✓ To establish the baseline conditions in the project area so as to determine the likely impacts of the project on existing resources and infrastructures
- ✓ Ensuring compliance with relevant environmental and social regulations, policies, and standards at local, national and international level
- ✓ To identify both positive and negative environmental impacts associated with the project and provide for mitigation measures of the negative impacts.
- ✓ Identification and analysis of stakeholders relevant to the project at both national and local levels for purposes of stakeholder consultation
- ✓ Evaluating the significance and magnitude of identified impacts to determine their potential importance and consequences.
- ✓ Developing appropriate mitigation measures and management strategies to avoid, minimize, or offset adverse impacts on the environment and affected communities.

- ✓ Preparation of an Environmental and Social Management and Monitoring Plan (ESMMP) and an Environmental and Social Monitoring Plan including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.
- ✓ Providing recommendations to enhance the project design and planning to maximize positive impacts and reduce negative impacts on the environment and communities.
- ✓ Creation of awareness about the project and obtain opinions and concerns regarding the proposed project i.e. location, design, operation and management through public participation and consultation meetings as per Part II Section 17 of the Environmental (Impact assessment and Audit) Regulations, 2003
- ✓ Providing decision-makers with comprehensive information and analysis to support informed decision-making regarding project approval, modification, or rejection.

1.6 Project Classification

According to the Environmental Management and Coordination Act, No. 8 of 1999, projects should be classified as either Low Risk Project, Medium Risk Project or a High Risk Project. An analysis of the proposed borehole solarisation as per the Second Schedule of the EMCA Act shows that the project will be classified as a Low Risk Project ref. Legal Notice 31 (3a) Community water projects such as boreholes, water pans sand dams, sub-surface dams. This requires a Summary project report to be submitted.

1.7 Project cost

Total Project Cost: KES 2,410,132

Solar structure cost: Ksh 615,190

Solarisation: Ksh 1,794,942

1.8 Project Timeline

The project is expected to be completed in 12 months.

1.9 Approach and Methodology

The ESIA study utilized a systematic approach to identify the environmental and social impacts of a project, and describing the mitigation, management and monitoring measures that will be implemented to address these impacts. The approach also entailed stakeholder engagement. Ultimately, the study allows relevant organizations to make informed decisions about development proposals, and potentially affected stakeholders to participate in the process.

1.9.1 ESIA Process

1.9.1.1 Screening

It comprises of the initial identification of potential interactions between the Project and physical, ecological and human receptors indicating the level of impact assessment required. It also involves examination of relevant national and international legislative requirements and an illustration of the potential interactions of project activities with the physical, ecological and human receptors.

1.9.1.2 Scoping

This stage outlines the perceived required scope of the EIA to be undertaken, taking into consideration the nature of the Project, the results of the screening and applicable requirements. This stage included:

a) **Issues Identification**- a process of systematic identification of potential interactions between Project activities or events and known receptors
b) **Desk-Based Studies**- a review of existing environmental and social information, and gap analysis to identify additional baseline information required for the impact assessment.
c) **Identifying receptors-** Identification of potential physical, ecological, and human receptors that may be affected by the Project

1.9.1.3 Baseline Field Surveys and Studies

Field Studies included:

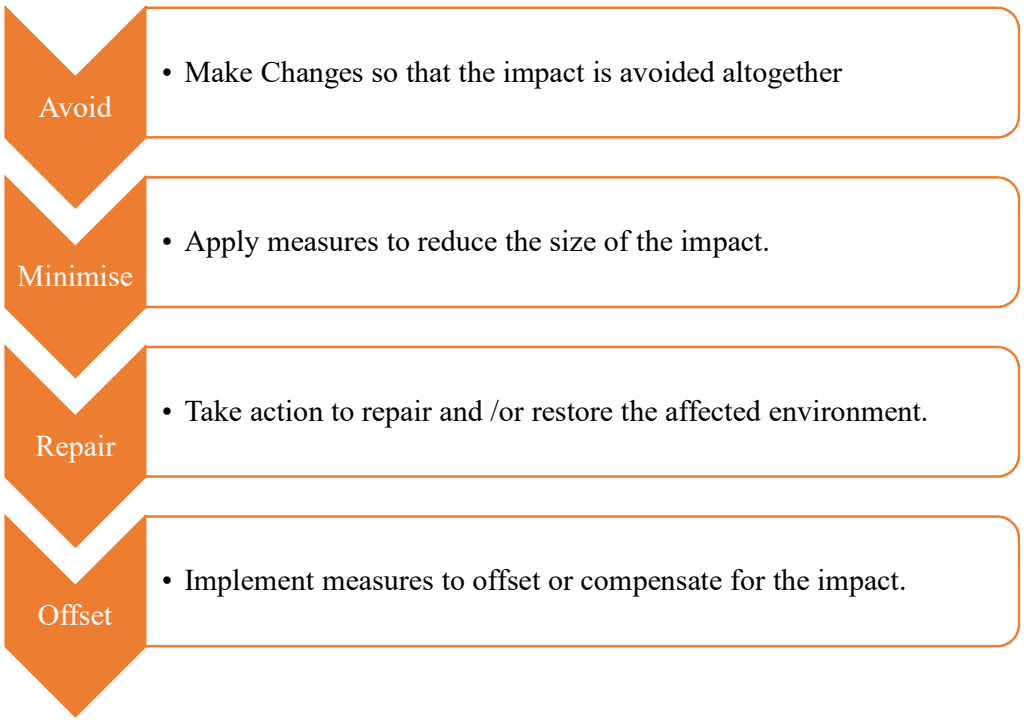
- **Baseline Survey:** The Consultant will undertake a household survey within the project area to understand the existing socioeconomic conditions. The information will be used in assessing the socioeconomic implications of the proposed project.

1.9.2 Impact Assessment Framework

The process of assessing the potential project impacts is centred on the following aspects:

- Prediction-What will happen to the environment because of this project?
- Evaluation-Will it have a beneficial or adverse effect? How big is the change expected to be? How important will it be to the affected receptors?
- Mitigation: If the impact is of concern, can anything be done to avoid, minimise, or offset the impact or to enhance potential benefits?
- Residual Impact: After mitigation, is the impact still of concern?

The hierarchy as illustrated in the chart below will inform the mitigation measures:



Environmental and Social Management and Monitoring Plans (ESMMPs) are developed to capture all mitigation and management measures, and environmental and social commitments made within the ESIA Report. Adherence to these plans will be a condition of any Project construction and operation contracts awarded.

1.9.3 Stakeholder Engagement

The ESIA team mapped out the relevant stakeholders who are likely to be affected by the proposed project either directly or indirectly. A stakeholder analysis was conducted to determine their level of power and interest in order to know the best approach for engaging them and the significance of their input to the project. The outcome of this engagement is analysed in the Public Participation Chapter 5 section 5.7 of this report.

1.10 Structure of the Summary Project Report (SPR)

Environmental and social impact assessment will include:

Executive summary: This section presents a summary of the entire report.

Chapter 1: Introduction: This chapter gives description of the Project Background, Justification of the Project, Study Methodology and Field Findings, and Scope and Content of the project.

Chapter 2: Project description: This chapter gives a description of the status of the project in the project cycle, specifically during construction, operation and decommissioning.

Chapter 3: Policy, legal and institutional / administrative framework: This chapter outlines the overview of legislative framework, regulatory, international guidelines and conventions relevant to this project.

Chapter 4: Environmental setting: This chapter gives description of the environmental setting of proposed project and surrounding areas, e.g., climate, soils, geology, vegetation, fauna, land use, human populations, socioeconomic, cultural heritage.

Chapter 5: Stakeholder Engagement: This chapter gives description of the objectives, methods used and summary of results of the public consultation activities undertaken during the ESIA.

Chapter 6: Assessment of environmental impacts and mitigation measures: This chapter presents the analysis of beneficial and adverse impacts of the project on the biophysical and human (social, cultural and economic) environments. The analysis covers anticipated impacts during the construction, operation phases and decommissioning phases and describes the enhancement and mitigation measures proposed to enhance benefits.

Chapter 7: Environmental and social management and monitoring Plans: This chapter presents the proposed Environmental and Social Management and Monitoring Plans prepared for the project.

Chapter 8: Conclusion and recommendations: The conclusion briefly presents the environmental and social acceptability of the project, taking into account the impacts, measures and recommendations identified during the assessment process.

Appendix and Annex: This section presents attached documents such as Minutes and supplementary reports.

2 PROJECT DESCRIPTION

2.1 Project Location

2.1.1 General Project Area

Baraka water project is within located 7 km west of Nanyuki town and within the NAWASCO service provision area. The land is 100 by 100 m. The project is adjacent to Baraka dispensary that serves the local community. Theproject is located at 0.01194. Longitude 37.04848 and the land is registered as Nanyuki/Marura Block 1/52 Ichuga and land ownership documents are attached in Appendix (Section 10.3).Baraka village suffers from acute water shortage and mostly served through a rationing program. The borehole is well reticulated with a network of pipelines both main and and sub main pipes directing water into homestead. To improve the water supply in the area NAWASCO in collaboration with the Laikipia county government developed a borehole in august 2020. NAWASCO through the utilization of internally generated funds has successfully constructed a 15 meters high water tower, installed water tanks of 15 m^3 capacity, and fenced off the borehole area.



Photo 1 Map of Baraka Borehole

2.1.2 Description of the Proposed Project

The proposed project was identified by NAWASCO after incurring high costs of pumping water to the community. This necessitated rationing of water leading to the community experiencing water shortages. Due to the community complaint over water rationing NAWASCO wrote a proposal to WSTF and sought funds to solarise the borehole. The community has been sensitised on the importance of solarising the Baraka borehole.

CONSTRUCTION PHASE

Solar Installation

A 200m deep borehole is in existence and uses power supply from Kenya Power and Lighting company. Borehole solarisation will entail construction of solar panel frames and ground mount points for control room housing the batteries, inverters, electrical cables and conduits. Installations/ electrical works will include solar panels, batteries, inverters and circuit breakers.

Pump Installation and Testing:

A submersible pump is already installed in the borehole. Pump testing will be conducted to assess if the solar power is working or not the yield and sustainability of the water source.

Water Quality Testing:

Baraka borehole is currently in use and water quality testing was and continues to be done at NAWASCO water treatment plant which has a licensed water testing laboratory. The water was cleared as safe for human consumption and domestic use. The water sampling will be continuously done by NAWASCO to ensure that the accepted quality standards are maintained. Testing is regularly done for chemical, physical and bacteriological characteristics before the water is made available for use.

Maintenance and Monitoring

Regular maintenance and monitoring will continue to be conducted by NAWASCO to ensure the longevity and efficiency of the borehole.

3 POLICY, LEGAL AND REGULATORY FRAMEWORK

3.1 Background

This chapter reviews into detail the current policy, legal and regulatory framework governing environmental quality, solid and liquid waste management, health and safety, protection of sensitive areas, land use and control at the local, national and international levels in accordance with the provisions of Environmental Management and Coordination Act (EMCA) of 1999.

3.2 LEGAL FRAMEWORKS

3.2.1 The Constitution of Kenya, 2010

The Constitution of Kenya is the supreme law of the Republic Kenya. It ensure persons and all State organs understand the comprehensive rights and responsibilities regarding environmental conservation and natural resource management. Article 42 is on fundamental rights and states that every Kenyan has the right to a clean and healthy environment. The environment should be protected for present and future generations through legislative and other measures. Article 69 on states responsibilities ensures sustainable exploitation, utilization, management, and conservation of natural resources. Aim to maintain a minimum of 10% tree cover across Kenya's land area. Protect biodiversity, indigenous knowledge, and genetic resources. Promote public participation in environmental management and conservation. Implement systems for environmental impact assessment, audit, and monitoring. Eliminate activities that endanger the environment.

Part II, Chapter 5 on additional environmental provisions ensures land use and management benefit local communities. Protect community land from state encroachment. Safeguard rivers, forests, and water bodies by law. Guarantee equitable access to land. Secure all lawful land rights. Enforcement and Redress (Article 70) ensures that any person whose right to a clean and healthy environment is threatened can seek redress through the courts.

Relevance to the Project

The Constitution of Kenya emphasizes the importance of sustainable and responsible environmental management in development projects. According to Article 69, project proponents are required to collaborate with government bodies and others to safeguard and preserve the environment. In this context, NAWASCO as a water service provider in Nanyuki must adhere to constitutional provisions to promote sustainable development. Additionally, projects should prioritize the sustainability of local livelihoods and biological resources within their operational areas, respecting communities' and individuals' constitutional rights to seek legal redress for the protection of their rights.

3.2.2 Environmental Management and Coordination Act, 1999 (Amended 2015)

The Environmental Management and Coordination Act (EMCA), enacted in 1999 and amended in 2015, forms the core legal framework for environmental management in Kenya. It supersedes conflicting environmental regulations and emphasizes the rights and responsibilities related to environmental conservation. Key provisions include; Right to Clean Environment, EMCA guarantees every person the right to a clean and healthy environment and ensures judicial enforcement of this right. Duty to Safeguard the Environment, Citizens are obligated to protect and enhance the environment under the Act. Environmental Impact Assessment (EIA), Part VI mandates that any new program, activity, or operation undergo an EIA. The National Environment Management Authority (NEMA) reviews EIA reports and issues licenses accordingly. Specific Regulations, Legal Notice 150 (2016) under EMCA includes water resources infrastructure among activities requiring an EIA. Protection of Water Bodies, Section 42 prohibits interference with rivers, lakes, and wetlands without permission from NEMA's Director General. Such permission is contingent upon the findings of an EIA. Protected Areas. The Act authorizes the Minister of Environment to designate lake shores, wetlands, coastal zones, and riverbanks as protected areas, imposing necessary restrictions to prevent environmental degradation. Regulatory Framework, The Environmental (Impact Assessment and Audit) Regulations, 2003 detail procedures for conducting EIAs and Environmental Audits (EAs).

Relevance to the Project: Nanyuki water and Sanitation Company intends to enhance water supply and sanitation services. As per Legal Notice 150 of EMCA 1999, this borehole solarisation project falls under Low Risk Projects. The project is therefore required to undergo environmental impact assessment and a Summary Project Report is what is contained in this report.

(ii)The Water Act, 2016

The purpose of this Act is to provide for the regulation, management and development of water resources and water and sewerage services in line with the Constitution. Water act typically encompass regulations and provisions concerning water supply, sanitation, and water resource management. They establish standards for water quality, safety, and conservation. These laws address responsibilities of water suppliers, sanitation facilities, and measures to protect water resources from pollution and overuse. Additionally, water acts provide a legal framework for licensing, enforcement, and dispute resolution related to water rights and environmental conservation. Overall, they aim to ensure public health, sustainable water use, and environmental protection.

Relevance to the Project : The project intends to increase the water supply in Nanyuki Town Laikipia County through solarisation. The current borehole has existing permits.

3.2.3 Occupational Safety and Health Act, 2007

The Occupational Safety and Health Act, 2007 is comprehensive legislation aimed at ensuring safety, health, and welfare in workplaces across its various provisions. Applies to all workplaces where any person is employed, emphasizing safety, health, and welfare for everyone present.

Occupiers (those in control of workplaces) have extensive responsibilities: Ensuring safety and health through safe systems and procedures ,Providing safe equipment, substances, and environments ,Offering necessary information, training, and supervision, Conducting risk assessments and implementing preventive measures ,Stopping dangerous activities promptly and notifying authorities, Registering workplaces and complying with safety regulations and Penalties for non-compliance include fines and potential imprisonment.

Health Provisions (Part VI) Covers cleanliness, ventilation, lighting, and sanitary facilities. Manual Handling (Section 76(4)) Prohibits handling of excessively heavy loads likely to cause injury.Safe access and workplaces (Section 77). Fire prevention (Section 78) and safety measures for dangerous fumes (Section 79) and Procedures for fire safety and evacuation (Sections 81 and 82).

Relevance to the Project : Solarisation will involve construction and works at elevated heights and safety measures will be of paramount importance The proponent shall ensure that the provisions under this act are applied appropriately.

3.2.4 Public Health Act, 2012

The Public Health Act (Cap. 242) stipulates in Part IX, Sections 8 and 9, that no individual or institution is allowed to create conditions that may endanger human health or cause nuisance. Any discharge of noxious matter or wastewater into watercourses is explicitly considered a nuisance. Furthermore, Part XII, Section 136, categorizes accumulations of water, sewage, rubbish, refuse, and other fluids that encourage the breeding of pests as nuisances. This legislation primarily concerns sanitation, hygiene, and overall environmental health and safety.

Relevance to the Project: During the construction phase of the project, all construction materials and waste generated by workers must be disposed of in a manner that protects the health of residents in the project area. The proponent is required to strictly follow these guidelines and implement suitable measures to meet these obligations.

3.2.5 Physical Planning Act 2019

The Physical and Land Use Planning Act, 2019) provides a legal framework for the preparation and implementation of physical and land use plans at national, county, and local levels. It replaced the Physical Planning Act, 1996 (Cap 286) to align with Kenya's 2010 Constitution and devolved governance structure.

The Act establishes the national physical and land use planning consultative forum to coordinate planning at all levels and creates the county physical and

land use planning liaison committees to handle planning disputes. The Act stipulates that plans must be prepared in consultation with communities thus public participation is emphasised.

Relevance to the Project : The Act emphasizes sustainable land use and requires an Environmental and Social Impact Assessment (ESIA) for a project; the act also provides for public participation to ensure that local communities benefit while minimizing negative effects like displacement or water conflicts

3.2.6 Work Injury Benefits Act, 2007

The Act mandates employers to secure and uphold an insurance policy covering liabilities arising from work-related injuries and diseases contracted during employment. Section 10 outlines the compensation procedures for work-related injuries. Subsection (1) specifies that employees disabled or deceased due to work accidents are eligible for compensation.

Relevance to the Project:The project proponent will need to observe the provisions of this Act during the course of the project especially during construction works.

3.2.7 Land Act, 2012 (Revised 2015)

The Lands Act was initially enacted in May 2012 and underwent revision in 2015. Its purpose is to review, consolidate, and rationalize land laws, establishing a framework for sustainable management and use of all land categories. The act governs the administration and management of public and private lands, covering leases, charges, compulsory acquisition, easements, and related rights. According to Section 61 of the Kenyan constitution, land is classified into three categories: Public land, this includes all government land not yet transferred to private ownership, territorial sea and seabed, all public roads whether officially designated or not, and any land not classified as private or community land under the Constitution. Additional lands can be designated as public through Acts of Parliament.

Community land, this refers to land vested in and held by communities identified based on ethnicity, culture, or shared community interests. Unregistered

community land is managed in trust by county governments on behalf of the communities. Private land, this encompasses land registered and owned under freehold tenure, land held under leasehold tenure, and any other land legally declared as private under an Act of Parliament.

Relevance to the Project : The proposed project will be within registered land owned by NAWASCO Land registration documents Nanyuki/Marura Block 1/52 Ichuga.

3.2.8 The Penal Code (Cap. 63)

Section 191 of the Penal Code stipulates that anyone who intentionally contaminates water intended for public use, such as springs or reservoirs, making it unsuitable for its normal purposes, commits an offense. Similarly, Section 192 of the same law states that creating or causing pollutants in the air of any place to a degree harmful to the health of individuals residing in nearby homes or conducting business nearby, or those passing through public areas, constitutes an offense.

Relevance to the Project: The project intends to supply water to Baraka residents. The proponent is tasked to provide clean water free from any contamination at all times during the operation phase.

3.2.9 County Government Act No. 17, 2012

This act outlines the responsibilities of County governments. Part II of the Act grants County governments authority over functions specified in Article 186 of the Constitution, such as county roads, water and sanitation, and health. Part XI of the Act assigns the County government the duty of planning and facilitating development in collaboration with the national government. This approach has been adopted to ensure that interventions align harmoniously with the provisions of the Kenyan Constitution.

Relevance to the Project: The County Government Act No. 17 of 2012 provides a legal framework for public participation in county governance in Kenya. The Act mandates county governments to ensure meaningful citizen involvement in project development through participating in decision-making and project

monitoring. Section 87 outlines principles of public participation, including transparency, inclusivity, and equitable access to information. Public participation during the ESIA process was done through 2 public barazas with the community , a household survey and gender disagreggated focus group discussions.

3.2.10 HIV and AIDS Prevention and Control Act, 2006

This legislation prohibits any form of discrimination, direct or indirect, against individuals based on their HIV or AIDS status, whether actual or perceived. Specifically, no individual can be required to undergo an HIV test as a condition for employment or to maintain their employment status.

Relevance to the Project : During employment within the project, there will be fair treatment and non-discrimination. The HIV status of employees will be kept confidential and employees have the right to voluntary testing and informed consent before any HIV-related test.

3.3 POLICY FRAMEWORKS

3.3.1 The National Environmental Policy, 2013

The Policy outlines key provisions concerning ecosystem management and the sustainable utilization of natural resources. It recognizes the significant pressures exerted by human activities on natural resources, particularly in crucial ecosystems such as forests, grasslands, and arid and semi-arid lands. Moreover, the policy aims to establish an integrated approach to environmental management, enhancing the legal and institutional frameworks to facilitate effective coordination. It also advocates for the promotion of tools for environmental management.

Relevance to the Project: *This ESIA study will develop an environmental and social management and monitoring plan to mitigate the impacts that may result during the construction and operation phases of the project. This tool is aimed at promoting coordination of environmental and social management of the project.*

3.3.2 Sustainable Waste Management Policy 2021

The National Sustainable Waste Management Policy outlines the benefits of managing waste as a resource in Kenya, including economic, social, and environmental advantages. The policy recognizes that sustainable waste management is critical to delivering on Kenya's constitutional right to a clean and healthy environment, achieving sustainable development goals. Kenya's Sustainable Waste Management Policy aims to address the growing challenges of waste management in the country by promoting environmentally sound waste handling, reduction, recycling, and disposal. *Relevance: During construction all wastes generated will be hoarded together and disposed in NEMA designated areas.*

3.3.3 Extended Producer Responsibility (EPR) (2021)

Extended Producer Responsibility (EPR) Regulations in Kenya are designed to hold producers accountable for the entire life cycle of their products, including post-consumer waste management. These regulations form part of the broader Sustainable Waste Management framework and aim to reduce the environmental impact of products, especially those that are non-biodegradable or hard to dispose of, such as plastics, electronics, and packaging materials. Extended Producer Responsibility (EPR).

Relevance: During the project cycle, any materials sourced should be the ones with a long lifespan and where possible the ones that have a return process provision.

3.3.4 The National Water Policy, 2021

The overall goal of the policy is to guide the achievement of sustainable management, development, and use of water resources in the country. The overall objective of the policy is to provide a framework that is dynamic, innovative, and effective for re-engineering the water sector.

Relevance to the project: This policy will guide NAWASCO to implement strategies specific to their local challenges. It encourages initiatives such as improving infrastructure, promoting efficient water use, and integrating environmental considerations. Each provider adapts these guidelines to enhance water access, quality, and resilience in their respective regions, contributing to the overall goal of re-engineering the water sector nationally.

3.3.5 The National Land Policy, 2009

Chapter 4 of the land policy emphasizes proactive environmental management principles. It addresses issues such as natural resource degradation, soil erosion, and pollution through measures like waste management, including treatment and recycling. The policy mandates environmental assessments and audits for all potentially impactful land developments, with corrective actions as necessary. Public participation is highlighted for effective environmental monitoring. Additionally, the policy promotes the polluter pays principle to hold polluters financially accountable for cleaning up pollution and encourages the adoption of cleaner production technologies by industries.

Relevance to the Project :The National Land Policy mandates environmental assessments and audits for all impactful land developments, promoting public participation in monitoring. Applying these principles to water providers in Nanyuki involves ensuring sustainable water management practices, minimizing pollution through effective waste management and recycling, and engaging local communities in environmental monitoring efforts.

3.3.6 The Kenya National Policy on Gender and Development

The Kenya National Policy on Gender and Development (NPGD), spells out a policy approach of Gender mainstreaming and empowerment of women and clearly states that it is the right of women, men, girls and boys to participate in and benefit equally from the development process.

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

Relevance to the Project: The issues of women and youth will be given prominence in the project. During the stakeholders and community engagement, issues affecting youth and different gender in water provision were noted and will be taken into consideration. Matters concerning hiring of staff to be

involved in the implementation of the project will not be gender discriminative. Moreover, the project will be of benefit to women and girls who are tasked with fetching water from far flung sources in the project area.

3.3.7 The Kenya Vision 2030

The Kenya Vision 2030 is a national development plan spanning 2008 to 2030, originating from the Economic Recovery Strategy for Wealth and Employment Creation. It aims to elevate Kenya to a middle-income economy with sustained annual growth of 10%. This vision emerged after the GDP growth rate dropped sharply from 7% in 2007 to 1.7% in 2008 due to post-election violence. Key objectives include transforming urban areas to support a well-housed population within environmentally-secure developments. This involves enhancing infrastructure such as roads, street lights, water, sanitation, storm water drains, and footpaths. Environmental conservation is prioritized to bolster the economic pillar of the vision.

Relevance to the Project: The proposed project intends to improve water supply and service delivery in Nanyuki (an upcoming urban areas) through construction of water supply infrastructure. This initiative is part of the process in achieving the goals of Vision 2030 for Nanyuki residents. The proponent should also endeavor to protect the environment in supporting the economic pillar of the vision.

3.4 INSTITUTIONAL FRAMEWORK FOR ENVIRONMENT MANAGEMENT

In Kenya, environmental management is primarily governed by the Environmental Management and Coordination Act (EMCA) of 1999. This legislation has instituted various institutions tasked with regulating and monitoring environmental issues. The Ministry overseeing environmental management is headed by the Ministry of Environment. This Ministry oversees several other bodies and authorities, all detailed within the EMCA 1999 framework.

3.4.1 Ministry of Environment , Climate Change and Forestry

The Ministry's mandate is to oversee the monitoring, protection, conservation, and sustainable management of the environment and natural resources. This includes ensuring their responsible exploitation to support socioeconomic development, alleviate poverty, enhance living standards, and maintain a clean environment. The mission and primary goal are to promote effective governance in safeguarding, restoring, conserving, developing, and managing the environment and natural resources for fair and sustainable development.

3.4.2 National Environment Management Authority (NEMA)

The National Environment Management Authority (NEMA) in Kenya serves as the primary administrative body responsible for coordinating environmental management activities and implementing governmental environmental policies. NEMA's pivotal role includes granting Environmental Impact Assessment (EIA) approvals and diligently monitoring projects to prevent environmental degradation.

NEMA's core functions encompass:

- Providing advice to the Government on legislative measures and international agreements pertaining to environmental management.
- Conducting and coordinating research, investigations, and surveys, and disseminating findings to inform environmental policies.
- Promoting the integration of environmental considerations into development policies, plans, programs, and projects to ensure sustainable utilization of environmental resources and enhance the quality of life in Kenya.
- Coordinating environmental management activities across various agencies to ensure coherence and effectiveness.
- Assessing Kenya's natural resources, their utilization, and conservation efforts.
- Developing protocols and safeguards to prevent environmental accidents such as floods, landslides, and oil spills, and implementing remedial measures when necessary.

- Mobilizing and monitoring financial and human resources dedicated to environmental management.
- Identifying projects and programs that require environmental audits or monitoring under regulatory frameworks.
- Monitoring and evaluating activities, including those conducted by lead agencies, to enforce adherence to environmental management objectives and provide early warnings of potential environmental emergencies.

3.4.3 National Environmental Council (NEC)

The body was created under section 4(3) of EMCA 1999, comprising the Cabinet Secretary of the relevant Ministry as the chairperson, the Principal Secretary, delegates from public universities, research institutions, NGOs, the Director General of NEMA, and a variable number of members as decided periodically by the Cabinet Secretary of the line Ministry.

3.4.4 National Environmental Tribunal (NET)

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

3.4.5 National Environmental Action Plan Committee

The committee, formed under Section 37 of the Act, has several key responsibilities. One of its primary duties is to develop a comprehensive five-year national environment action plan. This plan includes an analysis of Kenya's natural resources, detailing their distribution, quantity, and diverse uses.

Additionally, the committee is tasked with proposing legal and fiscal incentives to encourage businesses to integrate environmental considerations into their planning and operations. Furthermore, it establishes guidelines for the planning and sustainable management of the environment and natural resources. Once

approved by Parliament, the national environment action plan becomes mandatory for all government bodies to adhere to.

3.4.6 Standards and Enforcement Review Committee (SERC)

The Standards and Enforcement Review Committee (SERC) operates within the framework of NEMA, as stipulated in Section 70 of the Environmental Management and Coordination Act (EMCA) of 1999. Its primary function is to develop environmental standards, analytical methods, and guidelines for inspection, monitoring, and advising on mitigation measures. The Chairmanship of SERC is held by the Principal Secretary under the Cabinet Secretary. The composition of SERC members is detailed in the third schedule of EMCA 1999.

3.4.7 National Environmental Complaints Committee

The National Environmental Complaints Committee (NECC) in Kenya is responsible for investigating complaints or allegations related to environmental conditions and suspected instances of environmental degradation. Additionally, the NECC engages in public interest litigation on behalf of citizens concerning environmental issues. It consists of seven members appointed by the Cabinet Secretary for Environment and Natural Resources. The committee is chaired by an individual eligible for appointment as a judge of the High Court of Kenya. Other members are nominated by the Attorney-General, the Council of County Governors (Secretary), the Law Society of Kenya, and representatives from the business community.

3.4.8 County Environment Committees

Section 29(1) of the Environmental Management and Coordination Act (EMCA) 1999 stipulates that the Cabinet Secretary is mandated to officially establish County Environment Committees for NEMA through a notice published in the gazette. These committees play a crucial role in supporting NEMA in its responsibility of ensuring effective environmental management at the county level.

3.5 INSTITUTIONAL STRUCTURE OF THE WATER SECTOR

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

3.5.1 Ministry of Water, sanitation and Irrigation (MWI)

Its the ministry overseeing water in Kenya, manages policy formulation, sector coordination, monitoring, and supervision to ensure efficient water and sewerage services nationwide. It also focuses on sustaining water resources and developing them for irrigation, commercial, industrial, power generation, and other purposes. The Ministry's mission is to support national development by advocating and facilitating integrated water resource management to improve water availability and accessibility. Key technical departments within the Ministry include Water Services, Water Resources, Water Storage and Land Reclamation, and Irrigation and Drainage.

3.5.2 Water Sector Trust Fund (WSTF)

The Water Sector Trust Fund supports the improvement of water services in areas lacking adequate access by providing financial assistance for:

Encouraging community involvement in managing water services actively

- ✓ Investing in infrastructure for community water schemes in undeserved regions;
- ✓ Developing community capacities and initiatives;
- ✓ Funding water service activities prioritized in the Government's Water Services Strategic Plan;
- ✓ Promoting awareness and disseminating information on community-based water service management.

3.5.3 Water Resources Authority (WRA)

Water Resources Authority is a state corporation established under the Water Act 2016, serves as the primary agency for water resources management in the nation. Its mandate includes several critical functions, notably the issuance of

water use permits. The Authority is entrusted with ensuring the sustainable management of the country's water resources through:

i. Regulation and safeguarding of water resource quality against detrimental impacts,
ii. Classification, monitoring, and allocation of water resources,
iii. Implementation of policies and strategies pertaining to water resource management,
iv. Formulation of principles, guidelines, and procedures for water allocation,
v. Development of strategies for catchment-level management, including the establishment of catchment area advisory committees.

3.5.4 Water Services Regulatory Board (WASREB)

The Board's primary responsibility is to regulate water and sewerage services in Kenya, collaborating closely with the public. Its mandate includes:

i. Regulating the provision of water and sewerage services, encompassing licensing, quality assurance, and issuing guidelines for tariffs, pricing, and dispute resolution.
ii. Overseeing the implementation of policies and strategies concerning water services, including licensing of Water Services Boards and approval of their appointed Water Services Providers.
iii. Monitoring the performance of Water Services Boards and Water Services Providers to ensure effectiveness and efficiency.
iv. Establishing procedures for handling customer complaints related to water and sewerage services.
v. Informing the public about the performance of the water sector to enhance transparency and accountability.
vi. Providing expert advice to the Minister responsible for water affairs to support informed decision-making.

3.5.5 Water Works Development Agencies (WWDAs)

The WWDAs are tasked with efficiently and economically providing water and sewerage infrastructure in their respective jurisdictions. The Nanyuki Water and

Sewerage Company (NAWASCO) operates under the governance of the Laikipia County government. There are eight catchment boards established under the Water Act of 2016. According to this Act, the Boards are mandated to:

- Appoint and contract Water Service Providers (WSPs).
- Develop facilities, prepare business plans, and set performance targets.
- Strategize for the efficient and economical provision of water and sewerage services within their areas of jurisdiction.
- Manage Central Government facilities as assets.
- Enhance the capacity of water service providers to improve efficiency, accountability, and responsibility in water supplies.
- Monitor and supervise the provision of water and sewerage services by WSPs.

3.5.6 Water Services Providers (WSP)

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

3.5.7 Water Services Providers (WSP)

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

3.5.8 Sectoral Integration

Sectoral Integration in Kenya aims to ensure sustainable development and a healthy environment for all citizens. The National Environmental Council (NEC) assigns key responsibilities to NEMA, including setting national environmental goals, directing policy, and coordinating efforts among governmental bodies, local authorities, private sectors, NGOs, and other entities involved in environmental protection. Additionally, stakeholders such as the Ministries of Water and Irrigation, Environment and Natural Resources, Health and Sanitation, Lands, Housing and Urban Development, Transport and

Infrastructure, along with Laikipia County administrations, play crucial roles in fostering these objectives.

3.6 NATIONAL AND COUNTY PLANS AND STRATEGIES

3.6.1 The Kenya National Water Master Plan 2030

The Kenya National Water Master Plan 2030 has a special focus on enhancing water sanitation and irrigation systems. It aims to provide clean drinking water through infrastructure development and sanitation practices to prevent waterborne diseases.

Relevance to the project: The overall goal of Baraka water project is to improve access to clean and safe water for domestic purposes.

3.6.2 The National Water Harvesting and Storage Management Policy 2020 - 2025

The National Water Harvesting and Storage Management Policy 2020 - 2025 addresses water sanitation and irrigation within the context of sustainable water management. It emphasizes on ensuring there is clean water for consumption and hygiene. The policy establishes regulatory frameworks, promotes capacity building, and encourages research and innovation in water management.

Relevance to the project: The overall goal of cluster 3 projects is to improve access to clean and safe water making water provision sustainable for domestic purposes.

3.7 COUNTY STRATEGIES

3.7.1 Laikipia County Policies And Strategies

3.7.1.1 Laikipia County Water Master Plan For 20 Years (2022 to 2042)

In the Laikipia water master plan, the government identified some strategies to improve water provision through specific initiatives including the rehabilitation of 231 dams and pans, development of 130 boreholes, five mega-dams, and 15 privately developed dams as well as increasing bulk water supply

schemes across the county.The government also committed to connect 40,000 households to water.

Relevance to the project: Replacement of dilapidated pipes will improve water provision in the area.

3.7.1.2 The Laikipia County Water Services Bill, 2021

The County Assembly of Laikipia has committed to provide the legal and institutional framework for management of water resources, water harvesting, provision of water and sewerage services in the county.

Relevance to the project: Improvement of water supply through solarisation will ensure that water provision in the County is improved.

3.7.1.3 Laikipia County Integrated Development Plan 2023 To 2027

The CIDP 2023 to 2027 has laid among its priority provision of safe, secure and sustainably managed water. The sector targets include;

- ✓ Improving access to clean and safe Increase piped water access from the current 33% to 37% by 2027;
- ✓ Reduce average distances to water points from 4 Km to 3 Km by 2027;and
- ✓ Improve water supply by water companies from 60% to 70% by 2027.

The plan of action for water supply includes proposals for the development and maintenance of water infrastructure, such as boreholes, water pans, and dams. The expansion and rehabilitation of existing water supply systems are also key priorities.

3.8 INTERNATIONAL CONVENTIONS AND TREATIES

A treaty is a binding agreement under International Law concluded by subjects of International Law, namely states and international organizations. Treaties can be called by many names including; International Agreements, Protocols, Covenants, Conventions, Exchanges of Letters, Exchanges of Notes, etc. However, all of these are equally treaties and the rules are the same regardless of what the treaty is called. Treaties can be loosely compared to contracts; both

are means of willing parties assuming obligations among themselves, and a party to either that fails to live up to their obligations can be held legally liable for that breach.

Kenya is a signatory as well as a party to various international conventions, treaties and protocols relating to the environment and aimed at achieving sustainable development. According to the Registrar of International Treaties and other Agreements in Environment (UNEP 1999), there are 216 treaties, 29 of which are of interest to Kenya. The country is a signatory to 16 such agreements, which range from use of oil, protection of natural resources and protection of the atmosphere.

Protection of Natural Resources

There are 12 agreements of significance to Kenya under this category which the country has signed and ratified. This section reviews a number of treaties that are triggered or met by the proposed project.

3.8.1 Convention of Biological Diversity

This global convention was held to foster conservation and sustainable use of biological resources, to preserve their diversity for posterity. Kenya is a signatory to this convention, having ratified it in 1994. The provisions of this Convention have since been integrated in the laws of Kenya, climaxed by the development of the Kenya National Biodiversity Strategy and Action Plan in 2000 by the Ministry of Environment and Natural Resources.

Relevance: Minimal clearing of vegetation will be done. Existing shrubs and herbs will be cleared to pave way of access the solar areas and election of the solar panels stationing.

3.8.2 African Convention on the Conservation of Nature and Natural Resources

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

Relevance: In the project area, all the endemic and indigenous trees will be mapped and where it is logically possible to spare them during construction, they will not be interfered with.

3.8.3 Sustainable Development Goals

The Sustainable Development Goal that is most relevant to the Proposed cluster 3 Development Project is Goal 6 which targets to ensure availability and sustainable management of water and sanitation for all.

Relevance: All the Water Services Providers will ensure that there is provision of water to a water scarce project area.

3.9 THE WORLD BANK SAFEGUARDS

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

3.9.1.1 OP/BP 4.01 (Environmental Assessment)

The World Bank implements policies for borrowing countries to ensure sustainability and environmental integrity in its development projects. Environmental assessments play a crucial role in this process, including various tools such as environmental impact assessment (EIA), regional or Sectoral assessments, strategic environmental and social assessments (SESA), and others like environmental audits and management plans. Projects proposed to the World Bank undergo environmental screening to determine the appropriate level of assessment based on factors like project type, location, and potential environmental impacts. They are classified into three categories:

- Category A: Projects with significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These may affect broader areas beyond the project site, requiring a detailed EIA.
- Category B: Projects with potential adverse impacts on human populations or environmentally important areas, though less severe than Category A. Mitigation measures are feasible, and impacts are generally site-specific and reversible.

- Category C: Projects with minimal or no adverse environmental impacts. These require basic screening, and no further environmental assessment is typically necessary.

Environmental assessments at the World Bank aim to identify, avoid, and mitigate potential negative environmental effects of projects, ensuring sound decision-making and sustainability. The Baraka borehole Water project falls under Category C due to its minimal environmental impact and absence of permanent displacement of affected people.

3.9.1.2 OP/BP 4.04 (Natural Habitats)

The natural habitats policy aims to promote sustainable development by safeguarding and restoring natural habitats and their ecological functions. Projects supported by the World Bank must prioritize biodiversity conservation and the environmental benefits that habitats provide to communities. The policy imposes strict restrictions on damaging natural habitats in projects funded by the Bank, except in cases involving limited, localized riverine aquatic systems, where interaction with significant habitats is minimal.

3.9.1.3 OP/BP 4.11 (Physical Cultural Resources)

The purpose of this policy is to safeguard Physical Cultural Resources (PCR) from harm or destruction. These resources encompass archaeological, paleontological, architecturally significant, and religious sites such as graveyards, burial sites, and areas of unique natural value. While initial assessments indicate no identified physical or cultural resources will be impacted by the project, it is the Contractor's responsibility to be aware of the "Chance Finds Procedures." These procedures are to be followed in the event of discovering materials of potential archaeological, historical, paleontological, or cultural significance during excavation:

√ Immediately cease work upon discovering any materials that may hold cultural value. Inform the Project Manager and notify the relevant authorities;

While no cultural resources have been identified in the screening stage of Environmental and Social Impact Assessment (ESIA) study, the proponent must include a Chance Finds Procedure clause in all project contracts to ensure compliance in the event that during pipes expansion some artifacts are discovered.

4 BASELINE CONDITIONS

4.1 Physical Characteristics

Nanyuki is a town in central Kenya, located in Laikipia County that lies northwest of Mount Kenya and is positioned on the Equator. The coordinates for Nanyuki are approximately 0.0113°N latitude and 37.0723°E longitude.



Figure 1 Map of Kenya showing Position of Nanyuki Town

4.1.1 Topography

The altitude of Laikipia County ranges from above sea level at Ewaso Nyiro basin in the North to a 2,620 m above sea level around Marmanet forest, Mukogodo and Ol Daiga Forests in the eastern part of the County.

The County consists mainly of a plateau bordered by the Great Rift Valley to the West, the Aberdares Ranges to the South and Mt. Kenya to the South East.

4.1.2 Drainage

The main drainage feature in Laikipia is Ewaso Nyiro North basin with its tributaries having their sources in the slopes of the Aberdares and Mt. Kenya. These tributaries include Nanyuki, Timau, Rongai, Burguret, Segera, Naromoru, Engare Narok, Moyok, Ewaso Narok, Pesi and Ngobit rivers. The flow of these rivers matches the County's topography, which slopes gently from the highlands in the South to the lowlands in the North. The rivers largely determine the livelihood patterns in the County.

4.1.3 Agricultural activities

The South Western part of the County has the highest potential for forestry and mixed farming due to its favorable climatic conditions. The eastern and northern parts of the County are suitable for grazing while the plateau lying in the central and the northern parts of the County is suitable for ranching. The swamps require appropriate management as encroachment for human settlement and agricultural production poses serious threat to their existence.

4.1.4 Climatic Conditions

4.1.5 Rainfall

The County experiences a relief type of rainfall due to its altitude and location. The annual average rainfall varies between 635mm and 1,210mm. The areas nearest to the slopes of Mt. Kenya and the Aberdares Ranges record a higher annual rainfall. Doldol that receives the lowest rainfall recorded an average of 635.9mm of rainfall between 2017 and 2021, while highest rainfall, recorded an average of 1,210.9mm of rainfall during the same period. Nanyuki recorded an average of 761mm.The area experiences two rain seasons: long rains between March and May and short rains between October.

4.1.6 Temperatures

The annual average temperatures of the County ranges between 9.8° C and 24.48° C . The relief and trade winds result to cooler conditions in eastern side which is near Mt. Kenya and hotter in the low-lying areas in the North. The

western and southern parts of the County have cooler temperatures with the coolest month being April and the hottest month being February.

4.1.7 Sunshine and wind

The average duration of sunshine is between ten and twelve hours daily. The average wind velocity is 7.94km/hr in a general East to West direction.

4.1.8 Ecological characteristics

4.1.8.1 Flora

The vegetation types in Nanyuki are a transition zone for three major vegetation types; Somalia-Masai Semi-desert Grassland and Shrubland. This includes the Somalia-Masai Acacia commiphora; Bushland and Thicket and Afromontane Undifferentiated Montane Vegetation. The savannas of eastern Africa grade both into the semi-arid lands of the Horn of Africa and the montane elements of Mount Kenya and the Aberdares Range. The resultant great diversity of vegetation types, ecotones, and mosaics accounts, in part, for the high biological diversity of Laikipia.

The area around the proposed Baraka project has human settlements and agricultural activities have been established. On farm tree growing and agroforestry activities near Kilimo Teachers were witnessed in the area including exotic tree species like *Eucalyptus saligna* and *Grevillea robusta*, as well as cultivated crops such as maize, beans, and vegetables. The area also has scattered tree and shrub species such as *Euphorbia candelabrum*, *Balanites aegyptiaca* (Desert Date) and *Commiphora spp.* The plants growing in this area naturally are drought resilient.

The area also has grass species such as Cenchrus ciliaris (African foxtail grass) and Pennisetum mezianum (Napier grass) are prevalent and important for grazing livestock.

4.1.8.1.1 Fauna

Nanyuki area is surrounded by areas of conservation activities and wildlife sanctuaries namely:

- ✓ Mount Kenya National Park: A UNESCO World Heritage site, home to diverse wildlife and unique flora.
- ✓ Ol Pejeta Conservancy: Known for its conservation efforts, particularly for rhinos and chimpanzees.
- ✓ Solio Game Reserve: Famous for its black and white rhino populations.
- ✓ Aberdares National Park: Located nearby, it supports a wide range of wildlife including elephants, buffaloes, and leopards.

The project area falls within a human settlement ecosystem. Domestic animals found in the area include Therefore the fauna found in the area includes bird species, small reptiles like lizards, toads and frogs .

4.1.8.1.2 Agriculture

Crop Farming: In Nanyuki area is not a lucrative enterprise because of the other competing interests such as real estates development and tourism. However the area has fertile soils that can support the cultivation of crops such as maize, beans, potatoes, vegetables, and fruits. Around the town area, these crops are grown for subsistence purposed. The region is also known for flower farming, with flowers being exported to international markets.

Livestock Rearing

Cattle: Beef and dairy cattle can do well because the cool climate is ideal for dairy farming, and several dairy farms produce milk and other dairy products.

Sheep and Goats: These are raised for meat, wool, and milk.

Poultry: Chicken farming for eggs and meat is common.

4.1.9 Tourism

Nanyuki area is in the centre of conservation areas owned by the government. Privately owned and also community owned conservancies. The residents of the area engage in tourism and ecotourism activities such as:

- ✓ Wildlife Safaris: Ol Pejeta and the Mount Kenya National Park;
- ✓ Mountaineering: Nanyuki serves as a gateway for climbers heading to Mount Kenya.

- ✓ Eco-Tourism:
- ✓ Conservancies: Ol Pejeta
- ✓ Wildlife Research: Research activities
- ✓ Business activities: Shopping malls, green groceries, supermarkets, boutiques, hairdressing and barber shops and markets cater to the local population and tourists.
- ✓ Real Estate and Construction development: The town is growing very fast and demand for business premises is driving the town towards construction of highrise buildings
- ✓ Transport and Communication: Nanyuki town has a high number of residents who work in other towns such as Meru and Nyeri, These people need a regular transport system. Transport using minibuses and taxi services is popular.
- ✓ The boda boda industry is among the fastest growing industry employing many youth.

4.2 RESULTS ENVIRONMENTAL AND SOCIOECONOMIC SURVEY

4.3 Overview

This Chapter identifies, discusses and gives a critical analysis of both positive and negative impacts associated with the proposed Baraka Borehole Solarisation project. The project cycle is divided into three (3) main phases based on activities. These include construction, operation and de-commissioning phases. Impacts associated with the construction phase are short term while the impacts associated with the operation are long term.

Questionnaires, observations, interviews and photographs were used for data collection. A cross-sectional approach was used to collect socio-economic data once, from a sample of respondents. Relevant secondary data from all environmental and social institutions in the project area was gathered. Assessment data collection tools to adequately gather the required information

was prepared, such as household questionnaires; KII and FGD schedules; observation checklists; public consultation guides; digital camera.

4.4 Objectives of the Study

- To collect socio-economic data on the status of potential beneficiaries of NAWASCO water supply project with a focus on income, wealth, education, and occupation; demographics (population in the area & demographic patterns); seasonal land use patterns, livelihood activities; existing social infrastructure (schools, churches, health facilities, social centers and halls, markets, shopping centers, etc.); employment; labor availability across seasons; historical and cultural heritage sites; communication networks and households whose lands is likely to be affected by the project.
- To collect data on economic production activities, consumption, and distribution of goods among household members and existing social inequalities in resource ownership and access
- To collect data on social capital and reciprocal relationships
- Gender analysis: to investigate existing social economic inequalities in access and control of household and community resources, and the likely impact of the project on men, women and children.

4.5 Methodology

Social survey data were collected using a closed and open ended questionnaire (see appendices). A cross-sectional approach was used to collect data once from a sample of 97 households. Through focus group discussions, the study elicited information on gender stratification, social economic roles and responsibilities, access and control of household resources; potential impacts of the project on division of labour; potential impacts of the project on gender and likely impact of water distribution improvement

4.6 Study Area and Sample Size

The study was conducted within Baraka Village in Nanyuki.

4.7 BIODATA/ DEMOGRAPHIC CHARACTERISTICS

Most of the respondents sampled during the survey were female accounting for 56% of the interviewees, the males were at 44% . This is not surprising since most males migrate to towns in search of jobs and carry along their wives who are mostly house wives.

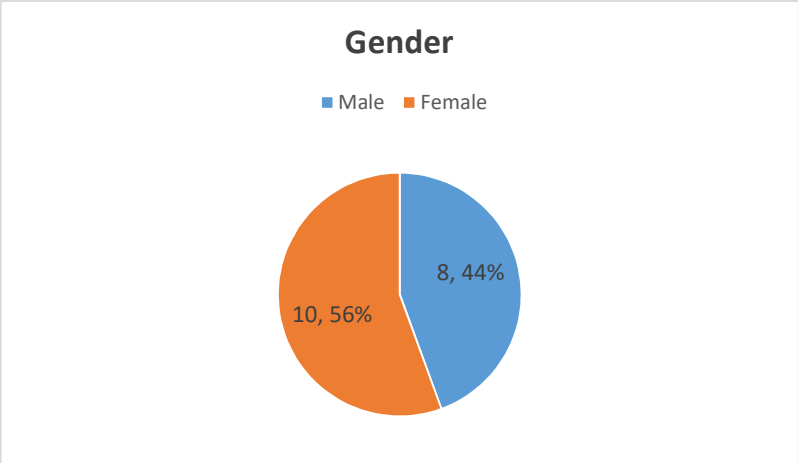


Figure 2 Respondents gender

Respondent's Age as per the Last Birthday.

The highest number of respondents at 44% were between 26 Years to 35 and 33% were 36 Years to 45 Years followed at 18 to 25 year old persons. Very few respondents were 46 to 55 and 56 to 65 occupied 6%. This is because most of the people living in urban areas are the youth who migrate to towns for employment.

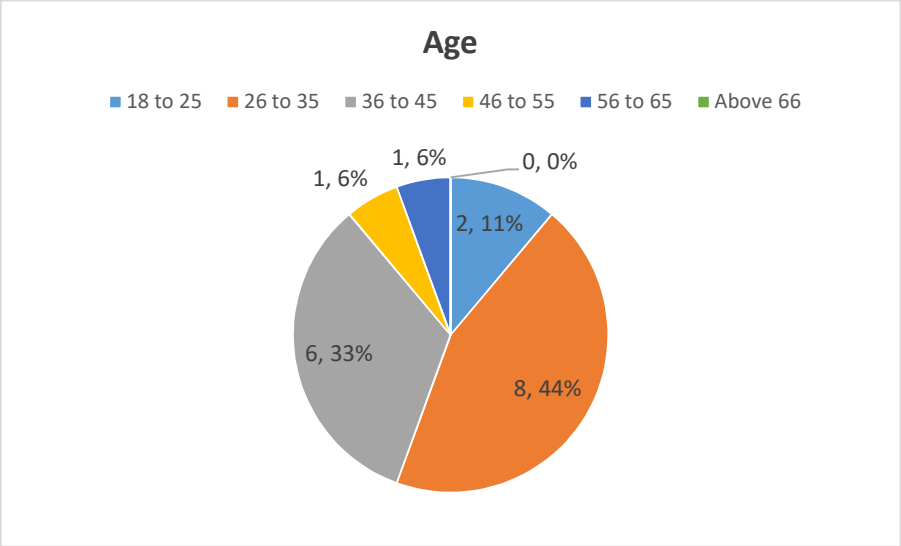


Figure 3 Age of respondents

Household Members

Adults

Most respondents' households (94%) have below 5 adult members and 6% have between 5 to 10.

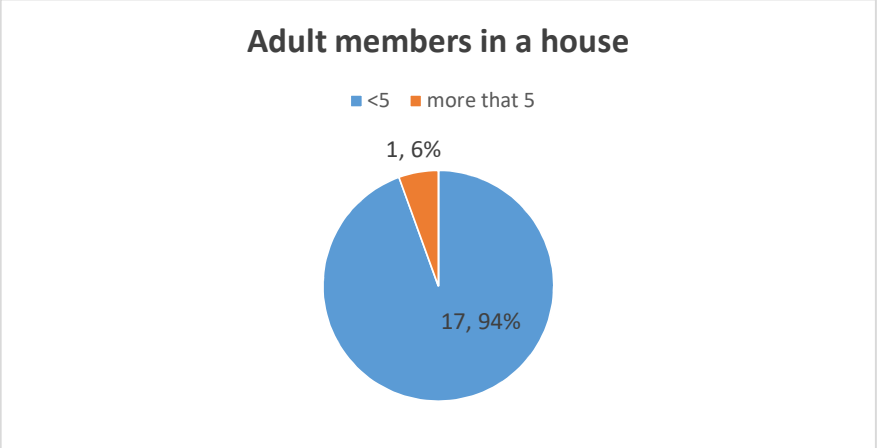


Figure 4 Adult members in a household

Household members (children).

89% of the respondents have less than 5 adults in their households while 11% have more than 5 adults. This could be due to the prevalence of a youthful population who have young families. This average concurs with KNBS report

2019 that indicates that the average number of members in a Kenyan households is 3.9.

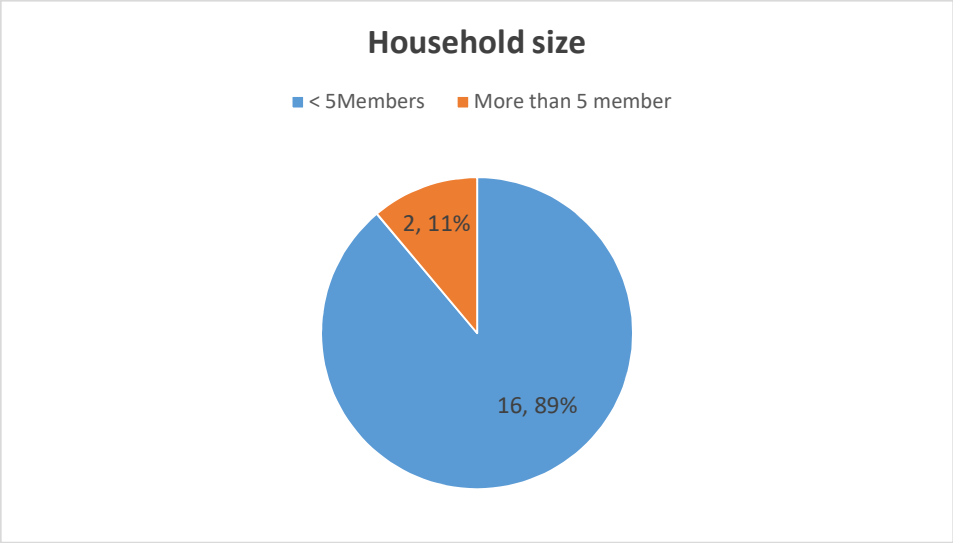


Figure 5 Number of Children in a Household

4.8 Formal education

In this study, 94% of the sampled respondents can read and write. According to the 2019 Kenya Population and Housing Census, Kenya's overall literacy rate for individuals aged 15 and above was approximately 83%. However, the Nanyuki area is an urban area with accessible educational facilities making the literacy levels high.

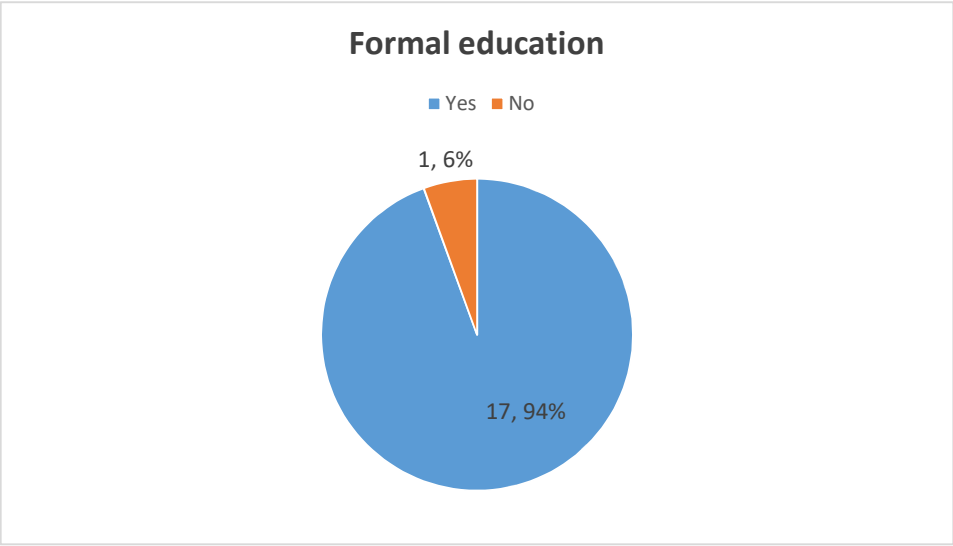


Figure 6 Respondents who have formal education

4.9 Occupation and Sources of Livelihood

4.9.1 Socio-economic activities

Twenty six (26%) of the respondents are in Business/Trading, 21% are in construction industry, followed by casual labourers (21%)and teaching at 12% and motorcycle (boda boda) at 11% among others.

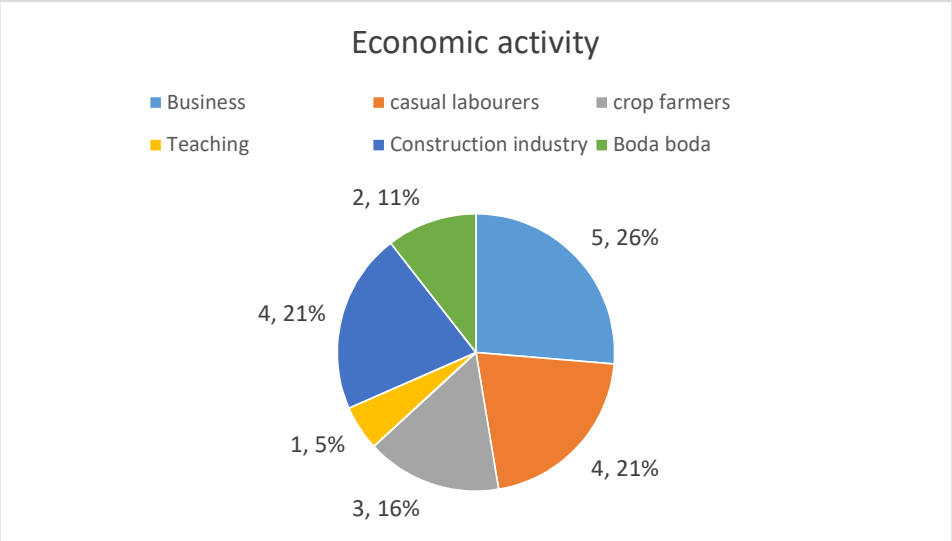


Figure 7 Socio-economic activities

4.9.2 Household Incomes when all sources are considered

The study revealed an average income of Ksh 15,000. The income levels reflect the community's social economic activities with most of the respondents (56%) falling under the category of those who earn less than Ksh 20,000; followed by 20,000 to 50,000 at 39% less than 50,000 and 100000 followed at 5% . There were no respondents who indicated they earn KSh 100,001 to 250,000 .

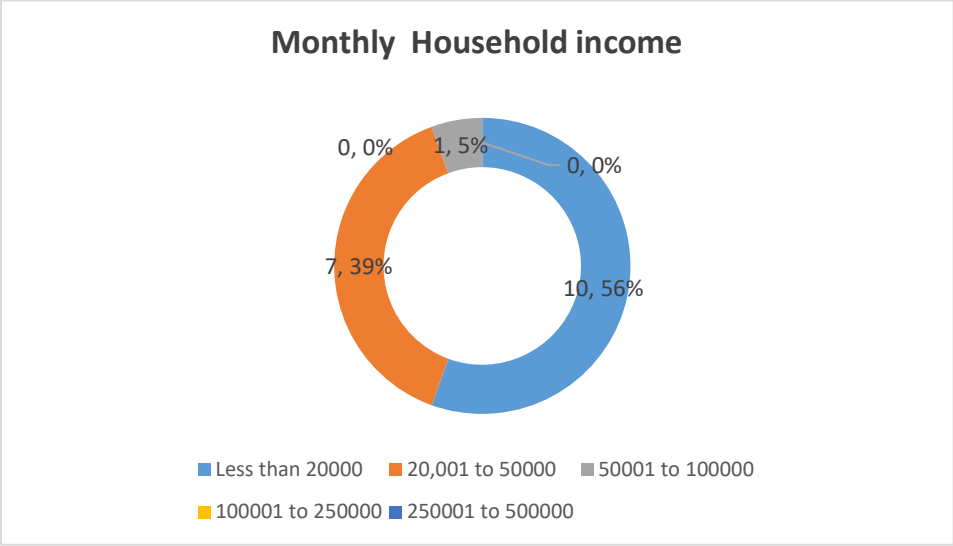


Figure 8 Household Incomes from all Economic Activities

4.9.3 Monthly expenditure

In this study, most (39%) of the respondent's monthly expenditure falls under the Ksh 10,001 to 15,000 and 5000 to 10,00 and 15,000 and 20,000at 22% category. This agrees with the income levels of the community bearing in mind most of the respondents are in the informal sector.

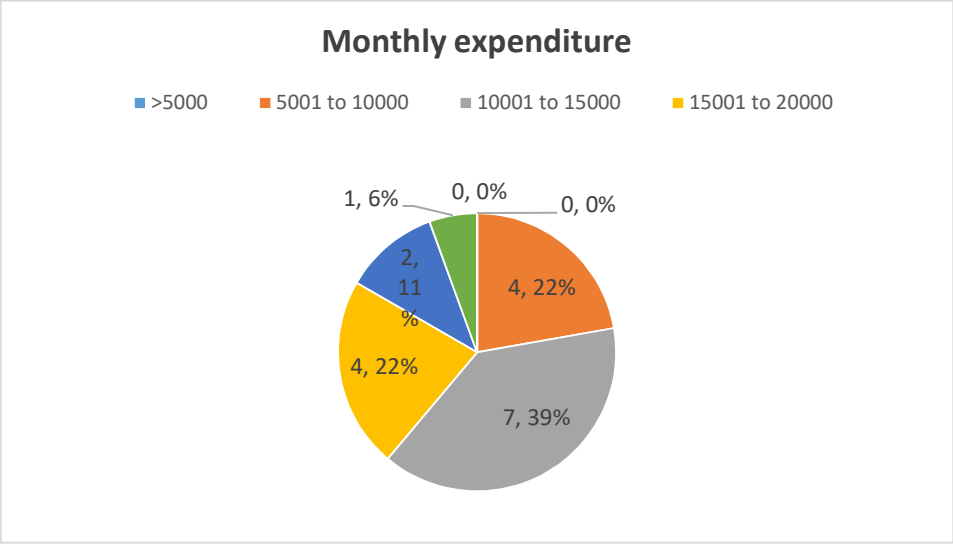


Figure 9 Monthly Expenditure

4.9.4 Major Types Of Household Expenditure

On being asked about the major types of household expenditure 100% of them mentioned food, 21% medical expenses, 19% water, 15% school fees among others. This means that buying water is putting a financial strain on the community members.

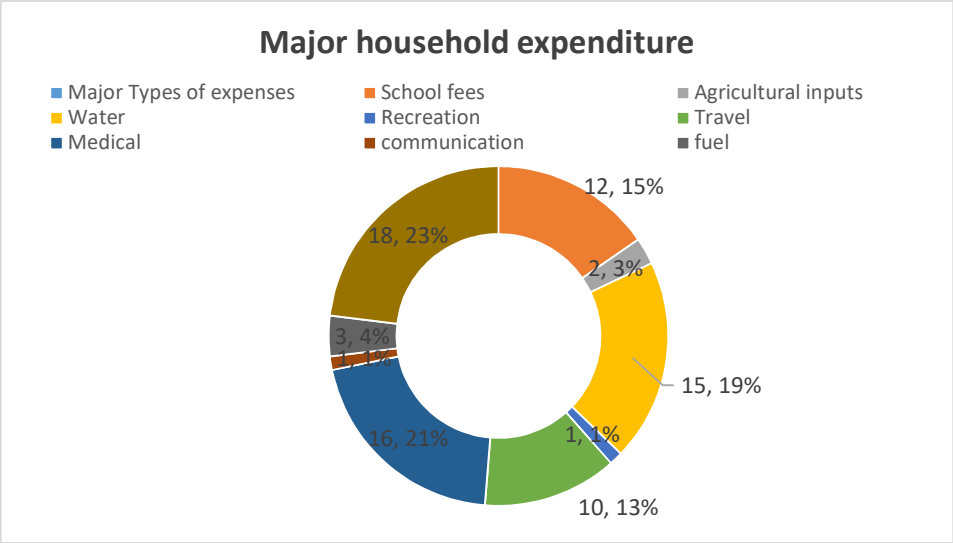


Figure 10 Types of Household Expenditure

4.10 Housing

4.10.1 Length of stay in the current area

Most (34%) of the respondents have lived in the area for 6 to 12months, 33% between 1-5 years, 22% for 6 to 12 months and 11% for 5 – 10 year and more than 10 Years. This trend agrees with the the pattern found for people living in urban areas where most don't stay for long if the necessary facilities lack or if they have to migrate for job related purposes.

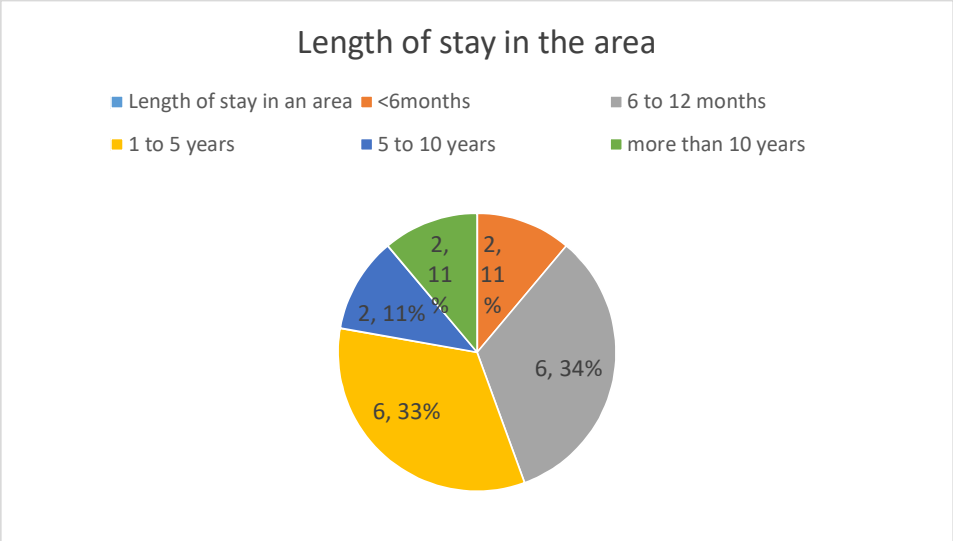


Figure 11 Length of stay in the current area

4.10.2 House Ownership

In the project area, there was almost an equal number of tenants and landlords/landladies. This ownership pattern suggests a population likely to be receptive to long-term infrastructure improvements.

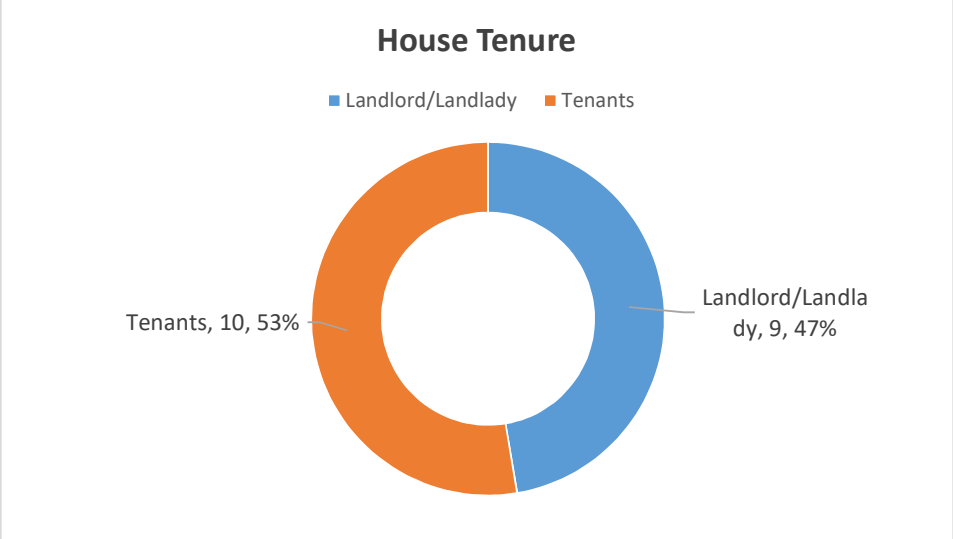


Figure 12 House Tenure

4.11 ENERGY

4.11.1 Energy Sources for Cooking,

Majority (27%) of the respondents use firewood and charcoal, 22% use charcoal, 21% kerosene and 14% Gas/LPG,

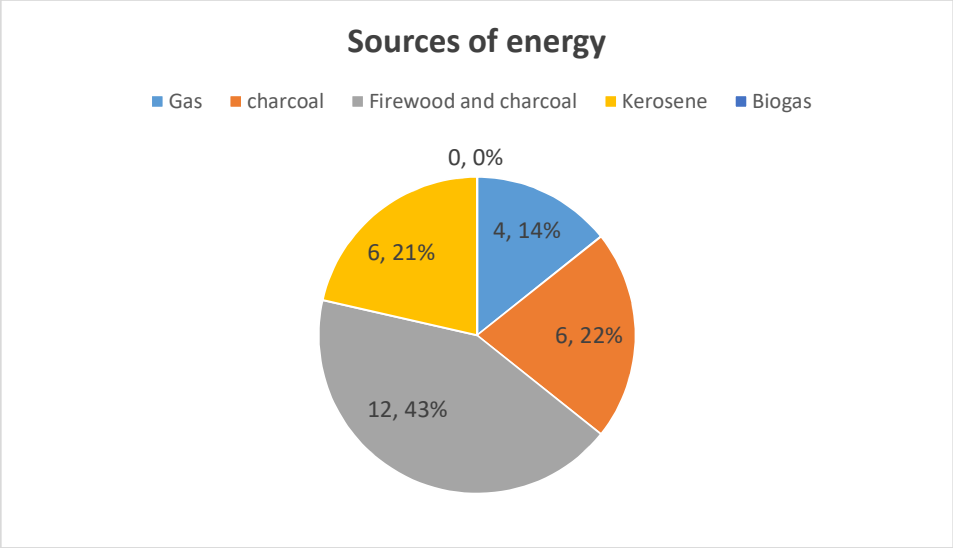


Figure 13 Energy Sources for Cooking,

4.12 Health

4.12.1 Common Water Borne Diseases

The common waterborne diseases experienced in the household over the last year at the time of study were assessed,53% reported amoeba, 39% of the respondents had suffered from amoeba, 33% Typhoid and 10%. These incidences may be due to water scarcity or consuming water that is not safe for human use.

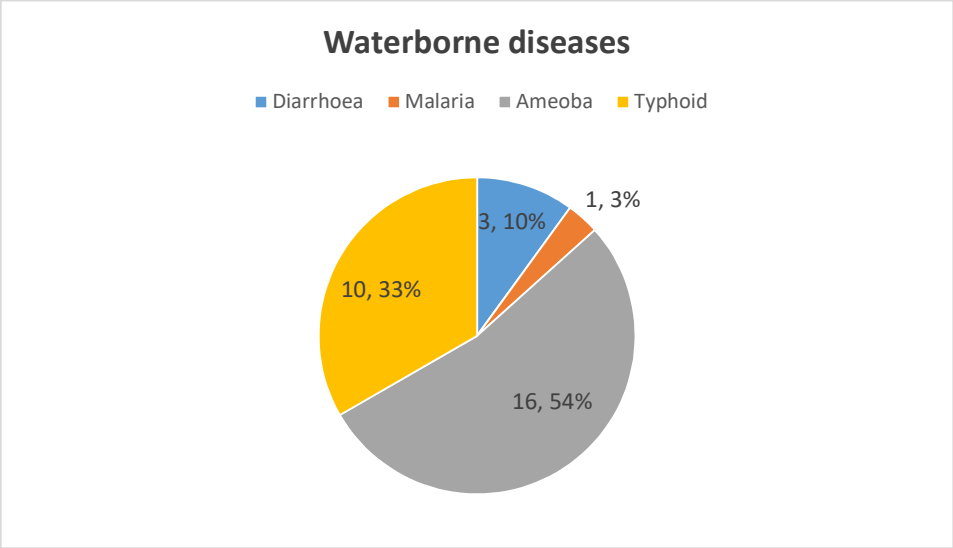


Figure 14 Common Water Borne Diseases

4.13 Water Access, Facilities and Sanitation

4.13.1 Sources of drinking water

Many (44%) respondents use borehole water, 22% taps outside their house and taps outside the house and only 6% have a tap inside the house.

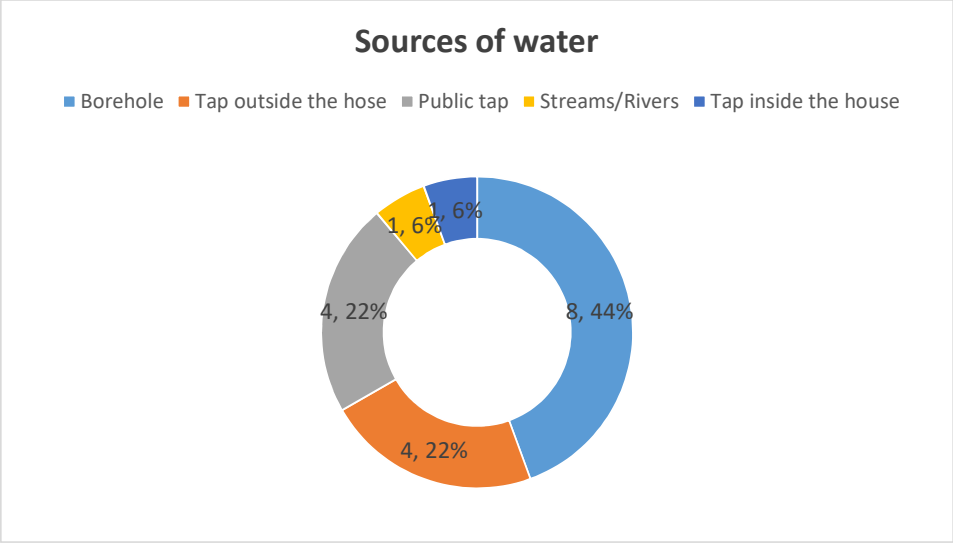


Figure 15 Sources of drinking water

4.13.2 Respondents preferred water source

Majority (49%) of the respondents preferred to use a tap inside their house and 24% preferred a tap outside their house and 6% preferred a pump/borehole. The lowest preference was for rivers and streams and commercial water vendors.

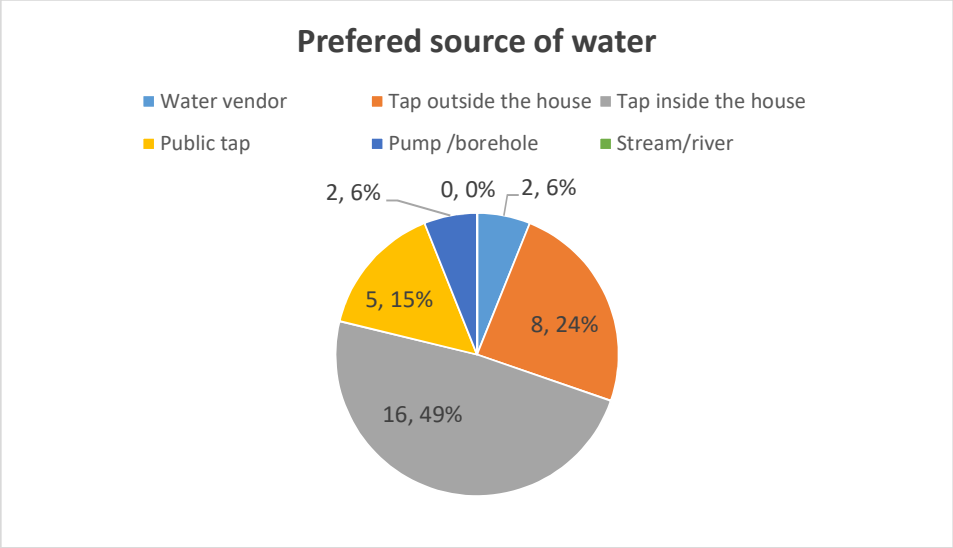


Figure 16 Preferred source of water

4.13.3 Nearest source of water for drinking

Majority (88%) of the respondents travel for less than 1km to fetch water and 6% travel between 1km – 5km. And 6% for more than 5km.

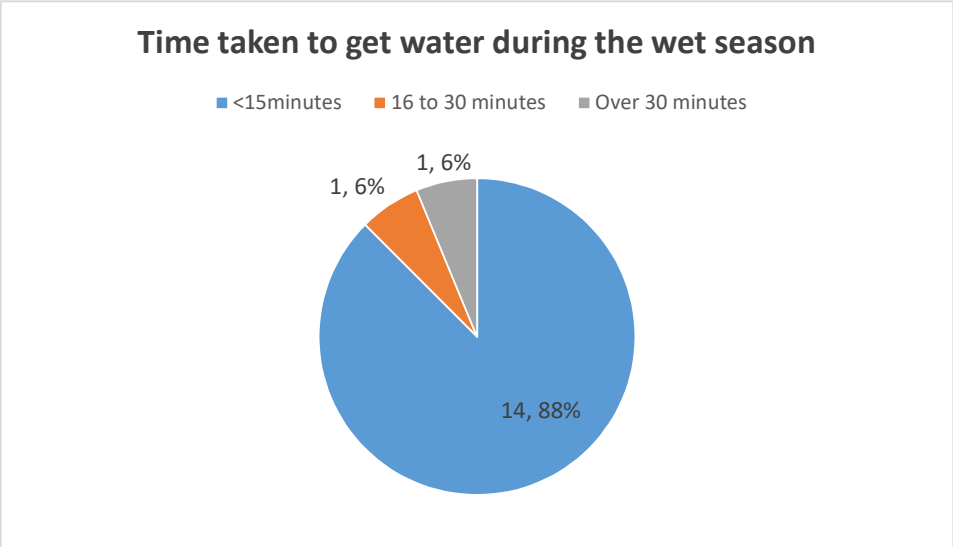


Figure 17 Distance Travelled in search of Water

4.13.4 Time taken to water source during the wet season

88 % of the respondents travel for less than 5km and 12% for more than 5km to to the nearest water source during the wet season indicating that water scarcity issues are not severe in the wet season.

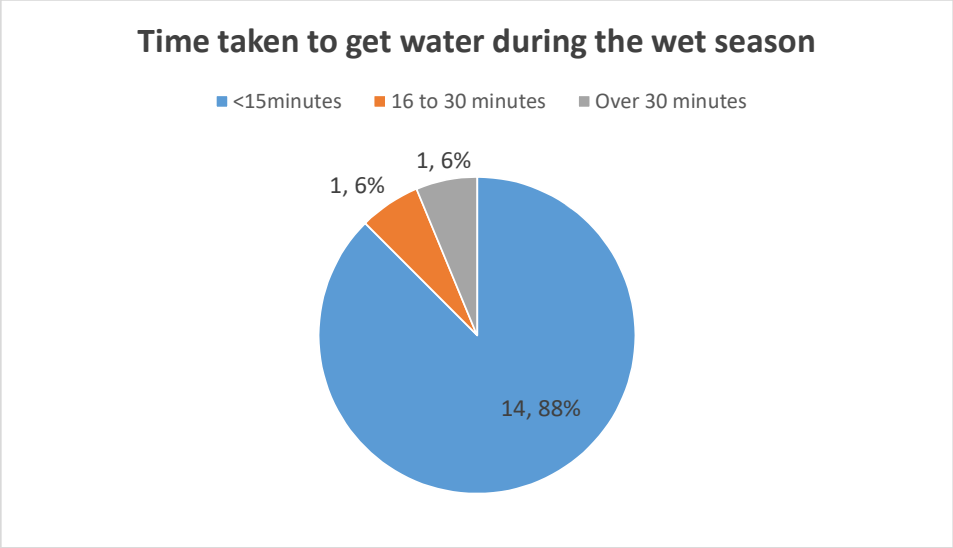


Figure 18 Time taken to water source during the wet season

4.13.5 Time taken to water source during the dry season

During the dry season ,67% of the respondents travel for 16 – 30 minutes to the nearest water source, 17% for 1 to 15 minutes, 11%% for 31 minutes to 1 hour and 5% more than 1 hour. This indicates that the gathering effort for water increases in the dry season as some of the sources dry up and rationing sets in.

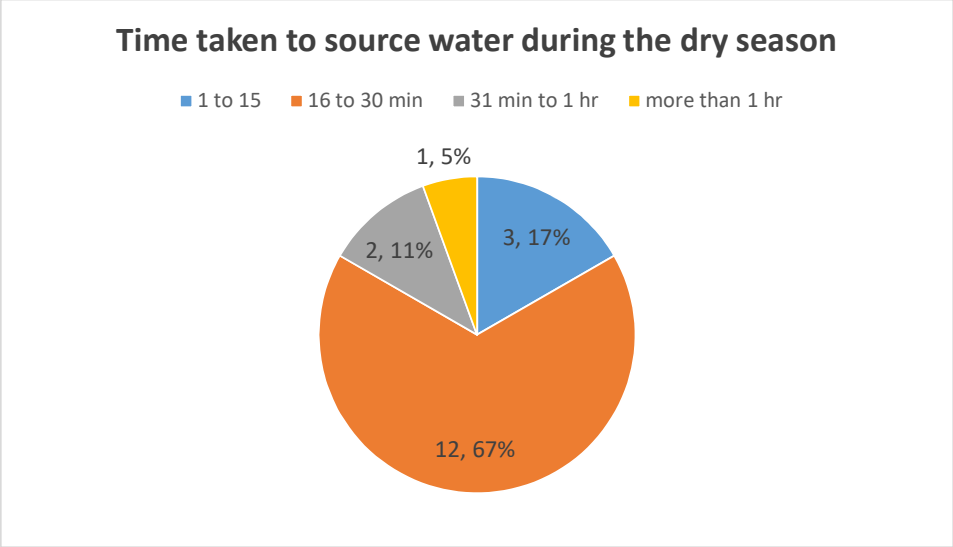


Figure 19 Time taken to water source during the dry season

4.13.6 Quantity of Water Used in Households

Majority (78%) of the respondents use 1 to 100 litres per day, 11% use 101 litres – 200 litres, 6% use 201 litres – 300 litres and only 5% use above 301 litres.

With an average of 3.9 persons per household,a single household needs about 390 Litres per day. The amount of water in use is below WHO and UN guidelines. WHO (2003) recommends a minimum of 50 liters per person per day to ensure basic needs such as drinking, cooking, and personal hygiene are met. This amount is considered essential for maintaining good health and sanitation (Domestic Water Quantity, Service Level and Health." WHO, 2003: The United Nations (UN) in a document titled 'The Right to Water." UN, 2010 recommend 50 l to 100 l per person per day.

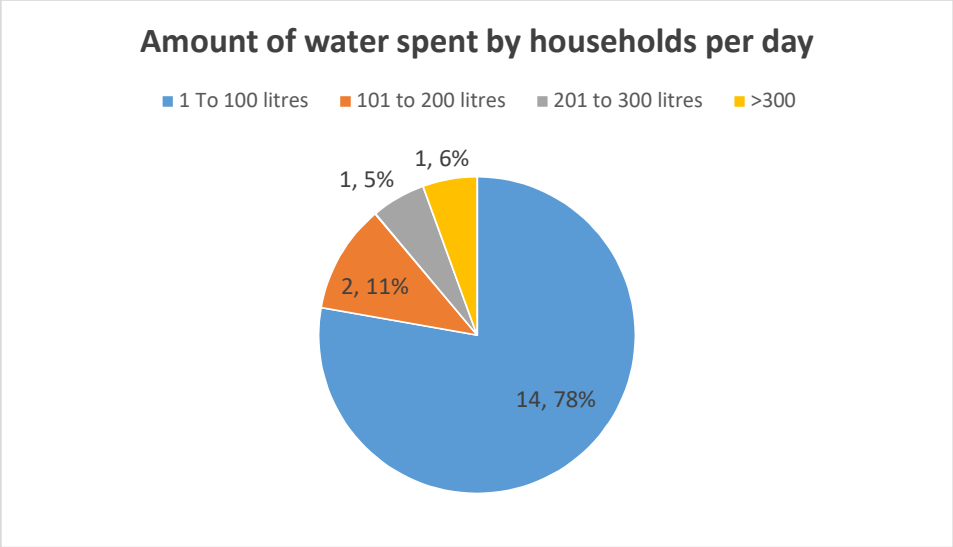


Figure 20 Quantity of water used in Households

4.13.7 Households using Water from Nanyuki Water and Sewerage Company

Majority (89%)of the respondents get their water from Nanyuki Water and Sewerage Company with no other source unless they buy from vendors. With the high water demand and low supply experienced, this project will be a game changer in the area.

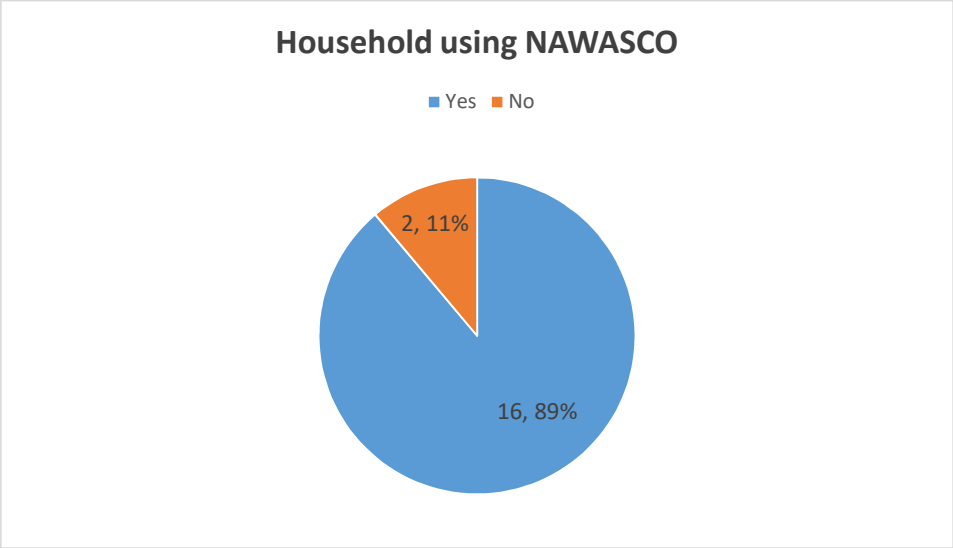


Figure 21 Households using Water from Nanyuki Water and Sewerage Company

4.13.8 Payment for the WSP water you consumed

All the 96% the respondents pay for the WSP water they consume and 4% buy from commercial vendors throughout the seasons. This shows a high dependence on water from NAWASCO.

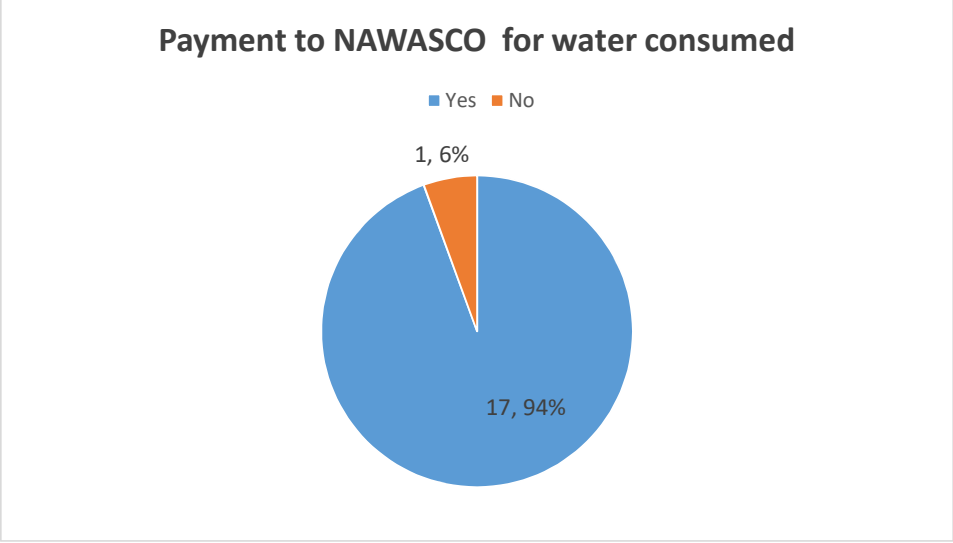


Figure 22 Payment for the WSP water you consumed

4.13.9 WSP Monthly Bills to Consumers

Majority 50% of the respondents pay ksh 100 to 500, 31% 500 to 1000, 29% pay Ksh100 to 500 monthly for the water they consume, 13% 1000 t0 1500

and 6% pay ksh 1501 – 2000. The WSP water is relatively cheap since the acceptable water tariffs are applied. From focus group discussions, the cost of water per 20 litre container is Ksh 50 thus on average a household using 100 litres per day would pay Ksh 250 per day.

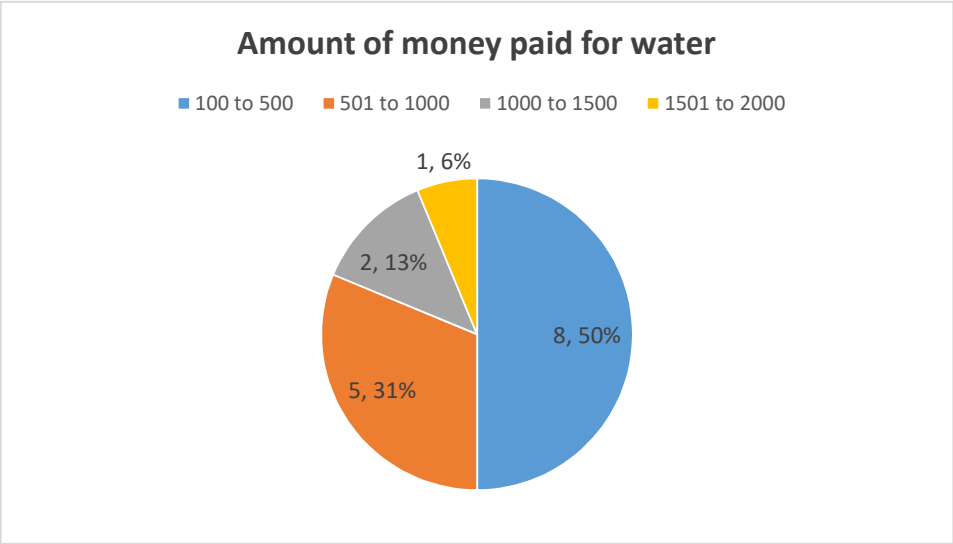


Figure 23 WSP Monthly Bills to Consumers

Satisfaction with the current water supply in the area 61% are satisfied and 22% are highly satisfied while 6% were non committal. This means that improvement of the water service will lead to a highly satisfied clientele. Te reason stated for dissatisfaction was water rationing and low pressure.

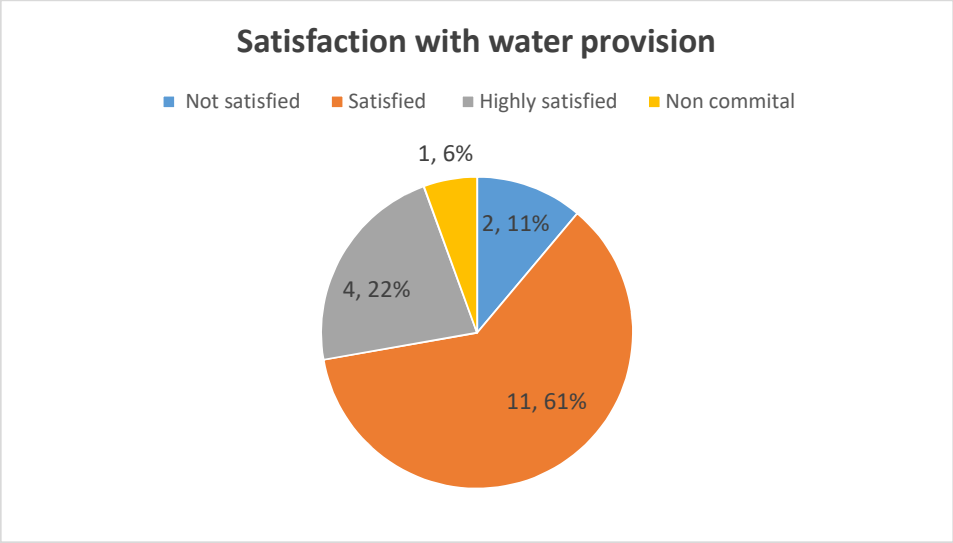


Figure 24 Satisfaction with the current water supply in the area

4.13.10 Change or improvement of the current water supply

Majority (67%) of the respondents want the water supply changed. The 33% who would not want the water supply to be changed are maybe those who indicated that they were satisfied or highly satisfied with the current water supply.

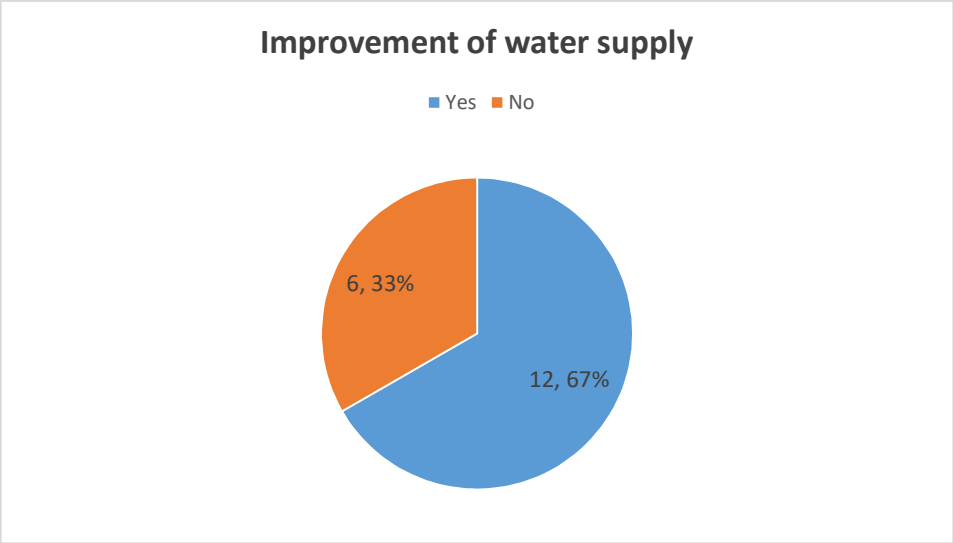


Figure 25 Change or improvement of the current water supply

4.13.11 Willingness to pay for improved water services

Majority (83%) of the respondents are willing to pay for improved water services. The 17% not willing to pay for the service may be the ones who are very satisfied or satisfied with the current water supply.

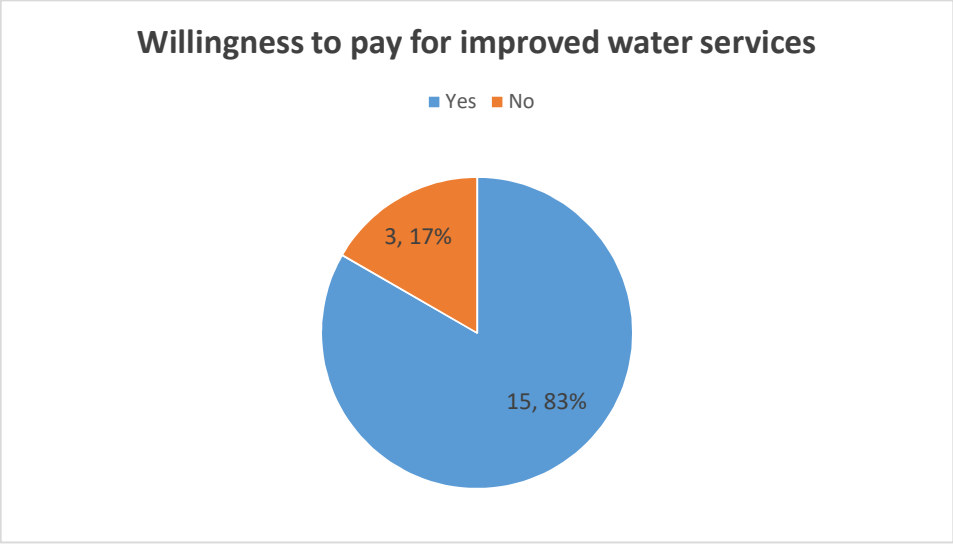


Figure 26 Willingness to pay for improved water services

4.14 Water and Gender Issues

4.14.1 Responsibility of fetching water in a household

Majority (33%) of respondents indicated that adult women are responsible for fetching water in most of the households and followed by the boy child and hired help in second place (24%) and (14%) girl child at 9% and adult men at 5% .

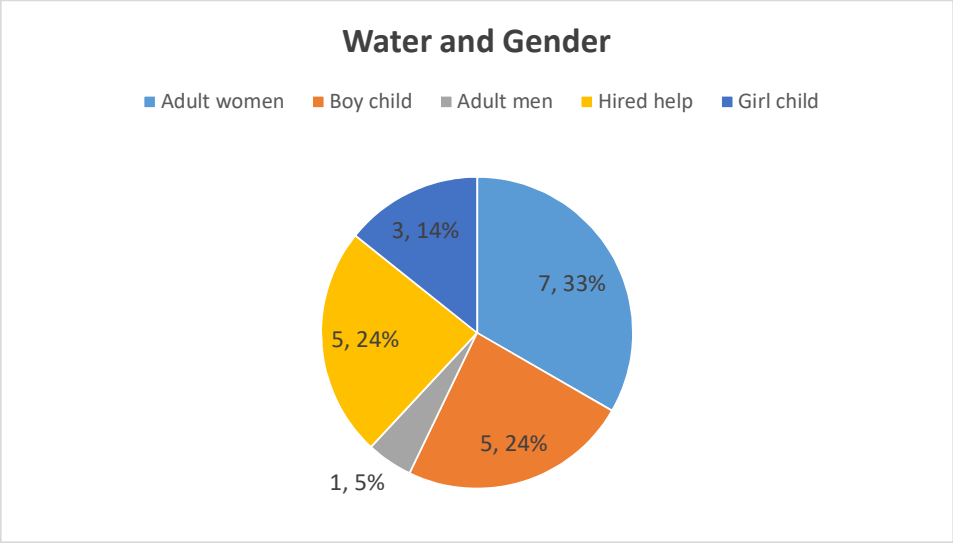


Figure 27 Water fetching and gender

4.14.2 Non Governmental Organisations (NGOs)Working in the Area

The NGOs working in the area include:

- ✓ Caritas: Caritas is a global confederation of Catholic Institutions working in humanitarian emergencies and towards the betterment and fullness of life for the marginalized in the community.
- ✓ Habitat for Humanity: Habitat for Humanity works by providing sustainable, safe and decent homes to vulnerable families.
- ✓ Kenya Red Cross: Red cross works during and after disasters and health emergencies to meet the needs and improve the lives of vulnerable people.

4.14.3 Social and cultural values

Most of the respondents (83%) indicated that there is a site associated with religion. The ritual ground mentioned is near River Nanyuki where there is a huge Mugumo tree (*Ficus thonningii*) a sacred/revered tree among the Kikuyu community. However, where the tree stands is on the banks of the river and the project will not at all interfere with the tree. 14% indicated that there are ritual grounds and 3% graves. The respondents indicated that male circumcision was the most conducted ceremony in the community.

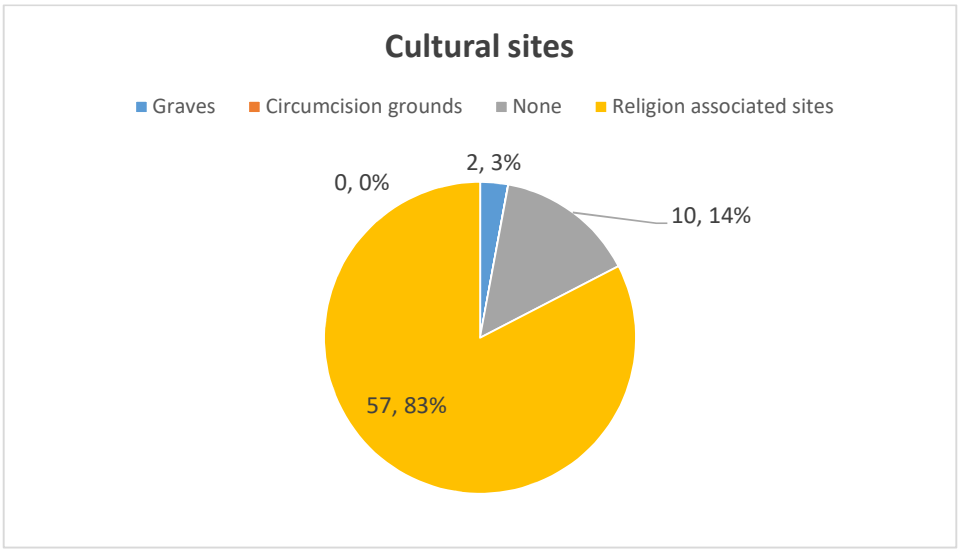


Figure 28 Cultural sites

4.15 ENVIRONMENTAL ISSUES

4.16 Environmental problems

93% of the respondents mentioned climate change as the leading and 73% poor waste disposal,poor drainage, drying of rivers and deforestation among others.

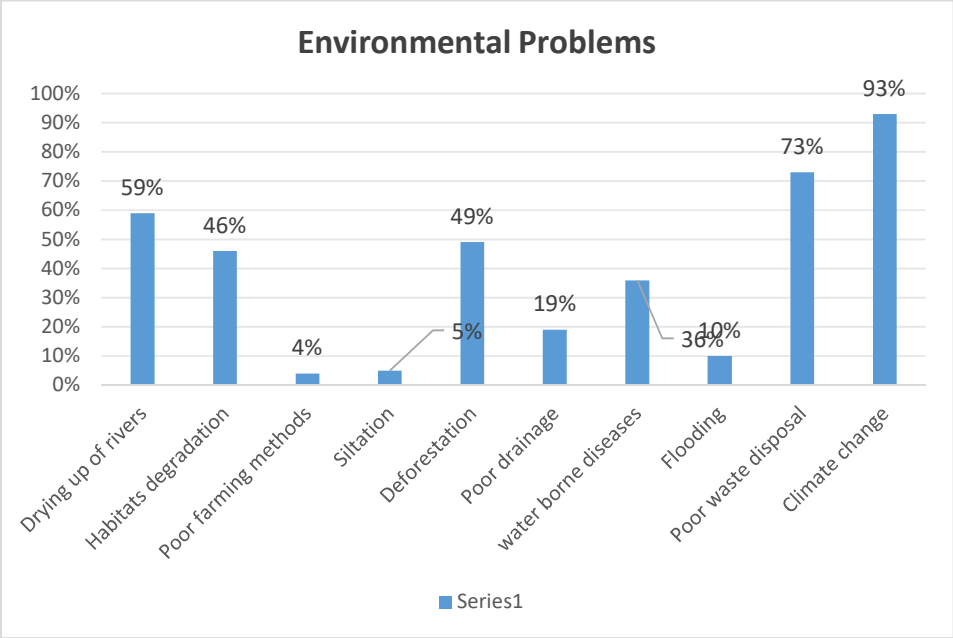


Figure 29 Environmental Challenges in the area

4.16.1 Mitigation of environmental problems

The community respondents mentioned that improving access to water (28%) is key to mitigating environmental problems. Others included: public education (24%), reforestation (24%) and heavy penalties on polluters among others.

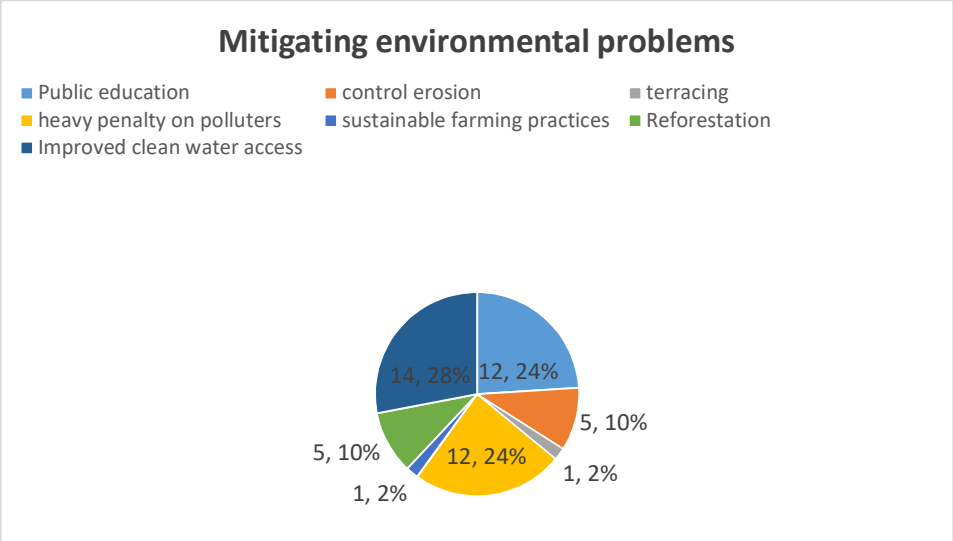


Figure 30 Mitigation of environmental problems

4.17 Flora and fauna of the project area

4.17.1 Common tree species

A transect walk around the pipe sites revealed a highly modified biological environment. The area had no forests or large pockets of natural vegetation. However, the scattered indigenous trees and shrubs were a characteristic of a dry Savannah vegetation. Urbanisation and human settlements have led to destruction and wiping out of the natural vegetation, However scattered trees and shrubs that exist include both exotic and endemic species that include: Acacia (*Acacia drepanolobium* (Gall acacia), *Acacia mellifera*, *Acacia nilotica*, *Acacia senegal*, *Acacia tortilis* and *Acacia xanthophloea*), Blue gum (*Eucalyptus globulus* (blue gum) and *Eucalyptus saligna* (Sydney blue gum), Avocado (*Persea americana*), Silky oak Grevillea *robusta*, Casuarina/Australian pine/whistling pine (*Casuarina equisetifolia*) , Bottom brush (*Syzygium guineense*), lemon bottle brush (*Callistemon citrinus*) Cypress, Kei apple (*Dovyalis caffra*), guava (P*sidium guajava*) and (*Cupressus lusitanica*).

4.18 Notable sensitive habitats within the area

Majority of the respondents (89%)indicated that there are no sensitive habitats, 6% sloppy lands and 5% gave sites as the most notable sensitive habitats.

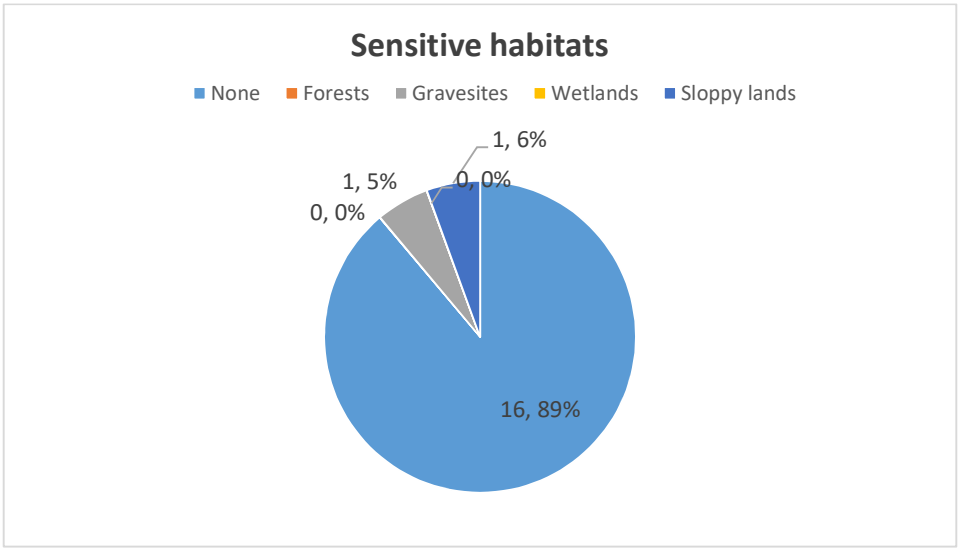


Figure 31 Sensitive habitats

Land Tenure System

Majority of the respondents (78%) are under Private Land (Freehold), 17% are under Private Land (Leasehold) and 6% are under Trust land.

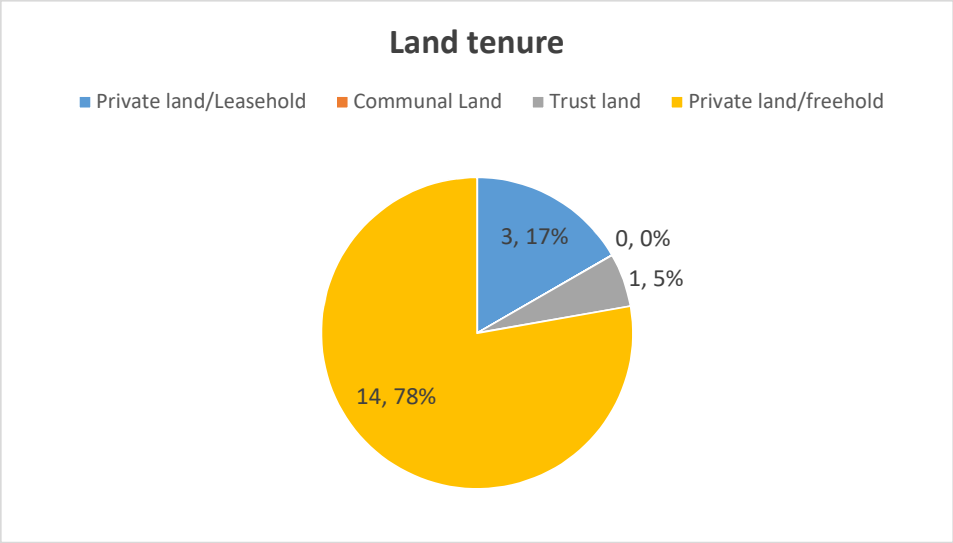


Figure 32 Land tenure

4.19 The Proposed Water Project

4.19.1 Awareness of the proposed Nanyuki Water Service Providers project

Majority (94%) of the respondents sampled in households were aware of the proposed Kilimo pipes rehabilitation project. However during the barazas, the awareness level by the community was noted to be high.

The situation with the Key Informants sampled during this project was different since most were not aware of the proposed project. Sensitisation on the same should be intentionally undertaken by NAWASCO.

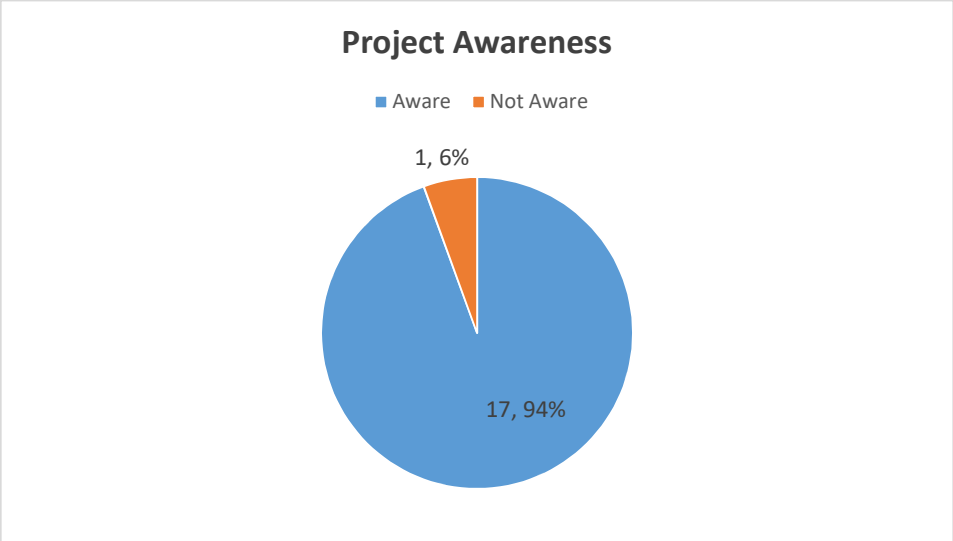


Figure 33 Project Awareness

Source of project information

Most information about the project was relayed to the community through NAWASCO 56%, village barazas (39%) and radio (3%).

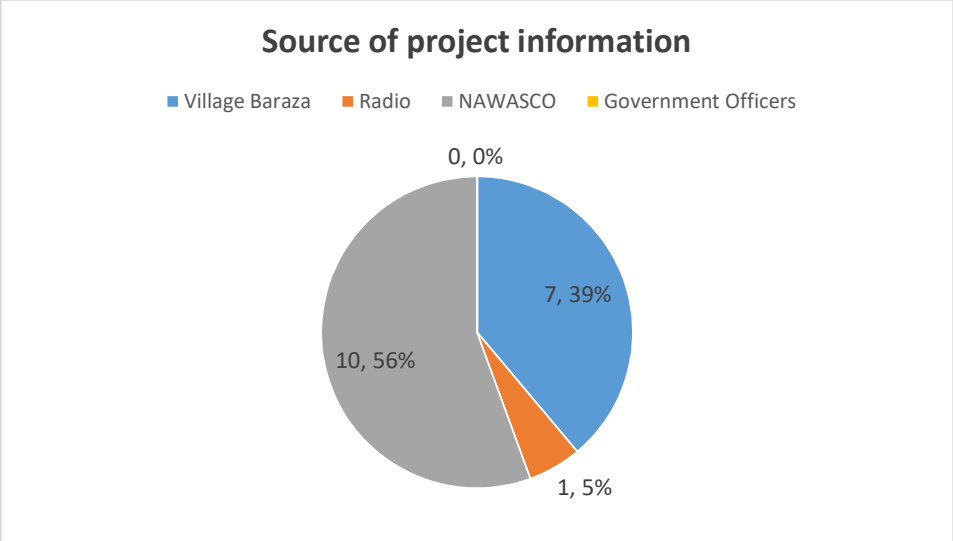


Figure 34 Source of information

4.19.2 Community support for the proposed project

During Household surveys, 94% of the respondents indicated that they would like such a project in their area and only 6% said no but no one strongly said they would not like such a project. The ones who said they wouldn't like the

project was because they don't own the land. During the baraza held at the project sites, 100% of the attendees were supportive of the project.

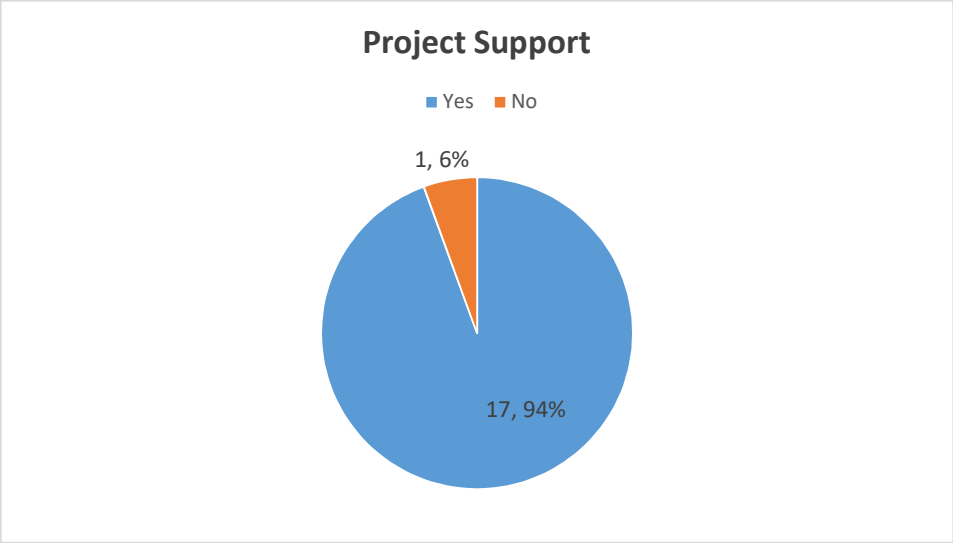


Figure 35 ***Community support for the project***

4.19.3 Project financing

The respondents indicated that both donors and government (34%) , NAWASCO (27) and community 5% should be the key financiers of the project.

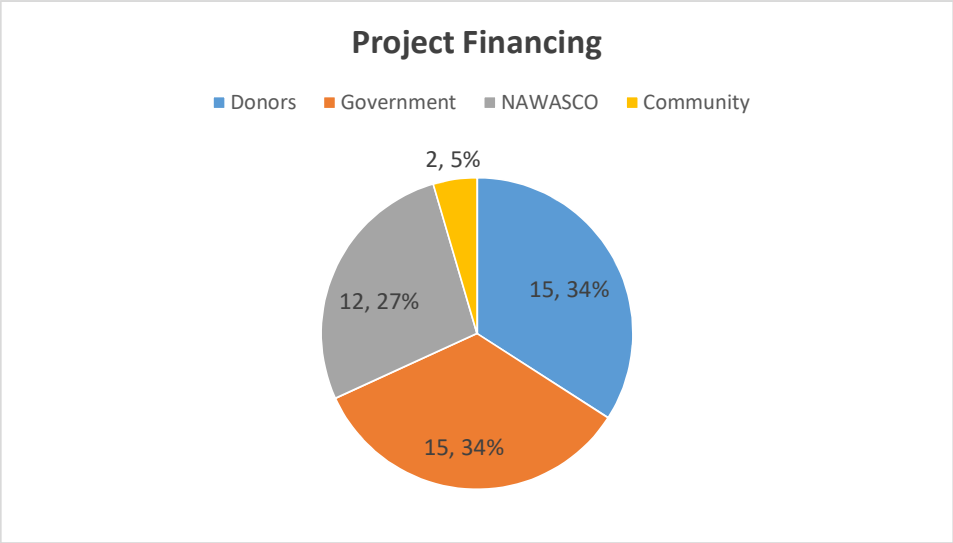


Figure 36 Project Financing

4.19.4 Benefits Anticipated from the project

Key benefits include:improved water supply efficiency (26%), The provision of safe drinking water and kitchen gardening (20%), reduced waterborne diseases (17%) and improvement of hygiene standards (14%) are the major benefits anticipated from the proposed project.

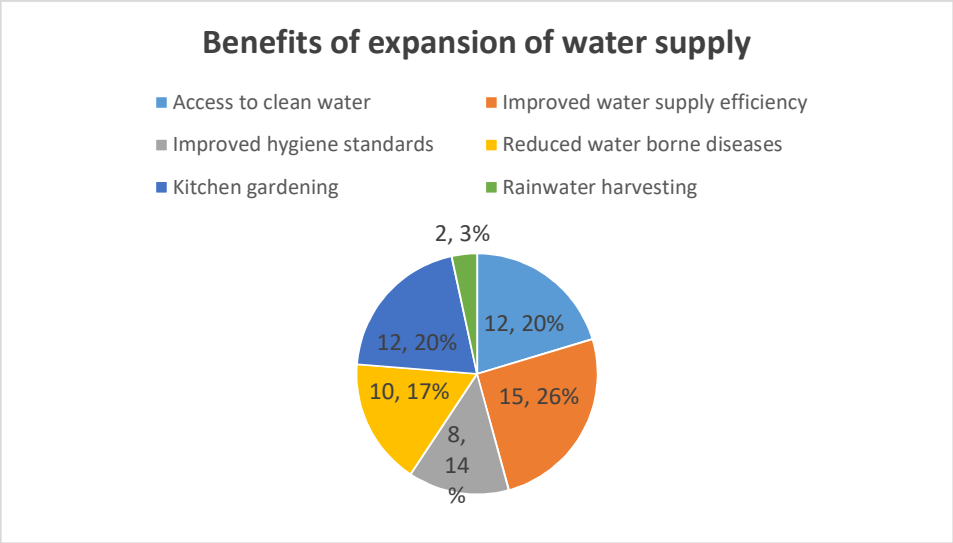


Figure 37 Benefits of the proposed Kilimo teachers project

4.20 Environmental problems anticipated from the proposed project

Some of the key environmental problems anticipated include dust generation, noise and vibration and drying up of rives. Other minor ones included: devegetation, soil degradation and water pollution among others.

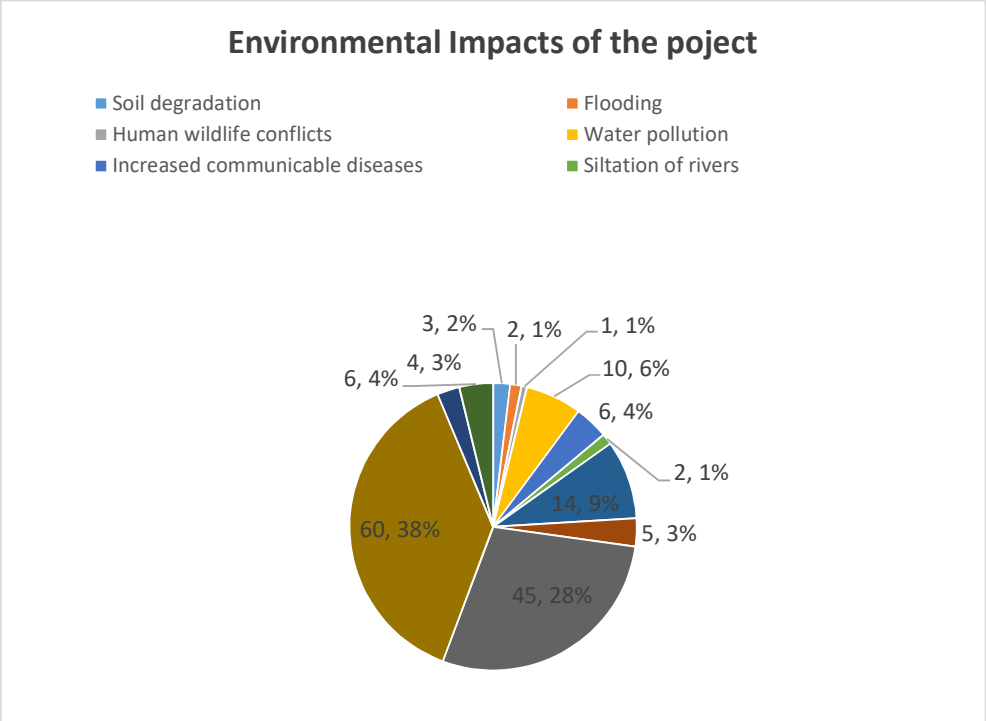


Figure 38 Anticipated negative environmental impacts

Mitigation of the anticipated environmental problems emanating from the proposed project:

The respondents indicated that the stated environmental problems can be mitigated through:

- Construction of soil conservation structures such as terraces and gabions to curb soil erosion
- Reforestation
- Agroforestry
- Building trenches to help with water drainage
- Treating the water before distributing it to consumers.

4.21 Social problems anticipated from the proposed project

Majority (26%), of the respondents indicated that corruption may be a major problem especially during construction of the project. Others included human conflicts over water distribution, loss of aesthetic value of land, increased insecurity and cultural erosion.

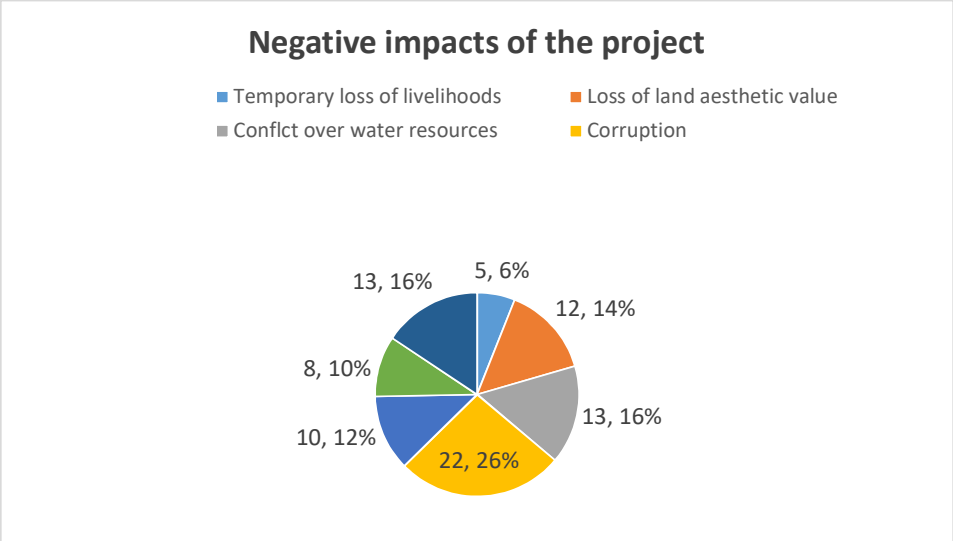


Figure 39 Social problems anticipated from the project

4.22 Gender Analysis

4.22.1 Women and girls

- ✓ Domestic chores such as fetching water from the river, boreholes and springs are mainly done by women;
- ✓ Women have been subjected to gender based violence when they take long to come with or without the water they had gone to fetch;
- ✓ Rape cases and child defilement as people go looking for water was mentioned as one of the problems in the areal
- ✓ There exists inequality in education attainment between men and women. When there is a water crisis, women and the boy child were mentioned as the ones who go to draw water;
- ✓ The women in the area are enlightened on public participation and were able to air their views.

4.22.2 The role of males

- ✓ Men it emerged are not key to water provision;
- ✓ Men indicated that women go to gossip when going to look for water and take long to come back and in the process fights come about;
- ✓ Men are also engaged in seasonal farm work such as digging and fencing.
- ✓ Young men also help in farm work and grazing animals

- ✓ Public participation: both men and women can freely express views in public meetings unhindered;

4.22.3 Project impacts

- ✓ Provision of domestic water nearer to residential areas will reduce distance, save on time and increase accessibility of water to women. This will afford them with time to pursue other opportunities and improve their well being;
- ✓ Better hygiene;
- ✓ Reduction of incidences of gender based violence;
- ✓ Improved health particularly in communities depending on boreholes with excess levels of salt;
- ✓ Reduction of incidences of waterborne diseases that emanate from buying water whose sources may not be safe;
- ✓ Elderly people who could not walk long distances in search of water will have easy access.

5 PUBLIC CONSULTATION AND STAKEHOLDER ENGAGEMENT

5.1 Introduction

Stakeholder engagement is a critical process in a project as it significantly influences the project's success. Stakeholders in this report refers to person (s) who has an interest or can either affect or be affected by the project. It is important to undertake effective consultation with stakeholders from the project inception to closure.

In this project, stakeholders were mapped out as either primary or secondary. They were then analysed based on their impact, level of influence, importance to the project, and contribution to the project. This helped in determining the best strategy for engaging with them. It then concludes with a summary of the feedback obtained from the stakeholders that is reviewed and incorporated in the final design, construction and operation of the project.

5.2 Objectives of Stakeholder Engagement

Stakeholder engagement has the following objectives:

- ***Inform***: Provide accurate, relevant, timely and culturally appropriate information to Project stakeholders about the Project, its impacts and benefits, and the ESIA process.
- ***Engage:*** Provide opportunities for Project stakeholders to express their opinions and concerns about the Project, and to seek broad stakeholder support for the Project and impact management
- ***Understand:*** Enable the Project team to understand the concerns and priorities of stakeholders
- ***Review***: Incorporate justified concerns and priorities into the design, construction and operation of the Project

- ***Inform (feedback):*** Provide feedback to Project stakeholders and host communities as the Project develops so that the consultation process continues.

5.3 Stakeholder Mapping

Mapping of stakeholders is an essential process that assists the expert in understanding whom they need to prioritize in their engagement. The following stakeholders have been identified as persons who will be affected by the project or who could influence the project's success. They are mapped as either:

a) **Primary Stakeholders-** Those who hold a direct interest in the proposed project
b) **Secondary Stakeholders-** Those with an indirect interest, but they can influence the project's success.

They are mapped as shown in the table below:

Table 1: Mapping of Stakeholders

Primary Stakeholders	Secondary Stakeholders
• Baraka local community • Hosting community (residents, businesses & institutions) • Nanyuki Water & Sewerage Company (NAWASCO) • Water Sector Trust Fund	County Government of Nanyuki • Department of Water, Environment & Natural Resources National Government • National Government Administration • State Department of Gender & Social Services • State Department of Early Learning & Basic Education
	• National Environment Management Authority (NEMA)

	• Water Resources Authority (WRA) • NGOs / CBOs
	Political class • MCA • Ward Administrator
	National Government Administration • County Commissioner • Chiefs and their Assistants

5.4 Stakeholder Analysis

Table 2: Analysis of project stakeholders

Stakeholder Name	Impact *(Low, Medium, High)*	Influence *(Low, Medium, High)*	What is important to the stakeholder?	How could the stakeholder contribute to the project?	How could the stakeholder block the project?	Strategy for engaging the stakeholder
Water Sector Trust Fund	High	High	Grant administration to facilitate infrastructure development	By providing funds for undertaking the project	Withdrawing financial support for the project	Regular status report, monthly reports and other deliverables
NAWASCO	High	Low	Obtaining water to supply to the public	Communicate with other stakeholders to express their	Ending their engagement with WSTF	Information and feedback meetings every 6 months

Stakeholder Name	Impact *(Low, Medium, High)*	Influence *(Low, Medium, High)*	What is important to the stakeholder?	How could the stakeholder contribute to the project?	How could the stakeholder block the project?	Strategy for engaging the stakeholder
				support for the project		
Baraka Community	High	High	Understanding how the project safeguards their safety as the host community	By sharing their concerns, opinions about the project from the design stage.	Rejecting the solarisation project	Create project awareness and provide an open communication to ensure they understand the project well. Their engagement shall be ongoing throughout the project cycle

Stakeholder Name	Impact *(Low, Medium, High)*	Influence *(Low, Medium, High)*	What is important to the stakeholder?	How could the stakeholder contribute to the project?	How could the stakeholder block the project?	Strategy for engaging the stakeholder
County Government of Nanyuki (Department of Water)	High	Low	Ensuring consistent water supply needs in the county are met.	By sharing relevant information on proposed project with the Client/Consultant. Assist in the creation of project awareness and promoting acceptance	_____	Through KII and Focused Group Discussions. Consultant sharing their findings with the County.
NEMA	High	High	Adequate Environmental and	By availing the ESIA report for	By not issuing EIA License	Providing ESIA Report and all other

Stakeholder Name	Impact *(Low, Medium, High)*	Influence *(Low, Medium, High)*	What is important to the stakeholder?	How could the stakeholder contribute to the project?	How could the stakeholder block the project?	Strategy for engaging the stakeholder
			Social Impact Assessment is undertaken before the project construction	review and licensing		necessary documentation regarding the project for review
WRA	High	High	Proper management and use of water resources	By sharing relevant information of the water resources that will be affected by the project.	By not issuing permits required for water abstraction	Consulting with the stakeholder during the design stage and providing the relevant reports needed for issuing of permits.

Stakeholder Name	Impact *(Low, Medium, High)*	Influence *(Low, Medium, High)*	What is important to the stakeholder?	How could the stakeholder contribute to the project?	How could the stakeholder block the project?	Strategy for engaging the stakeholder
Politicians (MCA, Ward Administrators, MP etc.)	Low	High	The residents within their area of jurisdiction access and enjoy amenities like water	Creating awareness about the project in order to obtain support and project acceptance	Inciting residents against the project	Involving them in focused group discussions and public stakeholder meetings
Local Administration (CC, DCC, ACC, Chiefs & Assistant Chiefs)	Low	High	Law and order are adhered to during the project implementation phases	Help in organization of local meetings, sharing relevant information about the project area, assist in identifying		Involving them in KII, focused group discussions and public stakeholder meetings. Communicating all findings during each step of the project.

Stakeholder Name	Impact *(Low, Medium, High)*	Influence *(Low, Medium, High)*	What is important to the stakeholder?	How could the stakeholder contribute to the project?	How could the stakeholder block the project?	Strategy for engaging the stakeholder
				the affected land owners, Help in resolution of any complaints that may arise during the project implementation phase.		Head the Grievance Redress committee once they are set up

5.5 Stakeholder Engagement Approach

Stakeholder engagement process is a crucial process in the undertaking of any project. The interaction is aimed at creating awareness, obtaining their views/opinions and concerns about the project.

Table 3: Methodology adopted in Stakeholder Engagement

Technique	Target Group	Objective	Date Undertaken
Key Stakeholder Interviews	Secondary Stakeholders County Government of Nanyuki Department of Water, Environment & Natural Resources National Government National Government Administration State Department of Gender & Social Services State Department of Early Learning & Basic Education	• To create awareness about the project • To obtain their views regarding the project	12/6/2024 to 13/6/2024 & 26th to 28th August
Household Surveys	• Residents within the project area	• To understand the socio-economic status of the affected communities	12/6/2024-14/6/2024

Focused Group Discussion	Key stakeholders	•To obtain their input on the proposed design	13/6/2024 28/8/2024

5.6 Household Survey

The household survey was done through questionnaire administration targeting project beneficiaries in the identified borehole sites. The consultant used a sample of 5% of the targeted population. According to Cochran (1977), a sample size of 5% is satisfactory provided it is truly representative of the whole. This representation is achieved through random or stratified sampling techniques hence reflecting the diversity and characteristics of the entire population. Kothari (2004) argues that if the sample is random and large enough approximately 5% of the total population it can still provide reliable estimates and valid inferences about the population parameters. Household survey respondents at Baraka were 18

Registered water connections	5% of the recipients	Total household respondents
314	16	18

5.7 Public Baraza

The Consultant undertook public participation through focused group discussions and public barazas 12/6/2024 to 13/6/2024 to create awareness and solicit views and opinions on the proposed project. The meetings targeted NAWASCO, local administration and host community and had 52 persons attending. The Consultant provided a brief of the project Scope, upcoming field activities then had a question and answer forum with the attendees. They are all supportive of the project as lack of water is a critical issue in the area. However, they had concerns that are summarised below. The minutes of the meetings are attached in the Appendix 10.4.



NAWASCO staff take the community through the project and community raise their hands in support of the project

Photo 2 Community Meeting at Baraka

COMMUNITY CONCERNS

The following concerns were raised by the community and the consultant respondent to the question. However, some of the questions were directed to the client and the client respondent to them.

Concern/Question	Response by Consultant/Client
What happens when the weather is not sunny and the solar power goes off?	Electricity from Kenya power supply of will still be retained for such seasons. Inverters will also be fixed so as to interchange solar power and electricity during such moments.
Will the current water tank be enough for water storage ?	Members of the community were advised to install water tanks for storage when water is available
How will the issues of high salt concentration in the boreholes be addressed ?	Treatment of water will be taking place and salty water will only be used during periods when the water levels are low
The current water bills are exaggerated yet the water supply has been infrequent. Who addresses the water bills?	The staff from the water department asked the community to attend a planned meeting and air their concerns to the desk officers who are carrying out community sensitisation on water bills and other project matters.

Who will ensure that there is security of solar panels to avoid vandalism?	The client indicated that more security guards will be employed within the project site but the community members were urged to also be responsible of the project infrastructure through the nyumba kumi initiative.
Bore hole may interfere with ground water levels (water tables)	A hydro-geological survey was done before the borehole was constructed to ascertain the water levels in the water table so as to get the place that will yield the highest amounts of water.

5.7.1 Feedback from Public during the Focused Group Discussion

A focused group discussion was conducted at the village level at Baraka dispensary and a baraza at the Sub County level (Nanyuki) to collect in depth concerns regarding the proposed project. The FGDs were disagreggated by gender to get gender specific views on the project.



Photo 3 Youth and Women FGDs at Baraka

During focus group discussions, the community raised the following:

- *Employment opportunities-* The locals should be given first priority in the available job opportunities especially during construction.

- *Scope of Water Supply Areas-* Areas that may not be reached with the water connections to the residential areas, consider putting up water kiosks at common points to boost accessibility.
- *Community safety concerns:* is a critical concern particularly among the residents living around the proposed sites.
- *Possibilities of radioactive Materials from solar cells:* The consultants assured the community that solar cells are just like the normal cells and are not associated with radioactivity.
- *Increased costs of the water tariffs:* NAWASCO confirmed to the community that the unit cost will remain the same but water supply will be improved

5.8 Key Informant Interview

Key informants were administered to institutional stakeholders using a key informant schedule from 12/6/2024-13/6/2024. The feedback is summarized below:

a) County Government of Nanyuki (Department of Water & Sanitation)

- The office is aware of the project
- The project will enhance water supply in a water scarce town
- Increased water supply will spur other benefits -improved hygiene & health
- Institutions can undertake other activities-e.g. promoting gardening
- There is need to safeguard against water wastage to those who will be served by the proposed project
- There is need to sensitize people on matters water recycling
- There are no sensitive areas in the proposed project sites
- The need to treat water
- The project will bear more benefits than negative impacts

b) County Government of Nanyuki (Department of Social Development)

- The project will lead to increased access to water by the community
- Improved hygiene & sanitation standards in the town
- Noise pollution during installation of solar panels in the borehole

- To mitigate against negative impacts there is need for involvement of the community during the project in order to find a middle ground especially for the people who will be affected.

6 IMPACT IDENTIFICATION, ANALYSIS

6.1 Potential Impacts and Mitigation Measures

It is envisaged that the proposed borehole solarisation project will generate both positive and significant negative impacts during its life. The construction, operation and decommissioning phase are evaluated for both positive and negative impacts. Positive impacts should be enhanced through enhancement measures while negative impacts should be mitigated to reduce them.

In the assessment, the assessors have suggested measures to mitigate against the negative impacts, while enhancing the positive one. The proponents should continuously monitor the effectiveness of the mitigation or prevention measures recommended in the report. This is because these impacts are interlinked and any fault in one component will affect all the other phases of the project.

After the impact were identified and assessed, suitable mitigation measures have been defined to reduce or totally avoid the impacts. Mitigation measures were proposed based on national requirements, best practices, preliminary stakeholders' views, ESIA experts' advice, and according to the following mitigation hierarchy:

- ✓ avoid as much as possible;
- ✓ where avoidance is not possible, minimize following best practices;
- ✓ where minimization is not sufficient, mitigate through specific measures;
- ✓ where mitigation is not sufficient, compensate for residual risks and impacts.

6.1.1 Impact assessment scoring

To systematically identify, predict, evaluate and determine the significance of impacts resulting from the project construction and operation, generic criteria developed by

Haug et al (1984) were adopted. Precautionary principle was used to establish the significance of impacts and their management and mitigation i.e. where there is uncertainty or insufficient information, the Environmentalist erred on the side of caution.

Table 6-1: Impact significance rating criteria

SEVERITY OF IMPACT	RATING	
Insignificant / non-harmful / less beneficial	-1/ +1	CONSEQUENCE
Small/ Potentially harmful / Potentially beneficial	-2/ +2	
Significant / slightly harmful / Significantly beneficial	-3/ +3	
Great/ harmful / beneficial	-4/ +4	
Disastrous/ extremely harmful / extremely beneficial	-5/+5	
DURATION OF IMPACT	RATING	
One day to one month	-1/ +1	
One month to one year	-2/ +2	
One year to ten years	-3/ +3	
Life of operation	-4/ +4	
Post closure	-5/+5	
SCOPE OF IMPACT	RATING	
Activity specific	-1/ +1	
Right of way specific (within right way)	-2/ +2	
Local area (within 5km of the project)	-3/ +3	
Regional	-4/ +4	
National	-5/+5	
FREQUENCY OF ACTIVITY / DURATION OF ACTIVITY	RATING	LIKELIHOOD
Annually or less / low	-1/ +1	
6monthly / temporary	-2/ +2	
Monthly / infrequent	-3/ +3	

Weekly/ life operation/ regularly / likely	-4/ +4
Daily / permanent / high	-5/+5
FREQUENCY OF IMPACT	RATING
Almost never/ almost impossible	-1/ +1
Very seldom / highly unlikely	-2/ +2
Infrequent / unlikely/seldom	-3/ +3
Often / regularly/ likely/ possible	-4/ +4
Daily / highly likely/ definitely	-5/+5

Table 6-2: Significance rating matrix

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

Table 6-3: Mitigation ratings

Significance Ratings	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
Very High	126-150	Improve proposed management	Maintain proposed management
High	101-125	Improve proposed management	Maintain proposed management
Medium - High	76-100	Improve proposed management	Maintain proposed management

Low - Medium	51-75	Maintain proposed management	Improve proposed management
Low	26-50	Maintain proposed management	Improve proposed management
Very low	1-25	Maintain proposed management	Improve proposed management

6.1.2 Construction Phase

6.1.3 Positive Impacts During Construction

The Proposed project could result into the following positive Impacts

a) Employment Opportunities: The construction phase will create job opportunities for local residents including positions in unskilled labour
b) Skill Development and Capacity Building: Workers involved in the construction phase receive training and develop skills related to construction and maintenance
c) Community Engagement and Awareness: The project can raise awareness about water management, construction practices, and community involvement.
d) Local business development: The project will promote local businesses through sourcing of construction Materials locally and other enterprises such as hotels
e) Improvement of infrastructure around the site (through negotiated CSR) e.g. security lighting or water tank

6.1.4 Negative Impacts During Construction

The proposed project could result into the following negative impacts:

Noise Pollution

Construction of the proposed project will result in minimal noise emissions since the project just involves setting up the solar panels and control rooms. Noise will be generated by the construction workers and also the vehicles moving into the area.

Noise impacts would only be considered significant if the project would result in the following:

a) A substantial permanent increase in ambient noise levels (more than 3 dBA) in the project vicinity above levels existing before the project; and

b) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing before the project.

Given these considerations, the proposed drilling will result in increase in noise.

Impact without Mitigation	
Severity of impact	-1
Spatial scope of impact	-1
Duration of impact	-1
Frequency of activity / duration of activity	-1
Frequency of impact	-1
Result	**-6 Very Low**

Mitigation measures

- To minimize noise from vehicles will only deliver construction material during daytime from 8:00 am to 6:00 pm.
- Construction workers will be sensitised on the importance of not shouting or playing loud music so as not to be a nuisance to the persons living in the area.
- Limit the idling time of pickup trucks and other small equipment. Workers should be encouraged to shut off vehicle engines whenever possible, adopting a common-sense approach to vehicle use.
- Regular communication and updates will help manage expectations and maintain good relations with the community.

Site Safety, Security, and Welfare arrangements

The nature of the project brings into fore some safety, security and health issues. These range from accidental falls and injuries from construction equipment or materials.

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-2
Duration of impact	-2

Frequency of activity / duration of activity	-2
Frequency of impact	-2
Result	**-36 low**

Mitigation measures

- Barriers shall be erected to prevent unauthorized access to the project sites by residents and other unauthorized persons
- Security personnel shall be deployed to secure the safety of the workers and property against vandals and to control access for safety purposes;
- The Contractor shall have his workers appropriately trained on safety and health matters-safety talks shall be held on a weekly basis;
- Personal protective equipment will be provided to the workers who will be working at heights when installing the solar panels.
- Any accident, incident or hazardous situation should be reported immediately it occurs or identified;
- The proponent/contractor shall provide adequate and suitable sanitary facilities for workers during construction period;
- The Contractor shall deploy as Environment Health and Safety officer at the project 'site' to foresee implementation of the EHS;
- Security personnel will be employed at the site for security of the materials and machinery needed for borehole construction; and
- The Contractor shall abide by the all the relevant provisions of OSHA, 2007 and other relevant legislations.

HIV/AIDS

Increased mobility of workers may lead to higher risks of HIV transmission if preventive measures are not implemented.

Impact Without Mitigation

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-1
Duration of impact	-1
Frequency of activity / duration of activity	-1
Frequency of impact	-1
Result	**-14 Very Low**

Mitigation Measures

- Ensure workers are trained on HIV/AIDS prevention, including safe practices and access to health services before and during the construction.
- HIV/AIDS talks can be included in the weekly safety talks that are proposed in other mitigation measures

Gender Based Violence and Sexual Exploitation and Abuse

Construction works may introduce migrant workers who may interact with the local community creating an avenue for sexual exploitation or abuse. This may also lead to gender- based violence due to the suspicions that may be created in families. Harassment within the workforce, particularly for women and youth laborers could arise.

Impact without Mitigation	
Severity of impact	-3
Spatial scope of impact	-1
Duration of impact	-1
Frequency of activity / duration of activity	-1
Frequency of impact	-1
Result	**-10 Very Low**

Mitigation Measure

- Enforce the environmental and social safeguards
- Include measures to control GBV-SEA-SH risks during project planning.
- All workers should attend a mandatory on code of conduct and sign the code of conduct.
- Awareness creation and community outreach to educate locals about their rights and available reporting mechanisms.

Worker's welfare (hygiene and sanitation)

Welfare of the workers is crucial for a successful project. Both legal and moral standards require that workers are provided with adequate facilities that will guarantee safety and health. The Act (OSHA, 2007) obligates the employer to provide essentials facilities for namely water, bathrooms, toilets etc.

Impact without Mitigation	
Severity of impact	-4
Spatial scope of impact	-2
Duration of impact	-2
Frequency of activity / duration of activity	-2
Frequency of impact	-2
Result	**-32 Low**

Mitigation measures

- The Contractor shall abide by the requirements under OSHA, 2007 in regard to the safety, health and welfare of the workers
- The contractors shall provide, free of charge, appropriate PPEs
- The Contractor shall provide clean portable drinking water for the workers
- The Contractor shall provide first-aid services

- Sanitation facilities for both sex including a hand washing facility;
- The Contractor shall communicate and implement the contents of the EHS policy of the Company to the employees
- The Contractor shall make available emergency services at the site;
- The Contractor shall retain a well trained and experienced EHS officer at the site

Effects on flora (plants/vegetation)

The borehole site already exists and solarisation will not consume a lot of space and thus therefore there will be minimal vegetation destruction.

Impact without Mitigation	
Severity of impact	-2
Spatial scope of impact	-2
Duration of impact	-2
Frequency of activity / duration of activity	-2
Frequency of impact	-2
Result	**-24 Very low**

Project Related Conflicts

There may be issues that arise during project construction that need attention. This may range from employment issues, project activities, duration of the construction period, engagement of host community and all the other form of grievances.

Impact without Mitigation	
Severity of impact	-3
Spatial scope of impact	-3
Duration of impact	-2
Frequency of activity / duration of activity	-2
Frequency of impact	-1

Result	-24 Very low

Mitigation measures

- The project shall have in place a conflict/issues management strategy including engaging an EHS expert who will manage the project related conflicts
- A grievance redress mechanism should be developed by the contractors team.
- All matters or issues that may arise during construction shall be documented and presented to the relevant persons namely: NAWASCO, Contractor, Administration Officers
- The Contractor shall ensure that locals are given first priority during recruitment of workers. Unskilled labour opportunities will be given to the locals
- The contractor shall hold periodic meetings with community representatives and local administration to communicate the project plan, design and progress.

Grievances Redress during project construction

The proposed grievances mechanism will entail:

- ✓ Having a project Grievance redress committee who will receive complaints from the affected persons.
- ✓ Engagement of an EHS Expert by the contractor who will act as a liaison person and expert in management of conflicts arising from the project.
- ✓ Documentation of all issues or matters arising during the construction phase so as to allow for follow up by NAWASCO and relevant stakeholders
- ✓ Sensitive Matters: If issues are beyond the control of the relevant persons or institutions, they should be referred to the court of law. This provides a formal legal avenue for resolving more serious or unresolved grievances.
- ✓ The Contractor will be required to prioritize local residents for recruitment, especially for unskilled labour positions.
- ✓ For specialized tasks, apprentices from the local community should be given opportunities, facilitating skills transfer and local capacity building.

- ✓ The Contractor is obligated to hold a meeting (at the inception) with community representatives and local administration. These meetings aim to communicate the project plan, design, and progress, ensuring transparency and continuous dialogue with the local community.

HIV/AIDS and STIs and Alcohol or Substance Abuse

The scourge still stands as a national disaster. Workers, especially upon payment are prone to indulgence in unprotected sex and alcohol.

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-1
Duration of impact	-1
Frequency of activity / duration of activity	-2
Frequency of impact	-2
Result	**-28 low**

Mitigation measures

- Voluntary testing and counselling of the project workers;
- Conduct education and awareness campaigns on HIV/AIDS, STIs, and the dangers of substance abuse.

(i). Politics and political good will

Intense and negative political influence is a recipe to collapse of many projects. Indulgence in political insinuations may lead to postpone or delay to project completion and implementation.

Impact without Mitigation	
Severity of impact	-2
Spatial scope of impact	-1
Duration of impact	-1

Frequency of activity / duration of activity	-2
Frequency of impact	-2
Result	**-16 Very low**

Mitigation measures

- The project will provide for extensive public participation including the political class
- The community shall be sensitized on negative political influence on projects implementation
- For goodwill and support of the project, the politicians shall be sensitised, consulted and involved in decision making in relation to the project matters.

Non Disruption of livelihoods

The process of borehole solarisation at Baraka will not cause disruption of livelihoods as the borehole infrastructure is already established. Installation of the solar system will be undertaken within the Baraka site which is owned by County Government of Laikipia and they have given their consent for the solarisation through a letter dated 27th November 2024 which is attached to Appendix A . Livelihoods will be improved through provision of employment opportunities during the solar installation phase.

6.1.5 Operational Phase

Positive Impacts during the operation phase

- Improved Access to Clean Water: Reliable and improved water supply systems will ensure consistent access to clean and safe drinking water.
- Enhanced Public Health and Hygiene: Increased access to clean water improves overall hygiene and sanitation standards.
- Support for Economic Development: A reliable water supply can support local businesses and agricultural activities.
- Environmental Benefits: Modern water supply systems often incorporate sustainable practices such as water conservation and recycling.

- Community Empowerment: Involvement in the operation and maintenance of water systems can foster a sense of ownership and responsibility within the community.

Negative impacts during the operation phase

(i). Birds Mortality

Solar panels,can pose a threat to birds. Birds can be killed by flying into the panels.

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-2
Duration of impact	-5
Frequency of activity / duration of activity	-5
Frequency of impact	-5
Result	**-70 Low to medium**

Mitigation measures

- ✓ **To avoid birds deaths the solar panels can have anti-Reflective Coatings to reduce glare that may confuse birds making them mistake the panels for water bodies (a phenomenon known as the "lake effect");**
- ✓ **Having textured Surface or patterned surfaces on solar panels can help break up reflections that might otherwise attract birds,**

(ii).Generation of E-Wastes

Waste Management: At the end of their life cycle, solar panels generate electronic waste (e-waste). If not properly recycled, this waste can contribute to environmental pollution.

Impact without Mitigation	
Severity of impact	-5

Spatial scope of impact	-2
Duration of impact	-2
Frequency of activity / duration of activity	-2
Frequency of impact	-2
Result	**-36 Low**

- ✓ To avoid solar panels generating e-waste, use panels with longevity reducing the frequency of replacement and disposal;
- ✓ Using panels with modular design that can be easily disassembled to allow for the recovery of valuable materials and components;
- ✓ Use of Recyclable Materials: Prioritize the use of materials that are easier to recycle, such as certain metals and plastics, to ensure a higher recovery rate.
- ✓ Buy panels from manufacturer who have a "Take-Back Program" where they take back and recycle their products at the end of their life cycle.

(iii). Theft and vandalism of installed infrastructure

Water utilities often experience theft from residents especially when the system is not functional/when there is no water flow. These activities can affect the delivery and management of the installed system, which results to limited access in the town. They range from theft of pipes, fittings, and water through bypassing meters and tempering with connections.

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-3
Duration of impact	-2
Frequency of activity / duration of activity	-5
Frequency of impact	-1
Result	**-60 low to medium**

Mitigation measures

- NAWASCO should ensure good relationship with the local community through continuous engagement. The existing NAWASCO area managers can facilitate this.
- Foster household ownership of the infrastructure through payment of water by households
- Enforce law against reported cases of vandalism

(iv). Water quality

The project seeks to supply water for domestic use hence the need to ensure the water is of acceptable standards. Water supply may be subject to risks such as water contamination at source or during the reticulation. This may lead to waterborne illnesses and other health complications.

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-1
Duration of impact	-1
Frequency of activity / duration of activity	-1
Frequency of impact	-2
Result	**-21 Very low**

Mitigation Measures

- Provide for periodic water quality monitoring at strategic points including the source and along the distribution lines
- Use high-quality casing materials and properly seal the annular space between the borehole wall and casing
- Install a screen in the borehole casing near the aquifer to filter out sediment and prevent entry of larger particles into the well

- Install a secure and sanitary wellhead to prevent surface water, insects, and debris from entering the borehole and potentially contaminating the water.
- Implement a regular monitoring program to assess water quality parameters such as pH, turbidity, total dissolved solids (TDS), microbial contamination (e.g., coliform bacteria), and chemical contaminants (e.g., nitrates, heavy metals)
- Maintain the borehole and pumping equipment regularly to prevent buildup of sediment, biofilms, and other sources of contamination that could affect water quality.
- Educate local communities on the importance of water quality protection, proper sanitation practices, and the potential sources of contamination that could impact their borehole water
- Develop an emergency response plan to address sudden water quality issues or contamination incidents including: protocols for water testing, notification of stakeholders, and remediation actions.
- Secure borehole area to prevent accidental or deliberate water contamination

Water wastage and losses

Increased water provision may lead to wastage of the scarce resource among beneficiaries. The system could also present inefficiencies that lead to water loss in the course of distribution.

Impact without Mitigation	
Severity of impact	-3
Spatial scope of impact	-1
Duration of impact	-4
Frequency of activity / duration of activity	-5
Frequency of impact	-4

Result	**-72 Low to Medium**

Mitigation Measures

- The piping Material should be resistance to abrasions from external elements to prevent leakages
- Establish a monitoring system to allow for prompt detection of leakages and repairs
- Create awareness among project beneficiaries on the need to use water judiciously.
- Build the capacity of the water utility to continuously improve the efficiency of the water supply system including reduction of non-accounted water, installation of efficient technologies e.g. automated water points in water kiosks

Energy Use

The proposed project will utilize solar power in pumping water from the borehole. This will enhance sustainability, low operation and maintenance cost. Additionally, it will promote adoption of green energy in the community and the county. Negative impacts may arise where the solar system fails to operate optimally due to changes in climatic conditions or technical failures. This may lead to disruption in water supply within the town.

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-1
Duration of impact	-1
Frequency of activity / duration of activity	-2
Frequency of impact	-2
Result	**-28 low**

Mitigation Measures

- Select high-quality solar panels, inverters, mounting structures, and other components from reputable manufacturers with proven track records.
- Hire certified and experienced solar installers who follow industry best practices and adhere to manufacturer guidelines for installation.
- Ensure the solar panels are kept clean and free of debris to maximize sunlight absorption.
- Regularly remove dirt, dust, bird droppings, and leaves that can reduce efficiency
- Periodically inspect and tighten electrical connections to prevent loose connections that can lead to system inefficiencies or failures.
- Install a monitoring system to track the performance of the solar panels, inverters, and overall system.
- Ensure all electrical components are properly weatherproofed and protected from rain, humidity, and extreme temperatures.
- Ensure proper charging and discharging cycles to prolong battery life
- Schedule periodic inspections by qualified technicians to check for wear and tear, corrosion, and other signs of potential problems.

Impact on vulnerable and marginal groups

Poorly managed boreholes can lead to over-extraction of groundwater, which can deplete local aquifers and impact water availability for vulnerable communities and ecosystems dependent on groundwater. If boreholes are not properly constructed or maintained, there is a risk of groundwater contamination, which can have severe health consequences, particularly for vulnerable groups who may be more susceptible to waterborne diseases.

Impact without Mitigation

Severity of impact	-5
Spatial scope of impact	-3
Duration of impact	-3
Frequency of activity / duration of activity	-3
Frequency of impact	-4
Result	**-77 Medium to High**

Mitigation Measures

- Involve vulnerable groups in all stages of borehole planning, construction, and management to ensure their needs and concerns are addressed.
- Ensure equitable access to borehole water by implementing transparent allocation mechanisms and considering the needs of vulnerable groups in water distribution plans.
- Implement pro poor water supply program to increase water access among the marginally poor groups in the area
- Implement sustainable groundwater management practices to prevent over-extraction and ensure the long-term availability of water resources.
- Regularly monitor the impact of boreholes on vulnerable groups and adjust management practices accordingly to address emerging issues.

By taking these considerations into account and implementing appropriate measures, borehole construction and operation can contribute positively to the well-being and resilience of vulnerable communities, ensuring sustainable access to safe water and improving overall quality of life.

Influx of migrants

The improved water supply in Baraka area may lead to population influx. The influx could result in secondary effects such as increased strain on social infrastructure such as schools and hospitals; there may be a rise in petty crimes.

Impact Analysis

Impact without Mitigation	
Severity of impact	-2
Spatial scope of impact	-2
Duration of impact	-3
Frequency of activity / duration of activity	-3
Frequency of impact	-3
Result	**-42 Low**

Mitigation:

- The local administration should carry out sensitization on negative social issues that may result from on -going developments such as this proposed one.

6.1.6 Decommissioning Phase

The project shall bear detrimental impacts if necessary measures are put in place to prevent environmental hazards and risks resultant of the abandonment. This may include the borehole safetyand security issues, the conveyances and the changes to the concerned community.

Mitigation measures

- The Proponent shall subject the project to an abandonment environmental and social impact assessment or risk management in the event of closure of the project.
- The process shall involve all the concerned parties
- The legislations and best environmental practices prevailing then shall apply.

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT & MONITORING PLAN

7.1 Introduction

Several impacts have been identified that are likely to affect the project both positively and negatively. They have also been identified based on three different project phases: construction, operation and decommissioning phase. A plan illustrating how the identified impacts will be managed throughout the project cycle has been formulated in Table 8-1 below. However, it is important to note that before the construction commences, the contractor will be required to develop an updated Construction Phase-Environmental and Social Management and Monitoring Plan (CP-ESMMP) that will be implemented during the construction phase of the project.

7.1.1 Management Responsibility of ESMMP

In order to ensure the sound development and effective implementation of the ESMMP, the responsibilities and authority of the various persons and organizations that will be involved in the project have been identified and are defined. The following entities will be involved in the implementation of this ESMMP:

- NAWASCO
- NEMA Nanyuki County
- Contractor
- Design Consultant;
- County Government of Nanyuki

7.1.2 NAWASCO

NAWASCO the project proponent, will be charged with the responsibility of implementing ESMP.

This will be achieved by inclusion of the ESMP provisions in the tender documents and conducting ESMP monitoring to ensure the objectives of this ESMMP are met. Monitoring will be done on a daily basis by an EHS consultant.

7.1.3 National Environment Management Authority (NEMA)

NEMA is tasked with overseeing and coordinating all aspects pertaining to the environment, serving as the primary governmental instrument in Kenya for implementing policies related to environmental matters. The Authority has an oversight mandate in ensuring proponents implement project ESMPs.

7.1.4 The Contractor

The person/firm contracted to drill the borehole will be required to comply with the requirements of the ESMMP within this report. To ensure strict compliance environmental specifications of this ESMMP should form part of the contract documents.

7.1.5 Environment al Health and Safety Officer

NAWASCO will identify an officer within the company who is trained in environment and social issues. With the help of WSTF, the identified person will be capacity built on how compliance to ESMP should be assessed during the project cycle to ensure the ESMP is well implemented. The EHS Officer will conduct weekly audits of the ESMMP to ensure that its performance is as expected. NAWASCO will share the EHS report with the contractor to enhance compliance.

7.1.6 County Government of Nanyuki

The relevant departmental officers in Nanyuki County will provide advisory and institutional monitoring services according to existing guidelines and policies e.g. water quality monitoring by WRA and Department of Water.

Table 7-1: ESMMP during the Construction, operational, and decommissioning phases of the project

Impact	Mitigation/s Remedial Action/s	Implementation agency/ies	Monitoring Indicators and Freq. (F)	Mitigation target	Mitigation Cost/s (KShs)
CONSTRUCTION PHASE					
Noise Pollution	• Provision of appropriate personnel protective equipment to workers • Traffic management to minimize noise e.g. minimum idling time, no hooting policy • Sensitize workers to avoid shouting, loud music and banging of equipment	Contractor NAWASCO	-Noise level readings at various points within 1km radius below 55 dBA, -Availability and enforcement of PPE use. -Traffic management policy developed & enforced -Worker's sensitization schedule	Minimal noise levels	10,000 (hiring portable barriers, noise PPEs)

Site Safety, Security, and Health Risks	• Barriers shall be erected to prevent unauthorized access to the project sites by patients visiting Baraka dispensary , residents and other unauthorized persons • Security personnel shall be deployed to secure the safety of the workers and property against vandals and to control access for safety purposes; • The Contractor shall have his workers appropriately trained on safety and health matters- safety talks shall be held on a weekly basis; • Construction vehicles will observe the required speed limit	Contractor NAWASCO	-Presence of barriers around project site. -Security personnel deployed -Safety talks shall be held on a weekly basis; -Traffic safety policy developed -Incidence book availed -Worker Insurance cover provided -Availability of sanitary facilities on site- -Presence of the EHS officer on site	Safety and secure sites	10,000 (safety PPEs, security personnel, first aid kit)

	of 50 KM/H -Nanyuki town, residential area • Any accident, incident or hazardous situation should be reported immediately it occurs or identified; • The contractor shall provide insurance cover for any eventuality during work to the employees; • The proponent/contractor shall provide adequate and suitable sanitary facilities for workers during construction period; • The Contractor shall deploy as EHS officer at the project 'site ' to foresee implementation of the EHS and security matter; and		-First Aid Kit availed on site -Emergency contact for a health facility provided to site agent & EHS officer		

	• The Contractor shall abide by the all the relevant provisions of OSHA, 2007 and other relevant legislations				
Worker's welfare (hygiene and sanitation)	• The contractors shall provide, free of charge, appropriate PPEs • The Contractor shall provide clean portable drinking water for the workers • The Contractor shall provide first-aid services • Sanitation facilities for both sex including a hand washing facility-Contractor can negotiate with Baraka Dispensary to use	Contractor	- PPE provided & distributed -Drinking water points on site -Sanitation facilities availed -EHS officer deployed	Safe and health working environment	10,000 (drinking water PPEs)

	its facilities and ensure they are kept clean • The Contractor shall communicate and implement the contents of the EHS policy of the Company to the employees • The Contractor shall make available emergency services at the site/ camp; • The Contractor shall retain a well trained and experienced EHS officer at the site				
Gender Based Violence and Sexual Exploitation and Abuse	All workers should attend a mandatory sensitization meeting on code of conduct and sign the code of conduct.	NAWASCO Contractor	-Sensitization meeting on code of conduct held -Evidence of awareness creation to locals e.g. materials on the site	Zero reports of sexual abuse & exploitation	10,000 (meeting venue)

	Awareness creation and community outreach to educate locals about their rights and available reporting mechanisms				
Effects on flora (plants/vegetation)	• The Contractor and other project participants must ensure minimal disturbance to existing vegetation by marking out access routes and construction area • The project will make provision for tree planting within the site restoration activity	The Contractor	-Clearly marked access route -Site restoration plan	Restoration activities implemented	5,000 (landscaping)
Water Quality	• Designate an equipment servicing location away from the proposed site	The contractor	-Location maps showing storage areas and borehole sites	Zero Contamination	5,000 (waste collection,

	• Appropriate storage of fuel and Materials on site • The contractor should engage a licensed waste collector to manage all the waste • Undertake water quality monitoring after construction to establish any contaminants in the water		- Contracts or agreements with licensed waste collectors - Water quality test results (e.g., levels of contaminants, pH, turbidity)		water quality test)
Project Related Conflicts	• The project shall have in place a conflict/issues management policy including engaging an EHS expert who will manage the project related conflicts • All matters or issues that may arise during construction shall be	Contractor	- Contactor's grievances management policy -Number of grievances reported to the Project Grievances Redress Committee.	EHS expert engaged to handle conflicts Grievances & Redress record book provided	5,000 (EHS, grievances book etc)

	documented and presented to the relevant persons- NAWASCO, Contractor, Administration Officers • Sensitive matters beyond control of the relevant persons or institutions shall be referred to the court of law. • The Contractor shall ensure that locals are given first priority during recruitment of workers. Unskilled labour opportunities will be given to the locals • In specialized tasks, the Contractor shall ensure that apprentices are from the local		- Complete and accurate documentation of all construction-related issues. - Documentation and tracking of court cases. - Number of unskilled labor positions filled by locals.	Evidence of how grievances are addressed	

	community to allow for skills transfers • The contractor shall hold periodic meetings with community representatives and local administration to communicate the project plan, design and progress.				
HIV/AIDs and STIs and Alcohol or Substance Abuse	• Establish clear, accessible channels for workers to report grievances related to sexual harassment during the project period. • Ensure the contractor has an explicit policy on Sexual Harassment, Gender based	Contractor	- Grievances redresss policy - Contractor's policy on Sexual Harassment & Gender based violence	Low or zero HIV/Aids prevalence and sober and productive workforce	20,000

	Violence, Substance Abuse & HIV/AIDS • Conduct education and awareness campaigns on HIV/AIDS, STIs, and the dangers of substance abuse.				
Politics and Political Good will	• The project will provide for extensive public participation including the political class • The community shall be sensitized on negative political influence on projects implementation • The politicians will be fully sensitised about the project and engaged in decision making for	NAWASCO County Government	-Number of community sensitization meetings held prior to the project -Number of Engagement meetings with Politicians	Encouraging Positive Political Engagement	5,000 (meeting venue)

	goodwill and support of the project.				
OPERATION PHASE					
Theft and vandalism of installed infrastructure	• Continuous engagement - meetings, liaison staff • Foster households sense of ownership of the infrastructure through payment of water by households • Enforce law against reported cases of vandalism	NAWASCO	-Frequency of Community Engagement Meetings -Percentage of Households Paying for Water -Number of Vandalism Incidents Reported	Infrastructure is secured	10,000 p.a (meetings)

Water Quality		NAWASCO	- Water Quality Parameters such as pH Monitoring - Borehole Casing and Screen Inspection - Community sensitization	Water quality is within recommended level	60,000 p.a (meetings, water tests)
Water Conservation	• The piping Material should be resistance to abrasions from external elements to prevent leakages • Establish a monitoring system to allow for prompt detection of leakages and repairs	NAWASCO	Material Durability Ratings -Leakage Incidents -Water Usage Trends -Training Sessions	Reduced water loss	50,000 p.a

	• Create awareness among project beneficiaries on the need to use water judiciously. • Build the capacity of the water utility to continuously improve the efficiency of the water supply system including reduction of non-accounted water, installation of efficient technologies e.g. automated water points in water kiosks.				
Energy Use	• Select high-quality solar panels, inverters, mounting structures, and other components from reputable manufacturers with proven track records.	NAWASCO	-Quality certifications and warranties from manufacturers.	Reduced energy loss	10,000 p.a (solar system maintenance)

	• Hire certified and experienced solar installers who follow industry best practices and adhere to manufacturer guidelines for installation. • Ensure the solar panels are kept clean and free of debris to maximize sunlight absorption. • Regularly remove dirt, dust, bird droppings, and leaves that can reduce efficiency • Periodically inspect and tighten electrical connections to prevent loose connections that can lead to system inefficiencies or failures.		- Performance metrics and visual inspections of panel cleanliness. - Visual inspection for loose connections, and checking for system performance drops.		

	• Install a monitoring system to track the performance of the solar panels, inverters, and overall system. • Ensure all electrical components are properly weatherproofed and protected from rain, humidity, and extreme temperatures. • Ensure proper charging and discharging cycles to prolong battery life • Schedule periodic inspections by qualified technicians to check for wear and tear, corrosion, and				

	other signs of potential problems.				
Impact on vulnerable and marginalized groups	• Involve vulnerable groups in all stages of project • Ensure equitable access to borehole water by implementing transparent allocation mechanisms and considering the needs of vulnerable groups in water distribution plans. • Implement pro poor water supply program to increase water access all groups • Implement sustainable groundwater management	NAWASCO	-Stakeholder Engagement - Feedback Mechanism - Allocation Mechanisms	Ensure equitable and sustainable access to water for vulnerable and marginalized groups	30,000p.a

	practices to prevent over-abstraction • Regularly monitor the impact of boreholes on vulnerable groups and adjust management practices accordingly to address emerging issues.				
DECOMMISSIONING PHASE					
End of project strategy	• The Proponent in consultation with community shall subject the project to an abandonment ESIA in the event of closure of the project. • The legislations and best environmental practices prevailing then shall apply.	NAWASCO	Decommission strategy/Plan Freq: End of Project	Environmental Protection	TBD

8 CONCLUSION AND RECOMMENDATION

8.1 Conclusion

The proposed project seeks to increase water supply in Baraka Village in Nanyuki County through solarisation. Water quality testing in accredited laboratories will be done to ensure compliance with consumption standards before handing over the operational borehole to NAWASCO for maintenance and monitoring. Existing infrastructure issues like vandalism and low storage capacity would persist, exacerbating water shortages and impacting health, sanitation, and economic growth. Furthermore, without the project, local skills would be underutilized, and risks of water-related conflicts would increase, hindering overall development and service distribution.

The project's proposed sites were selected based on geological suitability, accessibility, environmental impact, and future land use, offer a sustainable solution. Utilizing solar-powered pumping, the project aims to ensure reliable water supply, mitigate environmental impacts, and enhance water security despite climate variability. The construction phase is expected to provide local economic benefits and job opportunities but requires measures to mitigate environmental risks and community conflicts. During operations, benefits include regular water supply, reduced waterborne diseases, contingent upon strict water quality monitoring and sustainable management practices.

The project is located inside within the county government of Laikipia land; currently there are no persons settled in that portion of land and there are no livelihood activities within the compound. Therefore, there are no Persons Affected by the project, no displacement and no need for compensation.

8.2 Recommendations

The recommendation of this study is that the proposed project be allowed to proceed on strict condition that the environmental and social management and monitoring plan is implemented and follow-up is made to ensure compliance as may be directed by NEMA. Recommendations for the prevention and mitigation of adverse impacts are as follows:

i. Environmental and Social Management and Monitoring Plan should be communicated to all the responsible actors including Contractor, NAWASCO
ii. The contractor should develop a Construction Phase-ESMMP for the proposed project
iii. The proponent should establish an environmental and social unit to oversee the implementation of the Environmental and Social Management and Monitoring Plan
iv. The proponent should institute a periodic monitoring plan to ensure regular reporting on environmental and social indicators
v. The proponent should document all environmental and social incidences occurring during project construction and operation.

9 REFERENCES

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10 APPENDIX

10.1 Grievance Redress Mechanism (GRM)

A grievances and redress mechanism will be instituted by the Contractor & Proponent during the construction and operation phases respectively. With regard to this project, GRM will entail:

a) A grievances and redress policy which will be availed by the both the Contractor and proponent prior to project commencement
b) A unit or section or personnel responsible for handling grievances e.g. EHS officer
c) Grievances recording system-which will involve availing grievances record book on site (construction) and at the office during operation

The procedure for handling GRM will entail

a) A liaison or EHS officer will receive a grievance from a community member either at a personal level through or as presented in a community meetings; Record date, complainant details, nature of grievance, and any evidence provided.
b) Assessment of the grievance presented and review to categorize the grievance based on severity.
c) Acknowledge receipt of grievance to the complainant within a specified time
d) Gathering information and conduct Investigations
e) Analysis of the information provided to authenticate the cause of the grievance
f) Development of a proposal of action plans and response to the aggrieved
g) Invite the complainant to discuss the proposed resolution to ensure it addresses their concerns.
h) Carry out the agreed-upon action (e.g., compensation, project modification, public apology).
i) Monitor Implementation to ensure that the resolution is adhered to as agreed.

10.2 Bill of Quantities

EQUIPMENT SPECIFICATION - BARAKA BOREHOLE

a. Solar Power Control Unit – Sunverter 3 11kw Controller is used for controlling of the pump system, monitoring of the operating states and incorporates the following alarm functions: over current, under voltage, over speed, over temperature and low water. It has an integrated MPPT (Maximum Power Point Tracking) which maximizes power use from PV modules. The unit is housed in a damp proof enclosure with external display for current running data such as: input/output current/power/voltage, pump speed, temperature.

b. Installation- To include:

i. Transport of equipment to the site.
ii. Assembly of solar structure and placement of panels onto the structure.
iii. Cable connectors between pump, sunverter and solar panels.
iv. Testing and commissioning of the borehole with water delivered to the borehole surface.

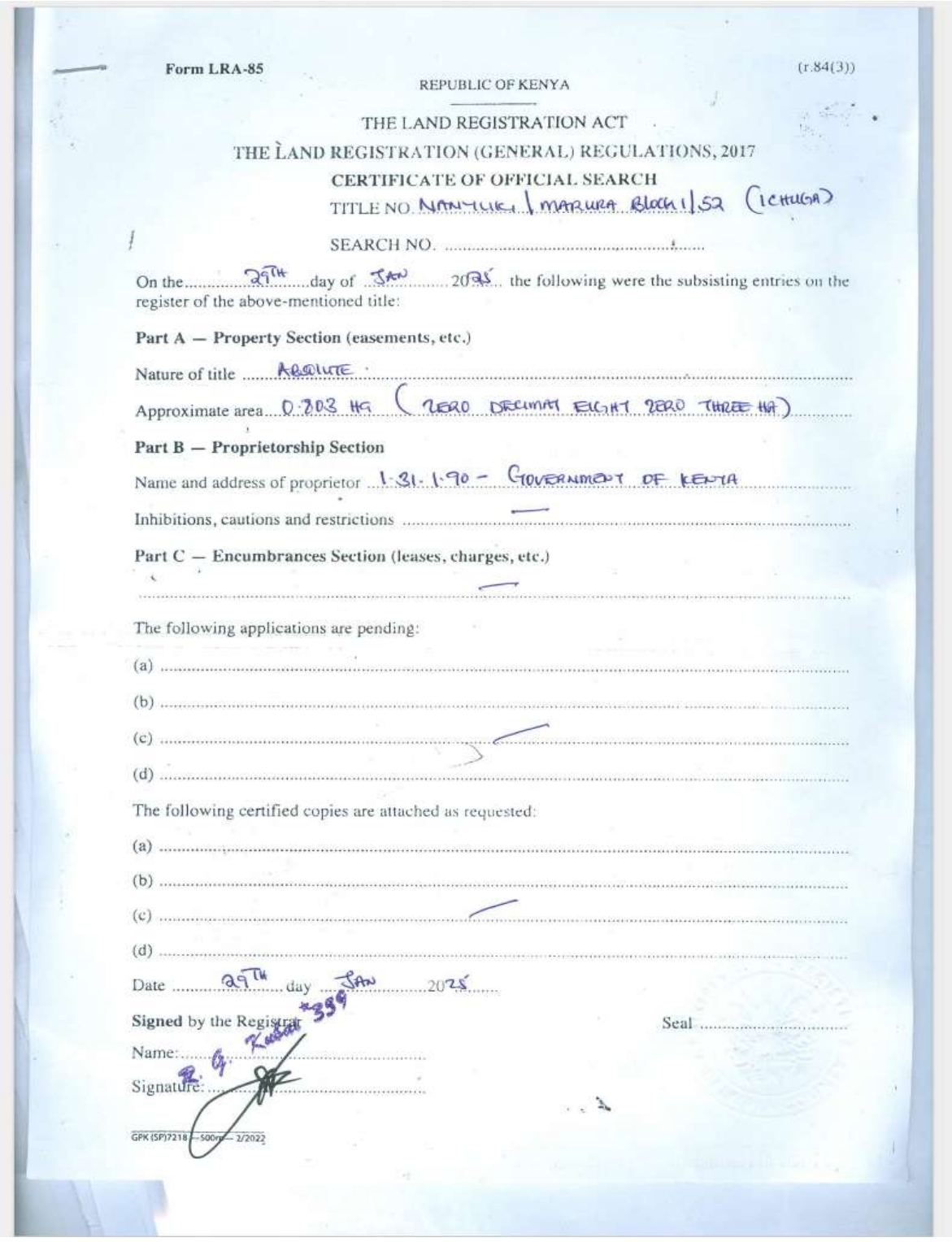
EQUIPMENT COST

The above listed equipment should be supplied at the following cost:

ITEM	DESCRIPTION	UNIT	QTY	RATE (KSHS)	AMOUNT (KSHS)
Main Components					
B.1	Sunverter 3 11kw Controller	No.	1	250,000	250,000
B.2	Controller Enclosure	No.	1	20,000	20,000
B.3	330W solar modules	No.	51	19,765	1,008,015
Pump Accessories					
B.4	$6mm^2$ 4-core U/G cable	m	267	800	213,600
B.5	$1.5mm^2$ 2-core U/G cable	m	50	170	8,500
B.6	Surge protector	No.	1	56,000	56,000
B.7	Pv protect	No.	1	21,000	21,000
B.8	Lightening arrestor	No.	1	6,000	6,000

B.9	PV Disconnect Switch 1000V/40A	No.	1	16,700	16,700
B.10	Water level switch	No.	1	3,900	3,900
B.11	$10mm^2$ twin flat cable with earth (DC)	m	30	630	18,900
B.12	Earth Rod c/w clamp	No.	1	1,168	1,168
B.13	$6mm^2$ Copper Earth cable	m	10	250	2,500
B.14	Installation Sundries & concrete works	Lot	1	55,000	55,000
B.15	Flotswitch	No.	1	4,900	4,900
B.16	Module Support Structure - 3m high	Lot	17085	40	683,400
B.17	Transport of Equipment to Site	Lot	1	10,000	10,000
B.18	Installation Labour	Lot	1	120,000	120,000
	sub total				**2,499,583**
	VAT				399933.28
	TOTAL				**2,899,516**

10.3 Land Ownership Documents



Form LRA-85 (r.84(3))

REPUBLIC OF KENYA

THE LAND REGISTRATION ACT

THE LAND REGISTRATION (GENERAL) REGULATIONS, 2017

CERTIFICATE OF OFFICIAL SEARCH

TITLE NO. NANYUKI / MARURA BLOCK 1/52 (ICHUGA)

SEARCH NO. .....

On the 29TH day of JAN 2025 the following were the subsisting entries on the register of the above-mentioned title:

Part A — Property Section (easements, etc.)

Nature of title ABSOLUTE

Approximate area 0.203 HA (ZERO DECIMAL EIGHT ZERO THREE HA)

Part B — Proprietorship Section

Name and address of proprietor 1.31.1.90 - GOVERNMENT OF KENYA

Inhibitions, cautions and restrictions —

Part C — Encumbrances Section (leases, charges, etc.)

—

The following applications are pending:

(a) .....

(b) .....

(c) .....

(d) .....

The following certified copies are attached as requested:

(a) .....

(b) .....

(c) .....

(d) .....

Date 29TH day JAN 2025

Signed by the Registrar *359

Seal .....

Name: .....

Signature: .....

GPK (SP)7218 — 500m — 2/2022

10.4 Baraka Baraza Minutes

MINUTES OF BARAZA ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ON SOLARNISATION OF BOREHOLES HELD IN BARAKA (NANYUKI) ON 13/6/ 2024

PRESENT

SEE ATTACHED LIST

MIN 1. PRELIMINARIES

The meeting started at 11:30 with a word of prayer Macy Wambui a community member The area chief explained to the community the need for the project. Mr.Joseph Irungu Maina from NAWASCO gave some highlights on significance of expansion of the water infrastructure solarisation. He indicated that the current challenges in water supply in the area included:

a. High cost of electricity
b. Irregular power supply
c. Lack of continuous flow of water
d. High cost of water supply

He indicated that by solarisation of the boreholes will lead to diversification of energy supply cutting the cost of electricity and ensuing a regular supply of water.

MIN 2. INTRODUCTION.

Matha Wambui from NAWASCO Introduced the key members of the consultants team;

- Dr. Rebecca Karanja (team leader)– Kenyatta University lecturer in environment science and conservation
- Dr Purity Muthoni- Sociologist
- Dr. Florence Ngari – technical university of Kenya lecturer in biological science

MIN 3. ANTICIPATED POSITIVE IMPACT

The consultant led the community in a discussion and the key positive impacts they mentioned that can emanate from the project include:

a. Improvement of women health especially reduction of backache cases which have been affecting them;
b. Improvement of hygienic practices due to water availability;
c. Improvement in school performance as more time will be used in studies as opposed to school going children fetching water in the evening;
d. Improved security due to lighting that can be tapped from solar panels
e. Reduction of water borne disease such diarrhoea, amoebiasis and typhoid
f. Continuous water supply

MIN 3 ANTICIPATED NEGATIVE IMPACTS

Among the negative impacts they anticipated the following were listed;

a. **Insecurity in the area leading to vandalism of the water infrastructure;**
b. Wastage of wate due to constant supply

MIN 4. COMMUNITY CONCERNS

The community members indicated that the following are concerns that should be addressed during project implementation:

a. Insecurity in the area/fear of vandalisation of project infrastructure
b. The project benefiting people from other areas
c. Low water volumes
d. Exaggerated water bills
e. Poor water quality due to high salty concentration
f. Water rationing
g. Increased housing leading to high population

MIN 5 ROLE OF THE GOVERNMENT

a. Provision of security for the solar panels

b. Liaise with the client to provide jobs for the community during construction and also implementation.

MIN 6: ROLE OF COMMUNITY

a. Identification of water pipes
b. Identify water distribution challenges
c. Provide security for the water infrastructure
d. Report water pipe bursts.

MIN 7 QUESTIONS AND RESPONSES

Question	Response
1. What happens when the weather is not sunny and so the solar power generated is not enough?	Kenya power will still be retained for such seasons Inverters will also be fixed
2. Will the current water tank be enough for water storage ?	Members of the community were advised to install water tanks for storage when water is available
3. How will the issues of high salt concentration be addressed ?	Treatment of water (desalination) will be taking place and salty water will only be used during lack
4. Who addresses the water bills	The staff from the water department asked the community to attend a planned meeting and air their concerns

MIN 7: ADJOURNMENT

The meeting ended at 1 PM with a word of prayer from Nancy Kariuki a community members.

Minutes signed by:

Client ..... Joseph Muthigani .....

Signature .....

Date ..... 13/6/2024 .....

Minutes signed by:

Consultant Dr Rebecca HN Karanja

Signature ----------

Date 13/06/2024

10.5 Attendance Sheets

WaterFund
Financing the Water Sector

NANYUKI WATER AND SANITATION COMPANY NAWASCO

NAWASCO PUBLIC PARTICIPATION ON SOLARIZATION OF BARAKA BOREHOLE

DATE: 13TH JUNE, 2024
TIME: 9.30 A.M. – 12.00 NOON

VENUE: BARAKA DISPENSARY

ATTENDANCE LIST

No.	Name	Organization	Phone No. / Email	Signature
1.	JANE Wanjiru Ngaira	BARAKA B. AREA	0719596975	WATER Rlc.
2	Hakima Hussein	11	0725532326	
3.	Mary Ajeri	11	0714681291	
4.	Nancy Kavinuki	11	0717 124 973	
5.	Revs Gitonga	11	0721760225	
6.	Loise Nyawira	11	0108602768	
7.	CHRISTINA WAMBUGU	11	0721565316	
8.	Pauline Wambui	11	0723592435	
9.	Beatrice Gathigia	11	0723047827	
10.	Moses Kinoti	11	0704521673	
11.	Evelah Mukandi	11	0723893543	
12.	KARUME K. KINYUA	11	0715095584	

FRANK WANDIA +NAWASCO 0722883600

WaterFund
Financing the Water Sector

NAWASCO PUBLIC PARTICIPATION ON SOLARIZATION OF BARAKA BOREHOLE

DATE: 13TH JUNE, 2024
TIME: 9.30 A.M. – 12.00 NOON

VENUE: BARAKA DISPENSARY

ATTENDANCE LIST

No.	Name	Organization AREA	Phone No. / Email	WATER A/C No	Signature
1.	SAMUEL KABIA GACHIRI	BARAKA	0113618221		
2	PERIS WAMUYU MURIUKI	BARAKA	0727328834		
3.	NANCY MUTHONI	BARAKA	0713516542		
4.	AGNE WAMURU	BARAKA	0712485408		
5.	Esther Kamuleu	Baraka	0726137994		
6.	EVA WANJIRU	Baraka	0717585653		
7.	ROSAH NJOKI	Baraka	0711659980	18450	
8.	Samel Gicure	Baraka	0716208438		
9.	Margaret Wabera	Baraka	0715664346	18050	
10.	Moris Kamau	Baraka	0722504458		Kamau
11.	David KABIRU	BARAKA	0723310230		
12.	MUKUS Waime	Baraka	0746177763	2921923	
13.	Martha Wanjiru	NAWASCO	0726906916	-	

WaterFund
Financing the Water Sector

NAWASCO PUBLIC PARTICIPATION ON SOLARIZATION OF BARAKA BOREHOLE

DATE: 13TH JUNE, 2024
TIME: 9.30 A.M. – 12.00 NOON

VENUE: BARAKA DISPENSARY

ATTENDANCE LIST

No.	Name	Organization AREA	Phone No. / Email	ID No. WATER A/C No	Signature
1.	Dominic Kirini	Baraka A	0790 763 758		
2	Rachel Kariuki	Baraka	0723041745		
3.	Dennis Mwangi	"	0715078344		
4.	PETER KAMAU	BARAKA	0704577181		
5.	VINCENT OGEGA	Baraka	0727 910532		
6.	JOSEPH CHOMBE	BARAKA	0718343856		
7.	Patrick WAITHAKA	NASOSA ESTATE	0720560941		
8.	CYRUS GACOKI	BARAKA	0720983147		
9.	LUCY MUKAMI PETER	BARAKA	0716677704		
10.	PAUL KIAWERU	BARAKA	0728021252		
11.	Mwangi Mukunya	Baraka	0722526838		
12.	MARY GACHARI	BARAKA	0724 605 092		
13.	Joseph Muthugani	NAWASCO	0722978695		

WaterFund
Financing the Water Sector

Youth Baraza

NAWASCO

NAWASCO PUBLIC PARTICIPATION BARAZA ON UPGRADING WATER PIPELINE IN EMMANUEL & TEMU AREAS

DATE: 13TH JUNE, 2024
TIME: 2.00 P.M. – 4.00 P.M.

VENUE: TEMU

ATTENDANCE LIST

No.	Name	Organization	Phone No. / Email	I.D No.	Signature
1.	Joseph Muthigani	Nawasco	Mamamuthigani@gmail.com 0722 978695		
2	Pearle Nzeden	"	0722833600		
3.	Moses Murage	Nawasco	0724622959		
4.	Cecilia Wanjiri Kahiga		0721 740222		C.W.K
5.	Harrison Okumu	Sparby	0768144666		
6.	Samuel Mbiandau		0721630824		
7.	Charles Mwangi Ndirangu	Millyge Ltd	0711 663 506		
8.	Fridah Ngatia	NGAO	0708888694		
9.	CHARLES M. RUKENYA	NGAO	0723561354		
10.					
11.					
12.					

Women Oly Baraza

WaterFund
Financing the Water Sector

NAWASCO PUBLIC PARTICIPATION ON SOLARIZATION OF BARAKA BOREHOLE

DATE: 13TH JUNE, 2024
TIME: 9.30 A.M. – 12.00 NOON

VENUE: BARAKA DISPENSARY

ATTENDANCE LIST

No.	Name	Organization AREA.	Phone No. / Email	NO No. WATER A/C	Signature
1.	Esther Kamucharo	Baraka D AREA	0726137494		
2	Anastacia Gathoni	Baraka D	0716208438		
3.	Eva Wanjiru	Baraka D	0717585683		
4.	ROSAH NJOKI	Baraka	0711659480		
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

10.6 NEMA Practising License



EAE 23061620

FORM 7 (r.15(2))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/20611

Application Reference No: NEMA/EIA/EL/27771

M/S **REBECCA KARANJA**
(individual or firm) of address
P.O. Box 43844 - 00100 Nairobi

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

General

registration number **2860**

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

Issued Date: 1/25/2024 Expiry Date: **12/31/2024**

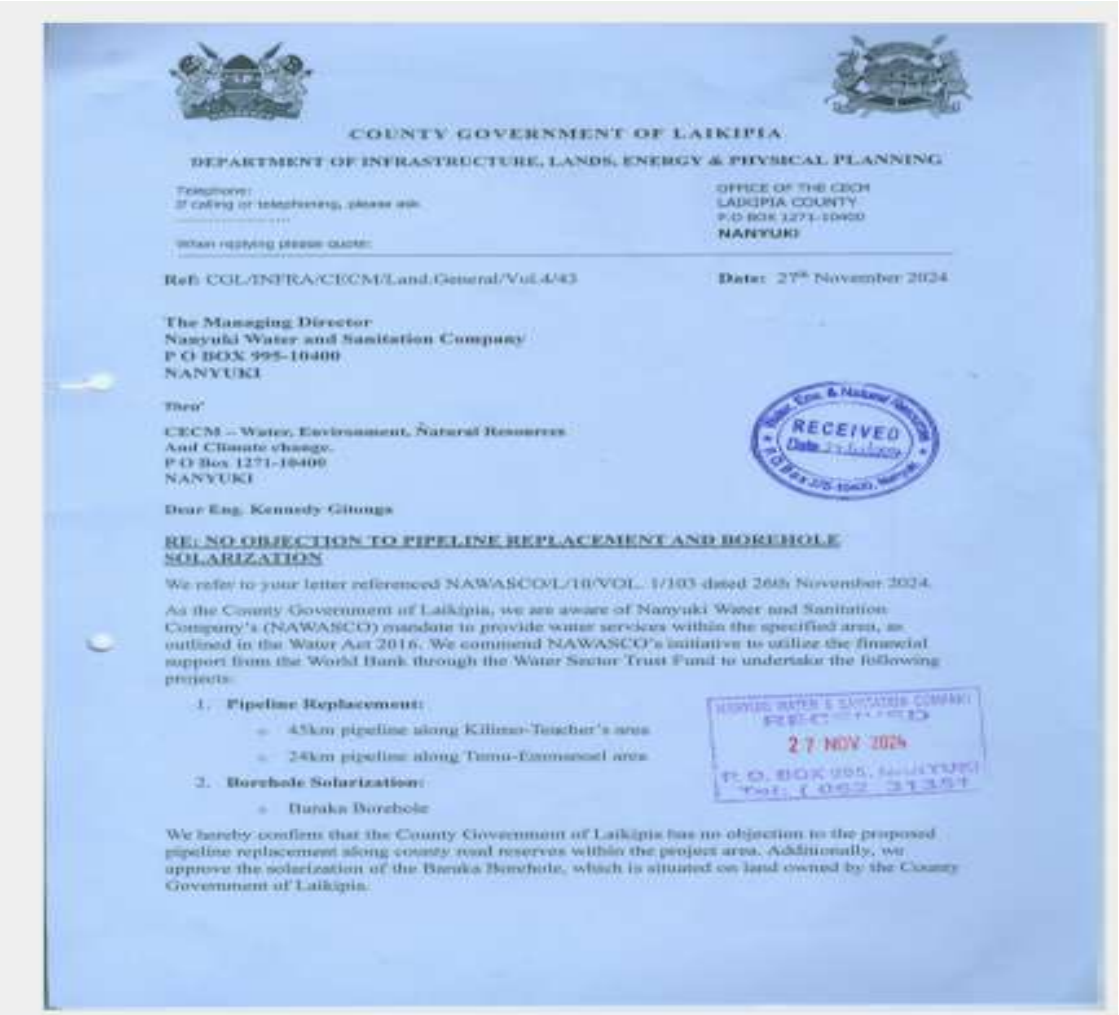
Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

10.7 County No Objection Letter



COUNTY GOVERNMENT OF LAIKIPIA

DEPARTMENT OF INFRASTRUCTURE, LANDS, ENERGY & PHYSICAL PLANNING

Telephone:
If calling or telephoning, please ask:

When replying please quote:

OFFICE OF THE CECM
LAIKIPIA COUNTY
P.O BOX 1271-10400
NANYUKI

Ref: COL/INFRA/CECM/Land.General/Vol.4/43

Date: 27th November 2024

The Managing Director
Nanyuki Water and Sanitation Company
P O BOX 995-10400
NANYUKI

Thro'

CECM – Water, Environment, Natural Resources
And Climate change.
P O Box 1271-10400
NANYUKI

RECEIVED

Dear Eng. Kennedy Gitonga

RE: NO OBJECTION TO PIPELINE REPLACEMENT AND BOREHOLE SOLARIZATION

We refer to your letter referenced NAWASCO/L/18/VOL. 1/103 dated 26th November 2024.

As the County Government of Laikipia, we are aware of Nanyuki Water and Sanitation Company's (NAWASCO) mandate to provide water services within the specified area, as outlined in the Water Act 2016. We commend NAWASCO's initiative to utilize the financial support from the World Bank through the Water Sector Trust Fund to undertake the following projects:

1. **Pipeline Replacement:**
   - 45km pipeline along Kilimo-Teacher's area
   - 24km pipeline along Tumu-Emmanuel area
2. **Borehole Solarization:**
   - Baraka Borehole

NANYUKI WATER & SANITATION COMPANY
RECEIVED
27 NOV 2024
P.O. BOX 995, NANYUKI
Tel: (062) 31351

We hereby confirm that the County Government of Laikipia has no objection to the proposed pipeline replacement along county road reserves within the project area. Additionally, we approve the solarization of the Baraka Borehole, which is situated on land owned by the County Government of Laikipia.

We encourage NAWASCO to coordinate closely with our County Engineers during the project implementation phase to ensure minimal disruption to public infrastructure and services.

We wish NAWASCO success in executing these projects.

Sincerely,

EKWAM NABOS
CECM- Department of Land, Housing, Energy & Urban Development
LAIKIPIA COUNTY

CC:

- The Governor of Laikipia County
- County Secretary & Head of County Public Service