ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT FOR A PROPOSED BOREHOLE DRILLING & SOLARIZATION AT WASO PRIMARY SCHOOL, ISIOLO TOWN-ISIOLO COUNTY



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

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INTERNAL QUALITY CONTROL

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CERTIFICATION

We hereby certify that the content of this Environmental and Social Impact Assessment Report for proposed borehole drilling and solarisation in Isiolo 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-ESMP	Construction Phase-Environmental & Social Management 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
ESMoMP	Environmental and SocialMonitoring and Management Plan
GDP	Gross Domestic Product
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Virus
IWASCO	Isiolo 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 Isiolo, 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 proposed project is located in Isiolo County, an area that is 95% arid and 5% semi-arid. It is characterized by limited water resources, evidenced by low precipitation, seasonal rivers and low surface water yields. The area also experiences frequent droughts which are exacerbated by the climate change phenomenon. As a result, residents in this area rely on groundwater which is usually salty or they have to walk for long distances in search of fresh water. This creates an economic and social burden on the communities living in these areas. It is against this background that the proponent has proposed to develop a water supply project so as to address the challenge of inadequate water supply in the area.

0.2 Project Description

The project proponent, IWASCO is a utility company responsible for providing water supply and sanitation services in Isiolo County. Its primary mandate includes ensuring reliable water supply to residents and managing wastewater and sewerage systems within its jurisdiction. The project will be implemented through the Conditional Liquidity Support Grant (CLSG) program whose objective is to improve water supply and sanitation services in select north eastern and coastal region and improve the financial performance of WSPs affected by the COVID-19 pandemic. The program is being implemented by Ministry of Water, Sanitation and Irrigation (MoWS&I) through the Water Sector Trust Fund. Under this program, IWASCO has been selected to implement 3 interventions including: drilling and equipping of 5 boreholes, solarisation of 7no boreholes, purchase and installation of 1,610DN 15mm consumer meters. In this regard, 7No project sites have been identified. One of the boreholes is located at Waso Primary School hence the name 'Waso Primary School Borehole'.

The project will entail hydrogeological survey which has been conducted and a report provided. The investigation established that the proposed location will yield ground water at the depth of 280 meters. Following these studies, the proponent will obtain permits and approvals from NEMA and WRA. Upon getting approvals, the construction work will commence including: borehole drilling to a depth of 230 meters and a diameter of at least 8″. Casing will be inserted into the borehole to prevent collapse and to protect the well from contamination. Gravel packing will be used around the casing to improve filtration and stability. Solarization will be done by way of constructing solar panel ground mount frames, control room and installing batteries, inverters, electrical cables and conduits. The proposed solar system will have a capacity of 7.5KW. 1No.Sunverter SV3/7.5T controller will be installed, 29No. 440W Dayliff solar modules. The ground mount will be 4meters in length. A Lightning arrestor of 5 meters will also be provided. The system will also provide for 1No. PV Disconnect

Switch 1000V/40A. A submersible pump will be installed in the borehole. The pump type is Grundfos submersible with a motor capable of delivering 15m3/hr against a head of 150m. Pump testing will be conducted to assess the yield and sustainability of the water source. Other accessories include: adapter set (1¼"), 63mm dia. PVC Dayliff borehole pipe 3m length, 25mm airline pipes, 1No cooling sleeve, 2" x 6" borehole cover and 63mm diameter water meter. Water samples will be collected and tested for various parameters at IWASCO water treatment plant laboratory to ensure it meets the required quality standards for human consumption. A steel tank will be mounted to facilitate water storage and reticulation. The tank will be 50 cubic meters elevated on 15 meters tower. Reticulation will involve connecting the borehole outlet to the mains. There is an existing water main in the area. The water will be supplied to residents who are already connected to the main but due to low water volumes, they have been experiencing intermittences. This borehole will serve to increase water volume in the main and hence residents who have connections will obtain adequate water quantities. Once the borehole is operational, it will be handed over to IWASCO for operation and maintenance. Regular maintenance and monitoring will be conducted by IWASCO to ensure the longevity and efficiency of the borehole.

The Waso Primary School Borehole site is located in Waso Primary School compound, Merille Sub-location, Central Location, Isiolo Central Sub- County, Isiolo County. The geographic location of the site is latitude 0.33260 North, longitude 37.57360 East and elevation of approximately 1148 meters. There is an existing well which will be upgraded to enhance capacity. There are also two plastic water storage tanks. The school compound is characterized by permanent structures, playing field and trees which are planted along the school boundary.

0.3 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 Plan (ESMP) 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

0.4 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 20 respondents. Key Informant Interviews were conducted. Public meetings were also held to create awareness about the project and obtain their views. The views of the public and secondary stakeholders are summarized in Chapter Five of this report.

0.5 Policy Legal and Regulatory Framework

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

- ✓ Isiolo County Water and Sanitation Services Act, 2020
- ✓ Isiolo County Climate Fund Act, 2018
- ✓ The Isiolo County Emergency Fund Act, 2016
- ✓ National Water Policy,
- ✓ Water Act 2016,
- ✓ Water Quality Regulations, 2006, (Legal Notice No.121),
- ✓ Water Resources Management Rules, 2007
- ✓ 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

0.6 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 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-Isiolo. 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 and household survey is annexed to this report.

0.7 Project Alternatives

(i) No Project Alternative:

This alternative entails maintaining the current status quo without implementing the project. Potential negative impacts include continued water shortages, high operational costs due to electricity dependency, and underutilization of local skills. It also risks exacerbating water-related conflicts and vandalism of existing infrastructure. However, opting for the "No Project" alternative would avoid potential environmental disturbances and maintain current conditions.

(ii) Borehole Location Options:

The project has evaluated multiple sites based on geological suitability, accessibility, environmental impact, water quality, and future land use considerations. Two location options were considered: a primary school site and IWASCO-owned land. The primary school site has the advantage of availability of land, security since the site is fenced and enjoys institutional benefits such as ownership and access control. It is disadvantageous in that there is a perceived lack of direct access ad control by IWASCO and the tenure security may be threatened by changes in school management or policies.

The second option involves acquisition of land by IWASCO. This will be under the full control and management of the IWASCO. However, it is costly and may have regulatory and administrative challenges that characterize land acquisition. Given the level of funding available, the Waso Primary School Borehole site is preferred as it is more affordable and will not require lengthy acquisition processes. Residents of Isiolo will not have to wait for long to benefit from the increased water supply. The project will enjoy the institutional benefits. The issue of tenure security can be mitigated by agreements, engagement of all stakeholders in the school and continued community participation.

(iii) Water Source Alternatives:

Surface water from River Ewaso Nyiro and groundwater from boreholes were assessed as potential water sources. Surface water offers initial cost advantages but is seasonal and poses environmental risks. Boreholes provide consistent and high-quality water, particularly beneficial during droughts, with minimal impact on surface water resources. Preference leans towards boreholes due to their reliability and sustainability, aligning with long-term water security goals.

0.8 Potential Project Impacts and Proposed Mitigation Measures

Construction Phase	Positive Impacts	Negative Impacts
	i. Job opportunities for the local community especially the youth ii. Skill transfer to the local communities iii. Promotes local businesses through sourcing of construction Materials locally and other enterprises such as hotels iv. Improvement of infrastructure around the site (through negotiated CSR) e.g. security lighting or water tank v. Improved livelihoods in the area as money generated from increased businesses in the area	i. Conflict due to disagreements on wages, piece rate, allocation of employment opportunities ii. De-vegetation/ disturbance (minimal végétation on site) iii. Noise and vibrations which may disrupt learners, road users & residents within 500meters radius-other receptors are AIPCEA church, St Anastacia Dispensary iv. Water contamination during drilling

		v. Occupational hazards such as falls, fire and other injuries vi. Risk of misdemeanour among workers-sexual assault to pupils, school staff vii. The project may pose a risk to the community and in particular the learners through traffic incidences, moving debris and dust viii. There may be increased risk of HIV/AIDS transmission particularly due to influx of migrant workers who may engage in casual sexual relationships due to their temporary stay ix. Workers' influx due to availability of casual employment which may create pressure on services or cultural conflicts x. Increased risk of child labour on site due to high number of non-school going children. xi. Children may be indirectly involved through sale of food and provision of support services Construction sites pose a risk of sexual exploitation and abuse from rogue workers.
Mitigation Measures	xii. Involvement of local leaders in project planning xiii. Establish standard procedures for skilled and non-skilled employment xiv. Prioritize local youths in employment esp non skilled labour xv. Institute a grievances and redress measures e.g. project committee, liaison officer xvi. Demarcate construction areas and routes to these sites xvii. Rehabilitate disturbed sites xviii. Adhere to the noise and vibrations protocols provided-notifications during drilling, drilling during day/weekend xix. Traffic management- speed limits in school vicinity, no hooting xx. Adopt occupational health and safety guidelines xxi. Pupil sensitization on security and moral issues that may result from the project	

	xxii. Provide barriers around the site and erect warning signages outside the mosque compound xxiii. Conduct HIV/AIDS sensitization to workers and community through weekly talks and on site sensitization materials xxiv. Prioritize locals in provision of employment opportunities and sensitize workers and migrants acceptable social conduct in this community xxv. Establish an employment policy which regulates the age of workers to those above 18 years. xxvi. Provide signages with sensitization and warning messages against sexual exploitation and abuse xxvii. Develop a code of conduct for workers on matters sexual exploitation and abuse and sensitize the community on the GRM procedure. xviii.	
Operation Phase	Positive Impacts	Negative Impacts
	Direct Impacts i. Regular supply of quality water to the institutions such as Waso Comprehensive School & residents of Isiolo Town ii. Improved access to portable water iii. Reduction of operation & maintenance costs as a result of solarisation iv. Increased revenue to IWASCO *Secondary Impacts* v. Reduced cases of water borne diseases among the locals vi. Establishment/Improvement of livelihoods *Cumulative Impacts* vii. Improved local economic development viii. Improved number of children enrolling in schools ix. Institutional strengthening & Capacity building for the water company x. Increased tree cover	*Direct Impacts* i. Concerns about water quality, such as high salinity or contamination, which could affect community health. ii. Risk of disrupted services during low sunshine months Cumulative Impacts iii. Continuous extraction may lead to lowered water tables, impacting local ecosystems and vegetation.
Mitigation Measures	• Regular testing and monitoring of water quality by IWASCO 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 school community-teachers, pupils 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. • Provide storage structures to provide water during the low sunshine hours • Implementing effective billing systems and revenue collection mechanisms to enable continued operation and maintenance • Ensuring transparency in financial management and accountability to stakeholders.
Recommendations	• Ensure public participation in all project stages • IWASCO should involve all relevant stakeholders from the planning, design, construction to commissioning • Engage the local leaders to create a 'buy in' and project support to ensure sustainability

1 INTRODUCTION

1.1 Project Background

Isiolo County is situated in the eastern part of Kenya and covers an area of approximately 25,336 square kilometres. About 65% of Isiolo County is very arid, 30% arid, and 5% semi-arid[1]. The climate is characterized by high temperatures and low rainfall, typically ranging from 150mm to 650mm annually. The current state of water supply in Isiolo County is a complex issue characterized by significant challenges related to infrastructure, resource management, and environmental conditions. The primary surface water source in the county is the Ewaso Ng'iro River, which is a crucial water source for both domestic and agricultural use. However, its flow is highly seasonal and unreliable, often drying up during drought periods. There are a few small dams and water pans that capture and store rainwater. These structures are critical for providing water during dry periods, but they are often poorly maintained and suffer from evaporation losses.

Groundwater is a major source of water in Isiolo. The county has several boreholes and wells, but many of them are not operational due to technical failures, poor maintenance, or salinity issues. High fluoride levels in some areas also limit the usability of groundwater. The ground water is distributed unevenly, and in some areas, the aquifers are not adequately replenished, leading to depletion. In view of this, improved water access in Isiolo calls for increased investment in groundwater through drilling of boreholes, rehabilitation of existing wells, instituting sustainable maintenance strategies and increasing the capacity of the water treatment plant to address water quality challenges. It against this background that Isiolo Water and Sewerage Company (IWASCO) has proposed to drill and equip 5 boreholes within Isiolo town.

The proposed project is a component of the Conditional Liquidity Support Grant (CLSG) program whose objective is to improve water supply and sanitation services in select north eastern and coastal region and improve the financial performance of WSPs affected by the COVID-19 pandemic. The program is being implemented by Ministry of Water, Sanitation and Irrigation (MoWS&I) through the Water Sector Trust Fund. Under this program, IWASCO has been selected to implement 3 interventions including: drilling and equipping of 5 boreholes, solarisation of 7no boreholes, purchase and installation of 1,610DN 15mm consumer meters. IWASCO is a utility company responsible for providing water supply and sanitation services in Isiolo County. Its primary mandate includes ensuring reliable water supply to residents and managing wastewater and sewerage systems within its jurisdiction. It ensures access to clean and safe drinking water while also managing sanitation infrastructure to improve public health and environmental sustainability in the county.

The project is expected to contribute towards increased water access in line with the 2010 Kenyan Constitution which entitles citizens a right to "reasonable standards of sanitation" and "clean and safe water in adequate quantities". The constitution under Article 21 further places

1 [1] Thiakunu et al., 2023 Camel Herd Structure and Performance in Isiolo and Marsabit Counties, Kenya

an obligation on the government to take steps to progressively realize this right. Additionally, Kenya's Vision 2030 for water and sanitation seeks to ensure that improved water access to all. The goal of the Third Medium Term Plan is to improve access to water and sanitation, have an innovative self-financing mechanism for the sector, and adequate investment planning to move the water sector into the path of Vision 2030. The economic, social, and political pillars of the vision 2030 are further anchored on infrastructure as one of the key foundation for the Vision 2030. Therefore, water facilities are a critical impetus to achieving the development initiative Water Sector Trust Fund, has engaged an individual consultant to undertake an Environmental and Social Impact Assessment for the proposed intervention to aid in the Implementation of the project.

1.2 Project Justification

The proposed project will allow for increased water access through diversification of water sources. It will provide an alternative water source that can supplement existing water supply from Ewaso Nyiro river which is not reliable particularly during the dry season. This will improve water security for residents, businesses, and institutions in Isiolo Town.

Additional boreholes in Isiolo Town will support local economic activities such as urban agriculture and businesses, which depend heavily on water availability. Given the rapid growth of the town, water access will foster economic growth of the town which will lead to increased household incomes and improved standards of living.

Rapid urbanization and population growth in Isiolo implies increased strain on existing water resources which may lead waterborne diseases such as Cholera and typhoid which are the most prevalent in this county. The project will increase the existing water supply and hence mitigate against an upsurge of waterborne diseases

With changing climate patterns leading to increased drought occurrences in many regions, including Isiolo, the proposed boreholes can serve as a climate-resilient solution by providing a sustainable water supply that is less vulnerable to climate variability.

1.3 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, drilling of boreholes will help in improving accessibility to clean water for the residents, ensuring consistent water supply and improved sanitation among residents. However, it is notable that the construction and operation processes may generate negative environmental and social impacts. Such negative effects if not properly managed may obscure the realization of benefits anticipated from the proposed development. It is therefore paramount that a comprehensive assessment of possible negative impacts is undertaken to identify mitigation measures and safeguards that need to be instituted during the project period.

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.

1.4 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 Plan (ESMP) 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.

1.5 Scope of the Study

In accordance with the ToR[2], the scope of the assignment entails:

a) Detailed description of the proposed project
b) Assessment of the baseline conditions in the project area
c) Stakeholder engagement
d) Analysis and Assessment of Potential impacts and recommendations for mitigation and potential development needs
e) Cumulative impact assessment
f) Waste Management (Solid and liquid/ effluents/wastewater)
g) Analysis of the relevant policy, legal and regulatory frameworks
h) Analysis of alternative to the project site, design and inputs
i) Development of an environmental and social management and monitoring plan

1.6 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.

1.6.1 ESIA Process

1.6.1.1 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.

1.6.1.2 Scoping

This stage outlines the perceived required scope of the ESIA 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

[2] Ministry of Water, Sanitation and Irrigation (MoWS&I) TOR for conducting ESIA

d) **Analysis of Alternatives**- undertaking an analysis of technically and financially feasible alternatives for the proposed project sites.

1.6.1.3 Baseline Field Surveys and Studies

Field Studies included:

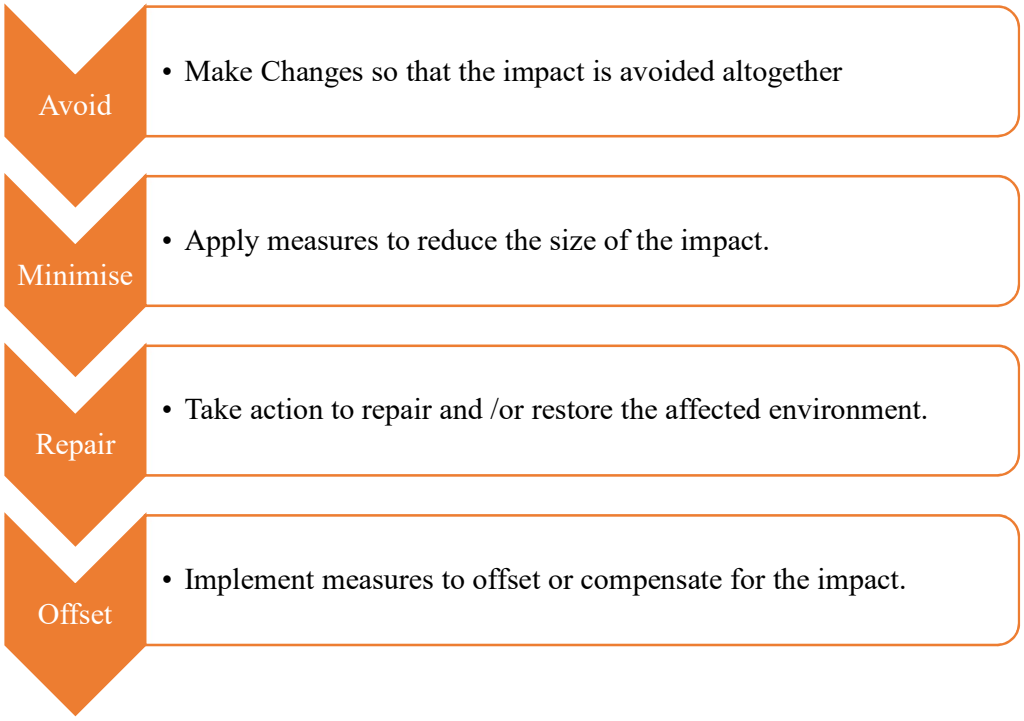
- **Baseline Survey:** The Consultant will undertake a household survey within the project area to understand the existing socio-economic conditions. The information will be used in assessing the socio-economic implications of the proposed project.

1.6.2 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 Plans (ESMPs) 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.

1.6.3 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 of this report.

1.7 Structure of the Comprehensive Project Report (CPR)

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, socio-economics, 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: Analysis of alternatives: This chapter gives a description of the project details of the proposed project, alternative options, designs and implementation strategies.

Chapter 7: 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 8: Environmental and social management and monitoring Plans: This chapter presents the proposed Environmental and Social Management and Monitoring Plans prepared for the project.

Chapter 9: 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

The proposed project is located in Isiolo Town, Isiolo Sub county within Isiolo Sub County Waso Primary School. Isiolo County borders Marsabit County to the North, Samburu and Laikipia Counties to the West, Garissa County to the South East, Wajir County to the North East, Tana River and Kitui Counties to the South and Meru and Tharaka Nithi Counties to the South West. It covers an area of 25,605km2. Isiolo is approximately 280KM North-East of Nairobi city via the (A2) Nairobi-Nanyuki-Isiolo Road.

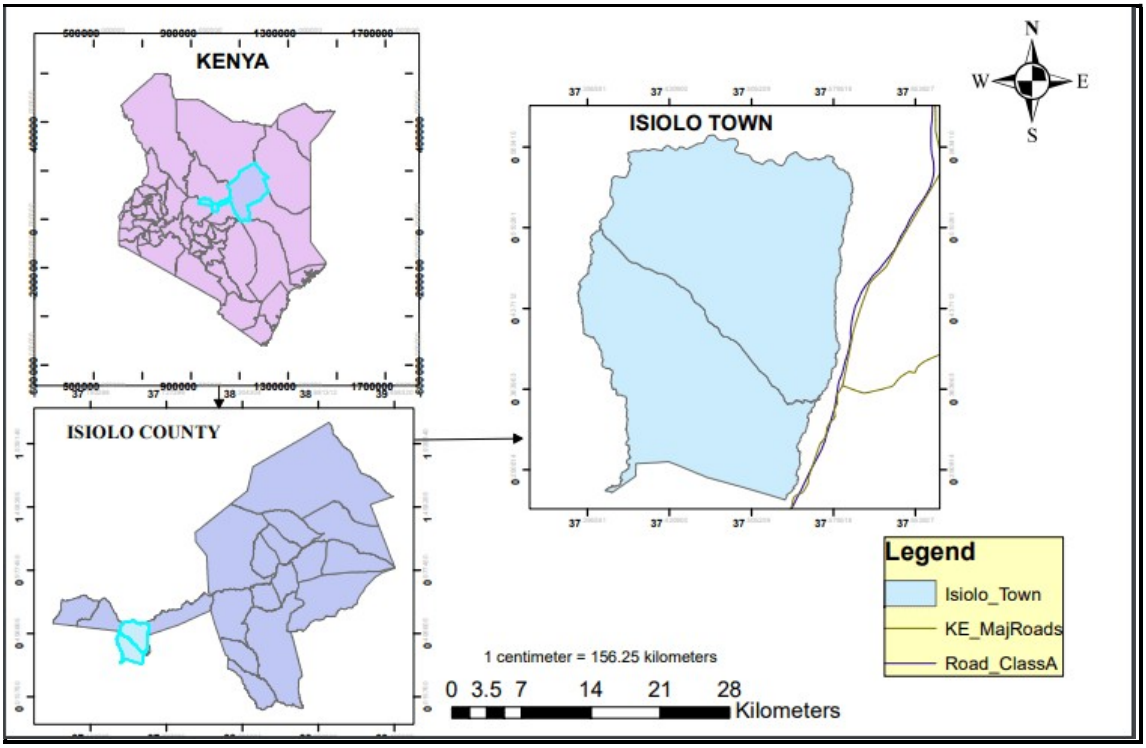


Figure 2-1: Map of Isiolo Town

2.1.2 Description and Location of the Proposed Project

The proposed project will entail site identification (which has already been done in consultation with the community), geo-hydrological assessment, borehole drilling, test pumping and surface casing. Following the drilling works, a solar system will be set up for purposes of pumping water. The proposed works will include:

PLANNING PHASE

Survey and Site Selection:

A preliminary hydrogeological survey was conducted to identify potential groundwater sources. Geophysical surveys will be employed to determine the best location for drilling based on water availability and quality.

Permitting and Approvals:

As part of the project planning phase, the proponent will obtain necessary permits and approvals from authorities and regulatory bodies including EIA license and WRA permit.

CONSTRUCTION PHASE

Drilling:

Once the site is selected and permits are secured, the proponent will engage a contractor to undertake the drilling works. The contractor will mobilize drilling equipment to the site. The borehole should have a diameter of at least 8″. Drilling will be done to a depth of depth of 230 meters.

Installation of Casing:

Casing will be inserted into the borehole to prevent collapse and to protect the well from contamination. Gravel packing will be used around the casing to improve filtration and stability.

Solar Instillation

Borehole solarization will entail construction of solar panel frames and ground mount points for control room housing the, batteries, inverters, electrical cables and conduits. Borehole solarization will entail construction of solar panel frames and ground mount points for control room housing the, batteries, inverters, electrical cables and conduits. The proposed solar system will have a capacity of 7.5KW. 1No. Sunverter SV3/7.5T controller will be installed and 29No. 440W Dayliff solar modules. The ground mount will be 4meters in length. A Lightning arrestor of 5 meters will be provided. The system will also provide for 2No. PV Disconnect Switch 1000V/40A. It will use 180 meters of assorted cables.

Development:

After drilling, the borehole will be developed to increase its yield. This will involve pumping to remove fine materials and improve water flow from the aquifer into the well.

Pump Installation and Testing:

A submersible pump will be installed in the borehole. The pump type is Grundfos submersible with a motor capable of delivering 15m3/hr against a head of 150m. Pump testing will be conducted to assess the yield and sustainability of the water source. Other accessories include: adapter set (1¼''), 63mm dia. PVC Dayliff borehole pipe 3m length, 25mm airline pipes, 1No cooling sleeve , 2'' x 6" borehole cover and 63mm diameter water meter.

Steel Tank Installation

A steel tank will be mounted to facilitate water storage and reticulation. The tank will be 50 cubic meters elevated on 15 meters tower.

Reticulation

Upon testing the water quality, IWASCO will connect the borehole to the existing water mains. This will entail trenching and pipelaying from the borehole (within the compound) to the existing main which is 50 meters from the well. IWASCO will ensure materials used are of good quality to prevent leakage and pipeline degradation which will compromise the water quality. The water will be supplied to residents who are already connected to the main but due to low water volumes, they have been experiencing intermittences. This borehole will serve to increase water volume in the main and hence residents who have connections will obtain adequate water quantities.

Water Quality Testing:

Water samples will be collected and tested for various parameters to ensure it meets the required quality standards for human consumption. This will be done in IWASCO water treatment plant which has a licensed laboratory. Testing will be done for chemical, physical and bacteriological analysis before the water is made available for use. Water quality analysis results will be submitted to WRA for issuance of a permit.

Handover and Maintenance:

Once the borehole is operational, it will be handed over to IWASCO for operation and maintenance. Regular maintenance and monitoring will be conducted by IWASCO to ensure the longevity and efficiency of the borehole.



Plate 2-1: Waso Primary School Borehole Site

2.2 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 drilling and solarisation as per the Second Schedule of the EMCA Act shows that the project will be classified as a **Medium Risk Project** *ref. Legal Notice 31 (3a) Drilling for purposes of utilizing groundwater*. This requires a comprehensive project report to be submitted.

2.3 Total Project Cost

The total project cost is for the proposed project is estimated at Four Million, Ninety-One Thousand, Two hundred and Fifty Kenya shillings (KES 4,091,250).

Activity	Cost
Borehole drilling & solarization	1,991, 750
Steel tank installation	2,099,500
Total	**4,091,250**

3 POLICY, LEGAL AND REGULATORY FRAMEWORK

3.1 Introduction

3.1.1 The Constitution of Kenya

The Constitution is the supreme law of the Republic and binds all persons and all State organs at all levels of government. In relation to the environment, article 42 of chapter one, *The Bill of Rights,* confers to every person the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative measures, particularly those anticipated in Article 69, and to have obligations relating to the environment fulfilled under Article 70. In addition, Article 21 entrenches water as a constitutional right by establishing a right to "clean and safe water in adequate quantities". This article places an obligation on the government to take steps to progressively realize this right.

3.1.2 The Kenyan Vision 2030

The Kenya Vision 2030 is a policy document outlining Kenya's development programme covering the period between the years 2008 to the year 2030. The objective of Vision 2030 is to help transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens in a clean and secure environment by 2030. Additionally, the Kenya Vision 2030 also has environmental goals outlined under the social pillar. According to the pillar, Kenya aims to be a clean, safe and sustainable environment by 2030. The country aims to achieve this goal by for example, improving pollution and waste management strategies. By commissioning an environmental impact assessment study for the project, the proponent has displayed his desire to support the Kenya Vision 2030. Further, the development blue print seeks to ensure that improved water and sanitation is available and accessible to all. The main goal is to **improve access to water** and sanitation, have an **innovative self-financing mechanism for the sector**, and adequate investment planning to move the water sector into the path of Vision 2030. The economic, social, and political pillars of the vision 2030 are further anchored on infrastructure as one of the key foundations for the Vision 2030.

3.1.3 National Policy on Water Resources Management and Development

The National Water Policy of April 1999, known as Sessional Paper No. 1 of 1999, advocates for decentralizing operational activities from the central government to various sectors, including local authorities, the private sector, and encouraging community involvement. This decentralization aims to enhance efficiency in delivering water services. The policy addresses issues such as water supply, sanitation facilities development, institutional framework, and financing within the water sector. Its overarching goal is to establish a rational and efficient framework to meet water needs for national economic development, poverty alleviation, environmental protection, and the social wellbeing of citizens through sustainable water resource management.

This approach encourages Isiolo county government to play active roles in improving water service delivery efficiency. By implementing sustainable water resource management practices

and ensuring adequate infrastructure development, Isiolo can meet its water supply needs effectively. *The policy also underscores the significance of institutional frameworks and financing mechanisms tailored to local contexts, which IWASCO can utilize to enhance their operational capabilities and ensure equitable access to clean water for all residents. This Conditional Liquidity Support Grant (CLSG) program provides an opportunity for water infrastructure development through an innovative funding mechanism.*

3.1.4 Policy Guidelines on Environment and Development

Among the key objectives of the Policy Paper on Environment and Development (Sessional Paper No.6 of 1999) are: -

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

b) To ensure that an independent environmental impact assessment (EIA) report is prepared for any industrial venture or other development before implementation,

c) To come up with effluent treatment standards this will conform to acceptable health standards.

Under this paper, broad categories of development issues were covered that require sustainable approach these issues include the waste management and human settlement sectors. The policy recommended the need for enhanced re-use/recycling of residues including wastewater, non-waste technologies, increased public awareness raising and appreciation of clean environment. *The proponent, IWASCO is therefore obligated to provide waste water management system to those who will be connected to the proposed water supply network.*

3.1.5 Sustainable Development Goals

Goal number eleven of the global sustainable development goals focuses on making cities inclusive, safe, resilient and sustainable. Some of the goal's targets which are relevant to the project include: to ensure access for all to; adequate, safe and affordable housing and basic services and upgrade slums by 2030 and to enhance inclusive and sustainable urbanization and capacity for sustainable human settlement planning in all countries by 2030. *The proposed project will contribute to this goal directly through increased access to water supply among urban residents of Isiolo which will consequently lead to sustainable urbanization.*

3.1.6 World Bank Operational Procedures

The following safeguards may be triggered in the course of project implementation

Environmental and Social Assessment:

- OP 4.01 Environmental Assessment: This project falls within the category of projects requiring environmental impact assessment. This implies that the project requires the assessment of potential environmental impacts and mitigation measures before approval. This includes evaluating groundwater quality, availability, and impacts on local ecosystems.

Biodiversity Conservation:

- OP 4.04 Natural Habitats: Ensures that projects avoid or minimize impacts on critical habitats and endangered species. The safeguard will not be triggered as there is no significant vegetation/habitat clearance that is anticipated

Water Resource Management:

- OP 4.07 Water Resources: Focuses on sustainable water resource management, including assessing the long-term availability and quality of water. The project should therefore allow for monitoring groundwater levels, recharge rates, and potential impacts on local water sources.

3.2 Water Regulatory Framework

3.2.1 Water Act, 2016

The Water Act 2016 provides for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water. Under this provision, the responsibility to regulate access, use and control of water resources is vested with the Water Resource Authority (WRA). Further it provides for the inclusion of communities living along the water resources in development projects. The Water Resource User Association (WRUA) are for consideration of project impacts on the community.

Part II section 18 of this act provides for the national monitoring and information systems on water resources. Sub-section 3 of this allows the water management authority to demand from any person or institution, specified information samples or raw Material on water resources. Under these rules, specific records may require to be kept by a site operator and the information made available to the authorities as and when required.

Section 73 of the act allows a person with a license to supply water to make regulations for purposes of protecting against degradation of water resources. Section 75 allows the licensee to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water within their jurisdiction. In Kenya, water is regarded as a national resource and is therefore owned by the state for and on behalf of the people (Section 3).

Section 36 requires applications for permit made in case of proposed diversion, abstraction, obstruction, storage or use of water from a water body.

IWASCO is required to obtain a permit for purposes of abstracting underground water. It is also a requirement to regularly undertake sample testing to determine the quality of water. These records should be availed to WRA upon request. IWASCO is also required to design regulations for purposes of mitigating degradation of the well.

3.2.2 Water Quality Regulations, 2006, (Legal Notice No.121)

Water Quality Regulations apply to water used for domestic, industrial, agricultural and recreational purposes; water used for fisheries and wildlife purposes; and water used for any other purposes.

No person is allowed to abstract water from a natural water body for domestic purposes unless such water meets the standards set out in the First Schedule.

These regulations provide for the protection of lakes, rivers, streams springs, wells and other sources. The overriding objective of the regulations is to protect human health and the environment. Proper enforcement of the regulations can lead to marked reduction in water-borne diseases. The regulations provide guidelines and standards for the discharge of poisons, toxins, radioactive and other pollutants into the aquatic environment. Standards have also been set for discharge of effluent into the sewer and aquatic environment. The National Environment Management Authority regulates discharge into the aquatic environment.

Persons (real or legal) discharging effluent into the environment are required to submit quarterly discharge monitoring records to NEMA.

IWASCO is obligated to undertake water quality assessment prior to operationalization of the borehole.

3.2.3 Water Resources Management Rules, 2007

The project will be required to submit authorization to the Water Resources Authority within 12 months of the commencement of the rules as stated in Part II Section 17 (1). Failure to submit the documents may be used as a basis for revocation, variation or cancellation of the permit or authorization.

Part VII Section 97 of the Rules states that the Authority shall, where applicable, require an applicant to show evidence of compliance with the provisions of EMCA. Section 99 states the need for controlling and measuring devises for accurate measurement of the water abstracted.

The WRA Rules, 2007, Part VIII Section 104, states that the Authority shall be paid for water abstracted by any person in possession of a valid water permit or supposed to have a valid water permit.

IWASCO shall submit an ESIA license to WRA for authorization of the proposed works.

3.2.4 Isiolo County Water and Sanitation Services Act, 2020

The Isiolo Water and Sanitation Services Act of 2020 is a pivotal legislative framework aimed at governing water resources management and sanitation services within Isiolo County. Central to this Act is the establishment of a Water Directorate, tasked with regulating and overseeing the provision and management of water supply services throughout the county. This Directorate plays a crucial role in ensuring compliance with water management regulations, coordinating water resource development efforts, and maintaining equitable allocation among residential, industrial, and agricultural users.

The Act also introduces water tariff regulations, which define the pricing structure for water services to cover operational costs and promote conservation. Furthermore, it addresses sanitation services, encompassing wastewater management and infrastructure development to enhance public health standards. Emphasizing community participation and stakeholder engagement, the Act seeks to foster partnerships with local communities, NGOs, and the private sector to improve water service delivery and sustainability. Enforcement mechanisms ensure adherence to regulations, underscoring the Act's commitment to sustainable water resource management and sanitation improvements in Isiolo County.

IWASCO will endeavour to comply with the Act with regard to the tariff system, conservation of water and community and stakeholder engagement in the development of this proposed project. This ESIA provides an opportunity for this broad engagement. The outcome of which is recorded in the public participation chapter

3.3 Environmental Policy and Regulatory Framework

3.3.1 National Environment Action Plan Framework

The National Environmental Action Plan Framework is the second national environmental policy after the 1994 National Environmental Action Plan (NEAP). The development of NEAP is provided for by EMC (amendment) Act 2015 which requires preparation of Environmental Action Plan at different levels; County and national levels. The framework recognizes the intertwined linkages between economic growth and environment in Kenya. It highlights priority themes and activities for the country towards achieving sustainable environment.

3.3.2 Environment Management & Coordination Act Cap 387

This Act of Parliament, EMCA 1999 and the subsequent amendments, is the parent Act of Parliament that provides for the establishment of appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto.

EMCA, in its 13 interrelated parts, provides regulatory provisions for all levels of environmental conservation and management. The first one part provides legislative guidelines on administrative and planning components of environmental management. They include; (I); General principles (II); Administration (III); Environmental planning (IV); Protection and Conservation of the Environment. Parts five to seven focus on on-field management of the environment as an integral component of actual or proposed projects. (V), Environmental impact assessments (EIA), audits and monitoring (VI); Environmental audit and monitoring (VII); Environmental quality standards. The last five parts of the Act regulate on enforcement of provisions outlined in the Act and recognition of international agreements along which the EMC (amendment) Act 2015 has been established. They are; (VIII); Environmental Restoration orders, Environmental Easements (IX); Inspection, analysis and records (IX); Inspection Analysis and Records (X); International Treaties, Conventions and Agreements (XI) National Environment Tribunal (XII); Environmental Offences (XIII).

All the chapters 1 to 13 apply to the proposed project at one stage or the other and therefore the project proponent is required to understand and conform with the Act accordingly. One

such area is Environmental and Socio Impact Assessment. This is expressly stated in section 58(2) of the Act.

3.3.3 The Environmental (Impact Assessment and Audit) Regulations, 2003/Legal Notice 31 & 32

This is a supplementary legislation to the EMC (amendment) Act. It gives additional punch by providing guidelines for conducting Environmental Impact Assessments and Audits. It offers guidance on the fundamental aspects on which emphasis must be laid during field study and outlines the nature and structure of Environmental Impact Assessments and Audit reports. The legislation further explains the legal consequences of partial or non-compliance to the provisions of the Act.

The Legal Notice 31 &32 categorizes the proposed project as a medium risk one that requires a Comprehensive Project Report (CPR). This implies undertaking a detailed assessment of site conditions, public participation and broad stakeholder engagement.

3.3.4 Environmental Management and Coordination (Conservation of Biological Diversity) Regulations 2006

These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84 of December 2006. These Regulations apply to conservation of biodiversity that includes Conservation of threatened species, inventory and monitoring of biological diversity and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties. This legislation takes cognizance of the need to promote the integrity of biodiversity to promote their integrity. Most of the biological diversity is highly threatened by development in the current world and there is an apparent need to enhance their integrity. Section IV, prohibits any activity, which may have adverse effects on the ecosystem.

The proposed sites are not within any sensitive ecosystem. The vegetation on site is well documented. Any clearance that must be done will require a permit.

3.3.5 Environmental Management and Coordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations 2009

These regulations provide for the protection, management of wetlands, riverbanks and lakeshores, seashore management.

3.3.6 Environmental Management and Co-ordination (Controlled Substances) Regulations, 2007

These Regulations aim to regulate the production, trade and use of controlled substances and products; provide for a system of data collection to facilitate compliance with relevant reporting requirements under the Montreal Protocol on Substances that Deplete the Ozone Layer; promote the use of ozone friendly substances, products, equipment and technology; and ensure the elimination of substances and products that deplete the ozone layer.

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

Regulations guiding waste management are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006. They offer legal provisions on handling of a variety of wastes emanating from various projects and activities. The waste categories covered by the regulations include:

- Industrial waste
- Hazardous and toxic wastes
- Pesticides and toxic substances
- Biomedical wastes
- Radio-active substances

These Regulations outline requirements for handling, storing, transporting, and treatment / disposal of all waste categories as provided therein. Part V section 34 requires that pesticides or toxic substances be disposed at designated site or plant approved by the authority.

The contractor & IWASCO will engage a licensed waste collector to handle waste generated during construction and operation respectively

3.3.8 Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006

These regulations are described in Legal Notice No. 131 of the Kenya Gazette Supplement No. 74 of October 2006 and will apply to all internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnerships to control fossil fuel emissions.

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

This is covered under the legal notice number 61. These Regulations under part II section 3 prohibit making or causing any loud, unreasonable, unnecessary or unusual noise, which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

Section 4 prohibits excessive vibrations and excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or30 meters from any moving source;

Operations of machineries that produce excessive noise are also prohibited under section 11 including; Operating or repair of any machinery, motor vehicle, construction equipment or other equipment, pump, fan, air-conditioning apparatus or similar mechanical device; or engaging in any commercial or industrial activity, which is likely to emit noise or excessive vibrations that exceed the levels prescribed in the First Schedule (See annex) to these Regulations.

The legal notice also prohibit construction at night except for the purposes specified in sub-Regulation (2) which include roads and other public utilities. Section 15 calls for an Environmental Impact Assessment to be carried out by any person intending to carryout construction, demolition, mining or quarrying work to do an Environmental Impact Assessment studies to identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from the construction, demolition, mining or quarrying;

Determine the measures that are needed in the plans and specifications to minimize or eliminate adverse construction, demolition, mining or quarrying noise or vibration impacts; and incorporate the needed abatement measures in the plans and specifications.

3.3.10 Isiolo County Climate Fund Act, 2018

The Isiolo Climate Fund Act of 2018 signifies a pivotal step taken by the County Assembly of Isiolo to confront the challenges posed by climate change within their jurisdiction. This legislation establishes the Isiolo Climate Change Fund with the primary goal of financing, facilitating, and coordinating projects aimed at both adapting to and mitigating the effects of climate change. By earmarking financial resources specifically for climate-related initiatives, the fund aims to support activities such as resilient infrastructure development, drought-resistant agriculture, and renewable energy projects. Moreover, the Act seeks to streamline the implementation of these projects by fostering collaboration among government bodies, non-governmental organizations, and local communities. It also emphasizes the importance of effective financial coordination to optimize resource allocation and avoid duplication of efforts. With provisions for governance structures and accountability mechanisms, the Act ensures transparency in fund management and monitors the impact of funded projects.

The Isiolo Climate Fund Act of 2018 holds significant implications for water supply and sanitation within Isiolo County, particularly in the context of climate change adaptation and mitigation. As climate change intensifies, the availability and quality of water resources become increasingly uncertain, affecting both rural and urban communities. The establishment of the Isiolo Climate Change Fund provides a structured mechanism to address these challenges.

Firstly, the fund can support projects aimed at improving water supply infrastructure to ensure reliable access to clean water. This includes initiatives such as drilling boreholes, constructing water storage facilities, and implementing water treatment technologies that are resilient to climate variability. Secondly, the Act facilitates investments in sanitation infrastructure to enhance public health and hygiene standards. Improved sanitation facilities, including eco-friendly toilets and wastewater treatment systems, can mitigate environmental pollution and reduce health risks exacerbated by climate impacts. Furthermore, the Act encourages the adoption of sustainable water management practices. This may involve promoting water conservation techniques, such as rainwater harvesting and efficient irrigation methods, to optimize water use in agriculture and household consumption.

By coordinating financing and fostering collaboration among stakeholders, including government agencies, NGOs, and local communities, the Isiolo Climate Fund ensures that water supply and sanitation projects are implemented effectively. The Act's governance structures and

accountability mechanisms also ensure transparent management of funds and evaluation of project outcomes, thereby enhancing the resilience of Isiolo County's water resources to climate change impacts. In essence, the Isiolo Climate Fund Act of 2018 not only aims to finance and facilitate climate change adaptation and mitigation projects broadly but also specifically addresses critical issues related to water supply and sanitation.

IWASCO can leverage on this fund particularly the component of solarisation.

4 BASELINE CONDITIONS

4.1 Physical Characteristics

Location and Coordinates

The Waso Primary School Borehole Site is located on Waso Primary School compound, Merille Sub-location, Central Location, Isiolo Central Sub-county, Isiolo County. The geographic location of the site is latitude 0.33260 North, longitude 37.57360 East and elevation of approximately 1148 meters.



Plate 4-1: **Google Map extract showing the location of the project**

Existing Infrastructure

There is an existing well in the school compound on the premises that will be upgraded as part of this project. Enhancing this well will involve improving its capacity to ensure it can meet the increased water demand resulting from the new borehole and solar system.

Water Storage

The school currently has two plastic water storage tanks. These tanks will be integrated into the upgraded water system, providing adequate storage for the increased water supply and ensuring that water is available even during non-pumping hours.

Environmental Considerations

The school where the proposed borehole will be drilled is characterized by mature trees which occur along the boundary. These trees contribute to serenity, shade and offer a cooling effect in this hot area. The proposed project will not necessitate cutting down of trees. However, some tree trimming might be necessary to prevent shading on the solar panels. This will not have a significant impact on the school vegetation. There grass that is scattered across school may be disturbed but clear markings will be provided to minimize disturbance. Restoration will also be done to enhance vegetation on site.

4.2 Topography

The relief and physiography of Isiolo town in Kenya are characterized by a flat terrain. The area is part of the Isiolo River basin, which has a catchment area of about 683 km2 and a total length of approximately 15 km.

4.2.1 Drainage and Land Use

The drainage type of Isiolo town is primarily influenced by the Isiolo River and the Ewaso Ng'iro River, which has variable drainage from the headwaters at Mount Kenya. The area is drained by these rivers. The dominant land use in the project area is commercial (isiolo Town centre), institutional (Waso primary School, hospital and other learning institutions) and residential. The project is not inconsistent with the existing land uses. It is an service infrastructure development.

4.2.2 Geology

The geology of the area is composed of trachyte, basalt and pyroclastics. Trachyte is a fine-grained and generally light-coloured volcanic rock that usually has a rough surface to the touch. It is an extrusive rock, belonging to the alkali series of intermediate volcanic rocks. The major mineral component of trachyte is alkali feldspar (e.g. orthoclase), and it generally contains no quartz. Trachyte often displays trachytic texture, where acicular to tabular feldspar phenocrysts align in one direction, suggestive of flow prior to cooling. Trachyte lava is of moderate viscosity and forms thick lava flows and domes. Basalt is a common rose-coloured volcanic rock composed of calcic plagioclase (usually labradorite), clinopyroxene (augite) and iron ore (titaniferous magnetite). Basalt may also contain olivine, quartz, hornblende, nepheline, orthopyroxene, etc. Basalt is a volcanic equivalent of gabbro. Basalt is usually black or dark grey and relatively featureless. It is composed of mineral grains which are mostly indistinguishable to the naked eye. Basalt may also contain volcanic glass. Basalt may contain phenocrysts (larger crystals within fine-grained groundmass) and vesicules (holes that were filled by volcanic gases). Pyroclasts (or "tephra') are any volcanic fragment that was hurled through the air by volcanic activity. A pyroclastic deposit is the resulting layer or pile of material that has fallen to the ground by one or many pyroclastic eruptions. A pyroclastic rock is the hardened, solidified, or compressed version of an originally loose pyroclastic deposit.

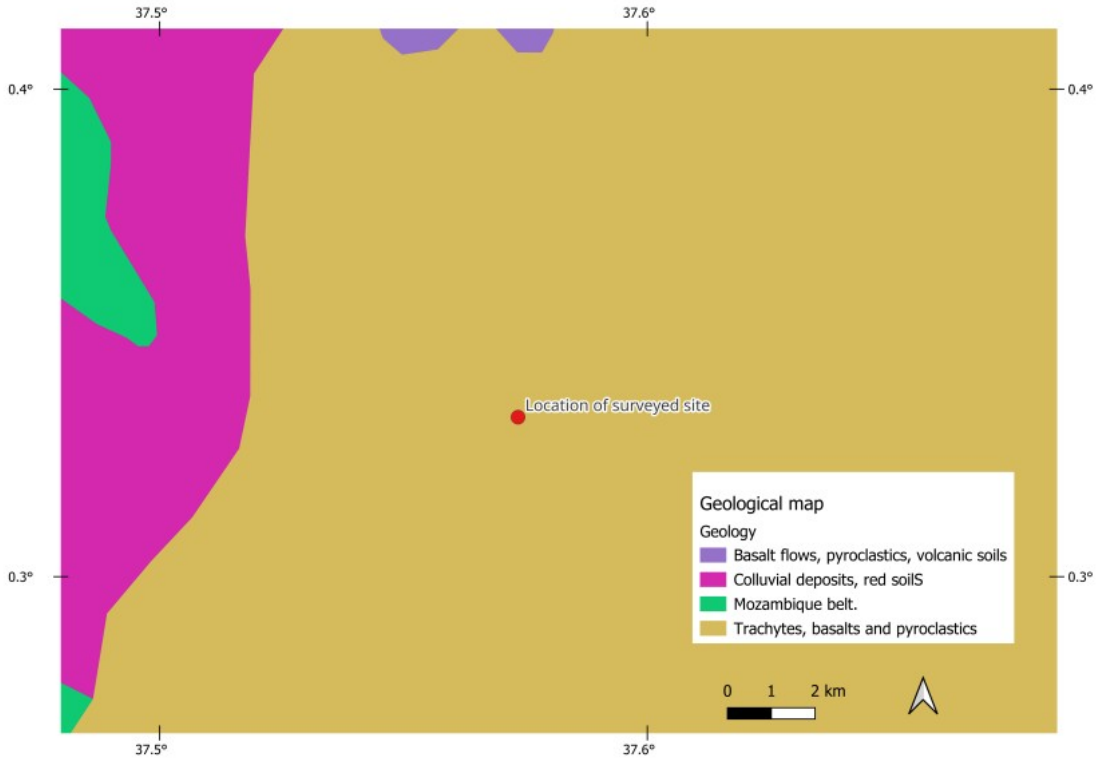


Figure 4-1: Map extract of geology of the area

4.2.3 Climatic conditions

(i)Rainfall

Isiolo Town is located in the centre part of Kenya and falls within the arid and semi-arid region of the country. The climate is characterized by distinct wet and dry seasons, with temperatures varying throughout the year. The town experiences a semi-arid climate, with an average annual rainfall ranging between 300 and 500 millimetres. The primary sources of precipitation are the short rains from October to December and the long rains from March to May. The town's rainfall pattern is characterized by low and erratic precipitation. The dry season, extending from June to September, experiences minimal rainfall, contributing to water scarcity and challenging agricultural practices.

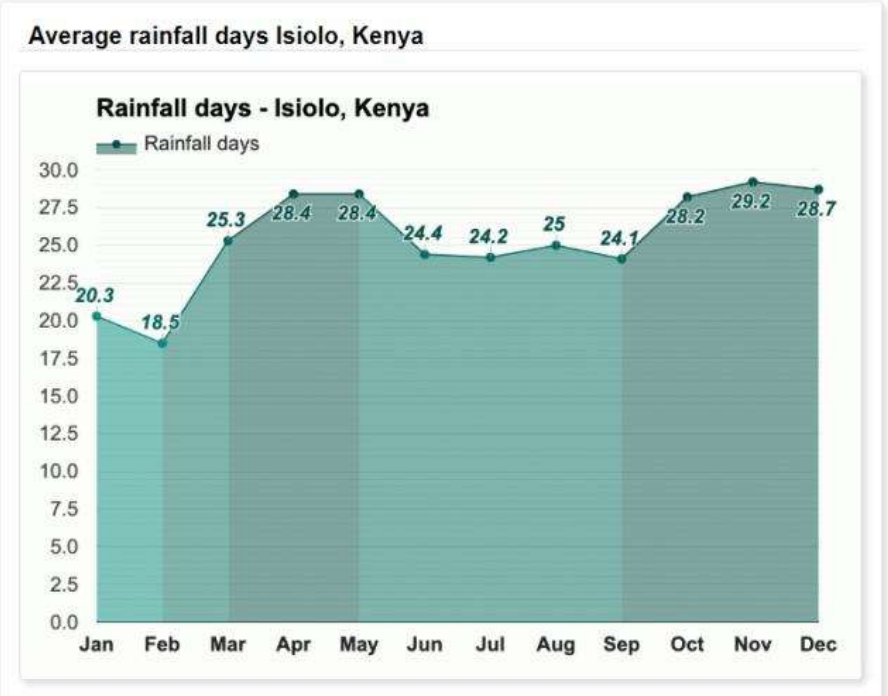


Figure 4-2: Average Rainfall in Isiolo Town

Kenya Meteorological Department, Isiolo Town, 2024

(ii)Temperature

Isiolo Town generally has high temperatures, especially during the dry season. The average annual temperature ranges from 20°C to 32°C. Daytime temperatures can exceed 35°C during the hottest months, contributing to the arid conditions of the region. Night time temperatures tend to be cooler, with lows ranging from 10°C to 20°C. It records more than nine hours of sunshine per day and has a huge potential for harvesting and utilization of solar energy.

With more than nine hours of sunshine per day, the town has abundant solar energy potential. Solar energy can be harnessed through photovoltaic panels to generate electricity. Solar-powered water pumping systems can be installed to extract groundwater for irrigation and domestic use. IWASCO is seeking to utilize this resource to minimize maintenance cost.

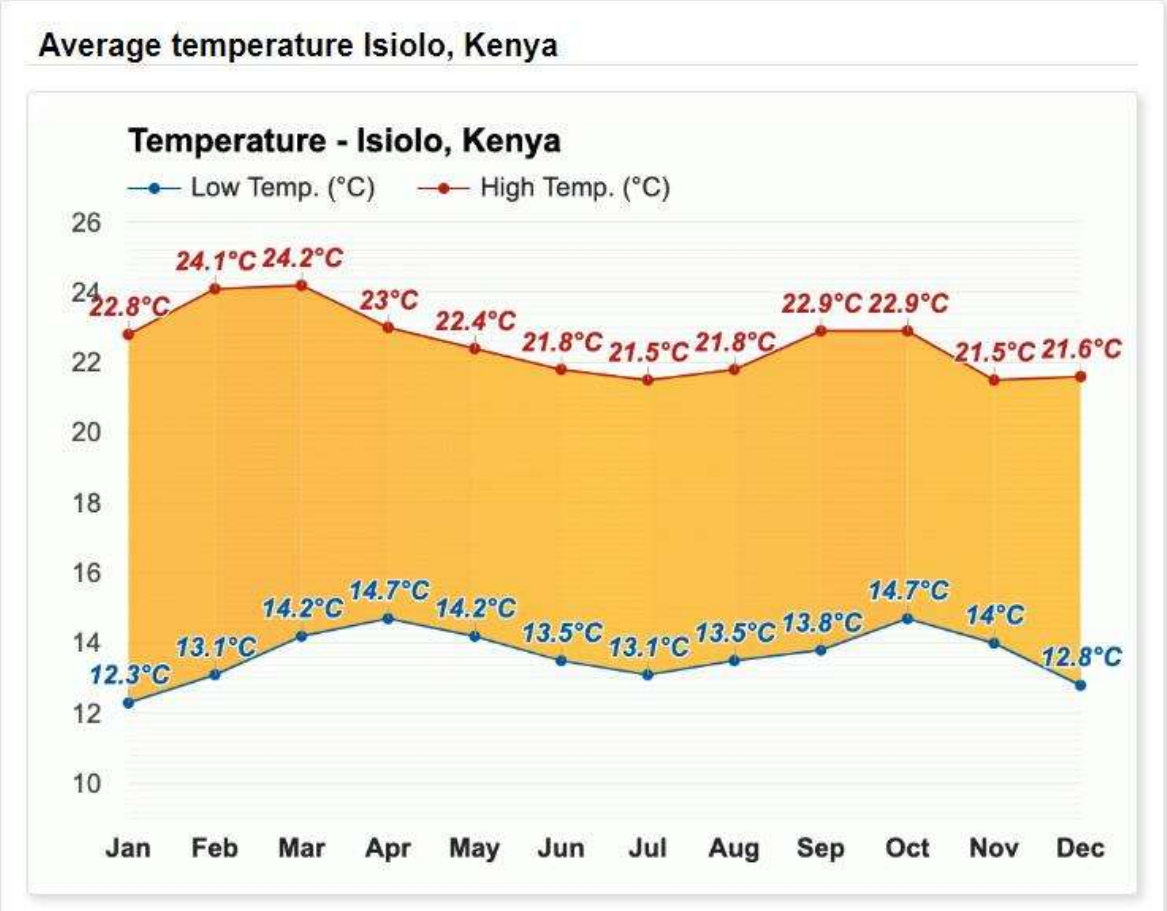


Figure 4-3: Average Temperature Isiolo Town
Kenya Meteorological Department Isiolo Town, 2024

4.2.4 Ecological characteristics

Flora

The vegetation in Waso Primary School is characterized by short, scattered grass, flowers along the class corridors, seedlings, young and mature trees. The trees are mostly acacia (*Commiphora* & *Vachellia nilotica*) Species, Grewia and Boscia, which are well-suited to the limited water availability.





Plate 4-2: Trees (acacia Vachellia nilotica) along the school perimeter fence

Fauna

The project area is within a typical urban centre with no wildlife habitat. It is not a wildlife corridor.

4.2.5 Socio-Economic Characteristics

Population

According to the 2019 Population and Housing Census, Isiolo County had a population of 268,002. The county's average growth rate from 2009 to 2019 stood at approximately 2.8%, exceeding the national average of 2.2%. This growth can be attributed to demographic shifts including in-migration, rising fertility rates, low mortality rates, and increased life expectancy. By 2027, the projected population is expected to exceed the current KNBS estimate of 345,871. The population is predominantly composed of Cushite communities such as the Oromo, Boran, and Sakuye, as well as the Turkana, Samburu, Meru, Somali, and other groups migrating from various regions within the country. The majority of these communities, approximately 59%, live in rural areas.

As the population grows, particularly in Isiolo town, due to in-migration, there is a higher demand for clean water. This places strain on existing water supply infrastructure and resources.

Table 4.1: Population Distribution in Isiolo County

Sub County	Male	Female	Intersex	Total
Garbatulla	54661	45068	0	99,729
Isiolo	60414	60647	0	121,061
Merti	24435	22768	9	47,212

Total	139510	128483	9	268002

Source: KNBS, 2019

Population for Isiolo sub-county wards

As highlighted below The Waso Primary School Borehole Site is located in Isiolo Sub-county, Central Ward.

Table 4-1: Population as per Isiolo sub-county wards

Wards	Population
Garbatulla	36301
Kina	27216
Sericho	36213
Central	56065
East	37439
Ngaremara	7425
Oldonyiro	20137
Cherab	27246
Kom	7665
Merti	12295
TOTAL	268002

KNBS, 2019

4.2.6 Socio Economic Profile of Residents in project Area

(i). Introduction

Baseline data was gathered from sample populations in Waso village through a household questionnaire survey targeting project beneficiaries who are connected to IWASCO WSP or fetch water from the identified borehole sites. The consultant used a sample of 5% of the targeted population. According to Cochran (1977), for household surveys a sample size of 5% is satisfactory provided it is truly representative of the whole. Kothari (2004) argues that if the sample is random and large enough approximately 5% of the total population can still provide reliable estimates and valid inferences about the population parameters. It is therefore notable that the most critical factor in sampling is not the size but the study design.

In this survey, the consultant adopted a multi -level sampling design which entailed clustering the project area into two sub-villages followed by selection of respondents randomly within the clusters. The expected household beneficiaries in Waso borehole project are 400 within Waso village. This formed the sampling frame (N). A total of 20households were sampled. Each sub village was allocated 50% of the total sample size. Respondents were selected randomly within the sub village.

(ii). Demographic Factors

Age

The age distribution of respondents in Waso village shows a concentration in the 26-35 years age group (60%), followed by 46-55 years (20%), with equal representation (10% each) in the 18-25 and 36-45 age brackets. This predominantly young to middle-aged demographic suggests a population likely to be economically active and raising families.

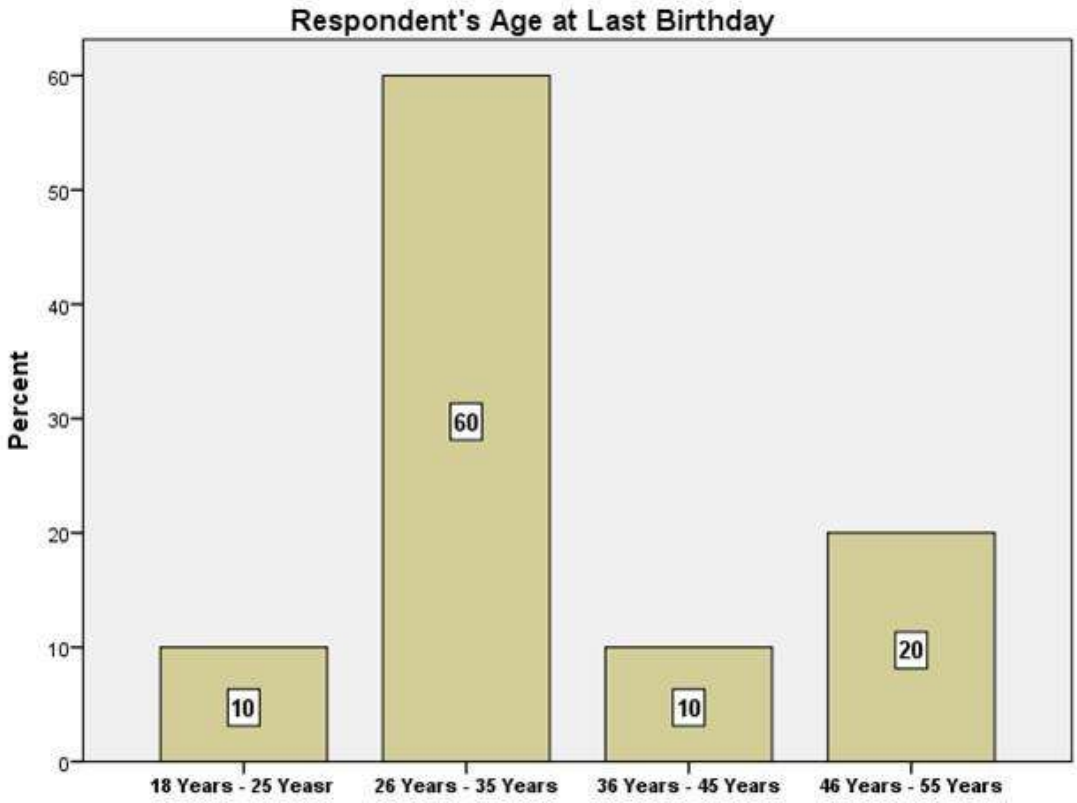


Figure 4-4: Age Distribution

Economic Activities

Residents have a mix of agricultural activities (crop farming, pastoralism), service sector jobs (construction, bodaboda), and informal employment (casual labor). This variety suggests a complex local economy. The proposed water project should consider this occupational diversity in its planning, ensuring that the improved infrastructure supports various economic activities.

Table 4-2: Main Occupation/Socioeconomic Activity

Occupational Activity	Percent
Casual Domestic Labour	10.0
Casual Farm Labour	10.0
Construction	10.0
Crop Farming	10.0
Crop Farming Bodaboda Construction	10.0
Crop Farming Casual Farm Labour	10.0
Crop Farming Kiosk	10.0
Others	20.0
Pastoralist	10.0
Total	**100.0**

Duration of Stay in the area

50% of respondents have been residing in the area for 5-10 years, 40% for over 10 years, and only 10% for 6-12 months. This long-term residency suggests strong community ties and invested stakeholders. The project can benefit from this stability, as residents are likely to have a vested interest in long-term improvements. Community engagement strategies should leverage this established population for sustained support of the new infrastructure.

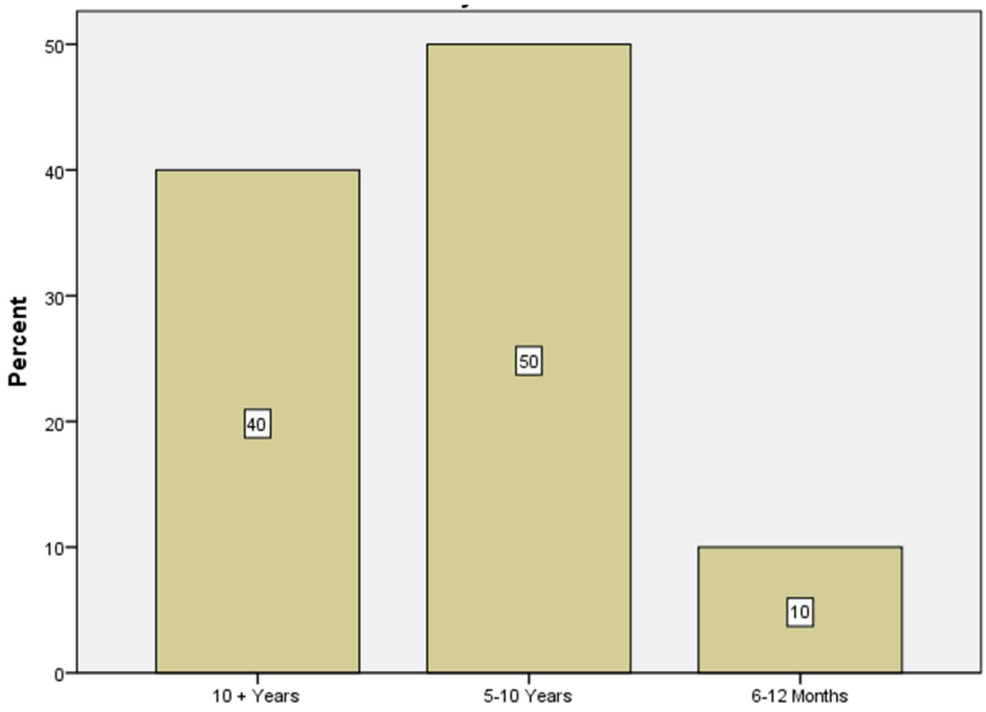


Figure 4-5: Duration of Stay

Housing Tenure

90% of respondents own homes while 10% are tenants. This high rate of home ownership (90%) suggests a stable community with long-term investment in the area. This stability is advantageous for the project, as residents are likely to have a vested interest in infrastructure improvements.

Table 4-3: Owner of The House

	Frequency	Percent
Husband	6	30.0
Others	2	10.0
Self	12	60.0
Total	20	100.0

Sources of Energy

Residents use multiple energy uses including fuelwood & charcoal (30%) firewood-charcoal-gas/LPG (20%), firewood (20%). The reliance on biomass fuels (70% using firewood in some form) suggests potential environmental and health concerns.

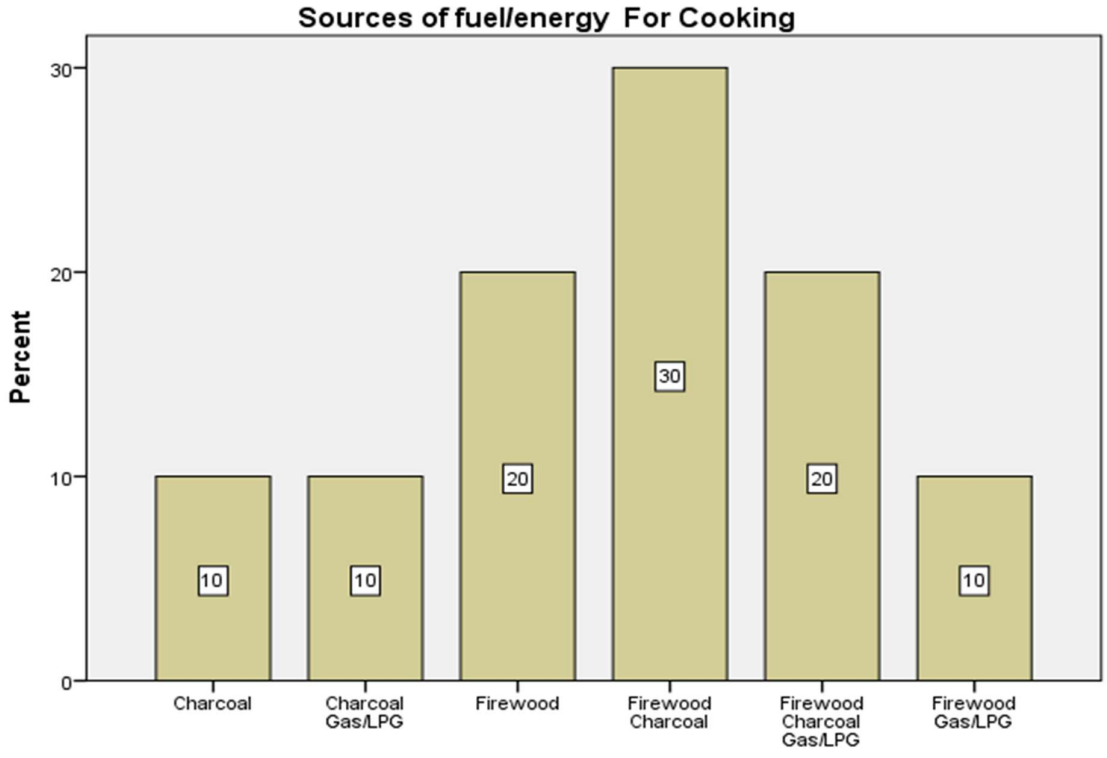


Figure 4-6: Sources of fuel/energy for Cooking

Sources of Drinking Water

The primary drinking water sources in Waso village are diverse with 60% using taps outside the house, 20% relying on pump/borehole taps outside the house and 10% use pump/borehole and stream/river/rain water harvesting. This distribution highlights the need for improved water infrastructure. The project should consider this water source diversity in its planning, ensuring that the new system doesn't negatively impact existing water sources and potentially integrating improvements to the water supply system alongside sewerage upgrades for a comprehensive water management approach.

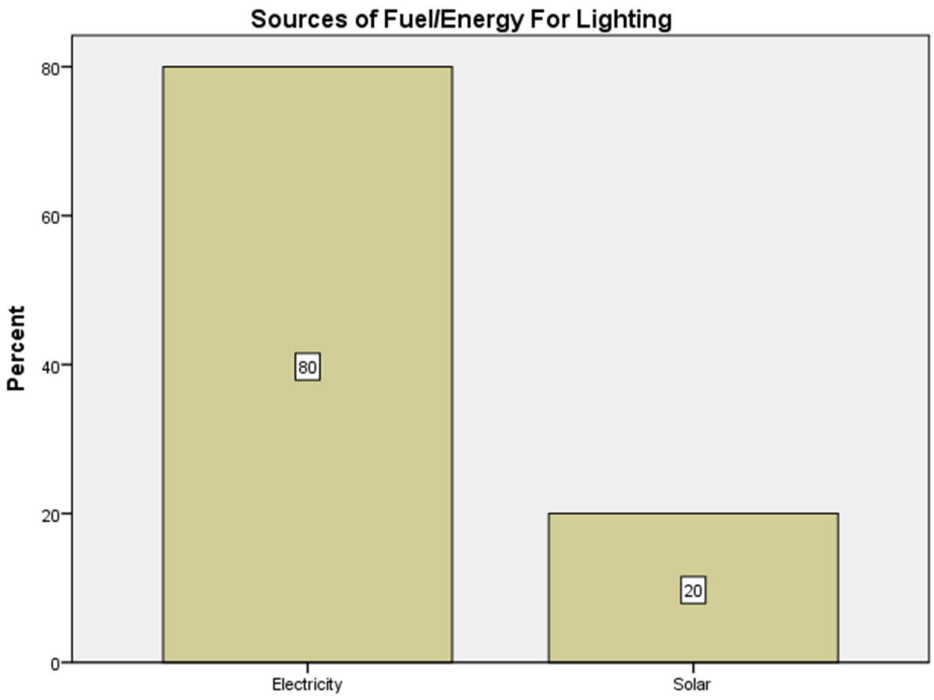


Figure 4-7: Sources of Fuel/Energy for Lighting

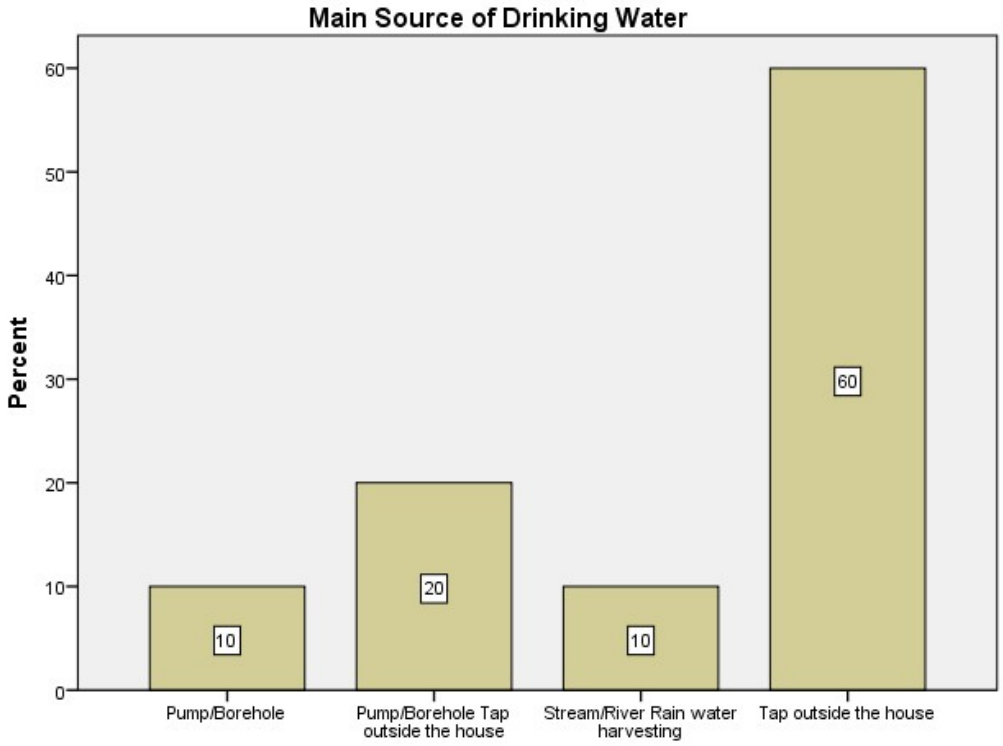


Figure 4-8: Main Source of Drinking Water

Nearest Source of Drinking Water

80% of residents have access within less than 1km, 10% travel 1km-5km while 10% travel 11km-15km. Despite the high number of residents with access to water within less than a 1KM, the intermittencies were noted to be very high. Community members mentioned that most of them have water for 2 days in a week. The proposed project will significantly address this challenge.

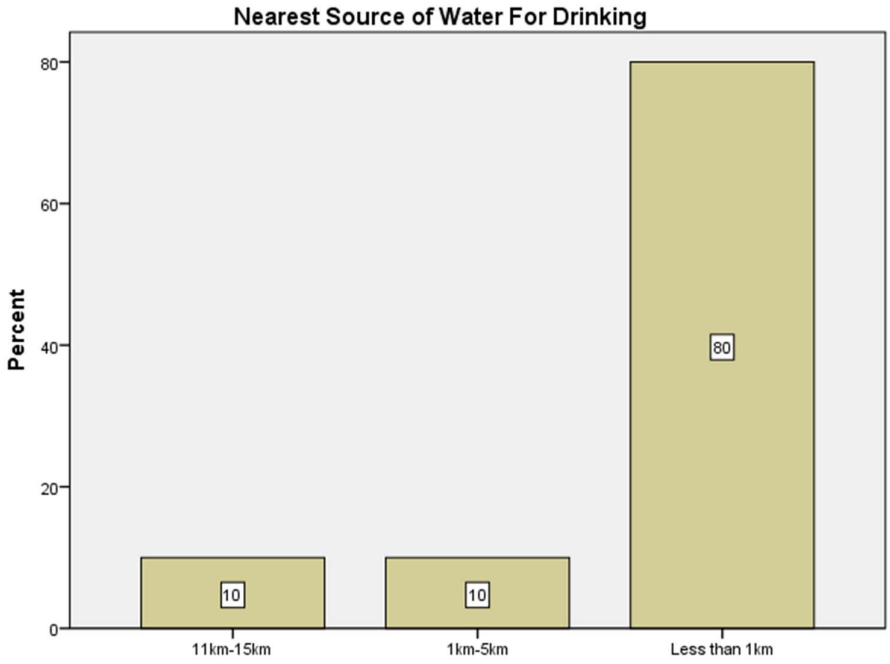


Figure 4-9: Nearest Source of Water for Drinking

Sewerage Services

80% of residents are served by IWASCO (Isiolo Water and Sewerage Company) for water and sewerage services, while 20% report having no service provider.

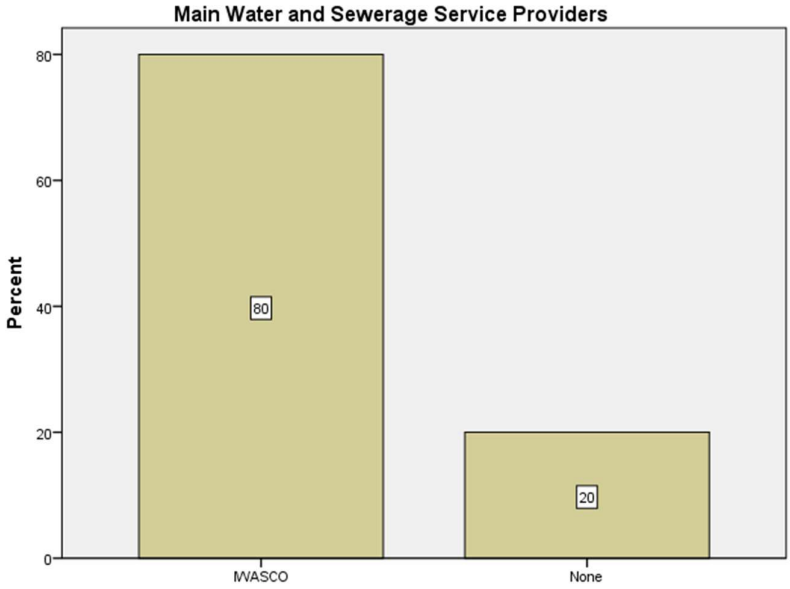


Figure 4-10: Main Water and Sewerage Service Providers

Environmental Problems

Residents in Waso village observed that the area is characterized by diverse environmental challenges, with deforestation and climate change being the most prominent (30%). Other significant issues include deforestation (20%) and drying of rivers (20%). It is notable that the project has a component of clean energy -use of solar power to pump water. The use of this form of energy could contribute to increased adoption of solar energy.

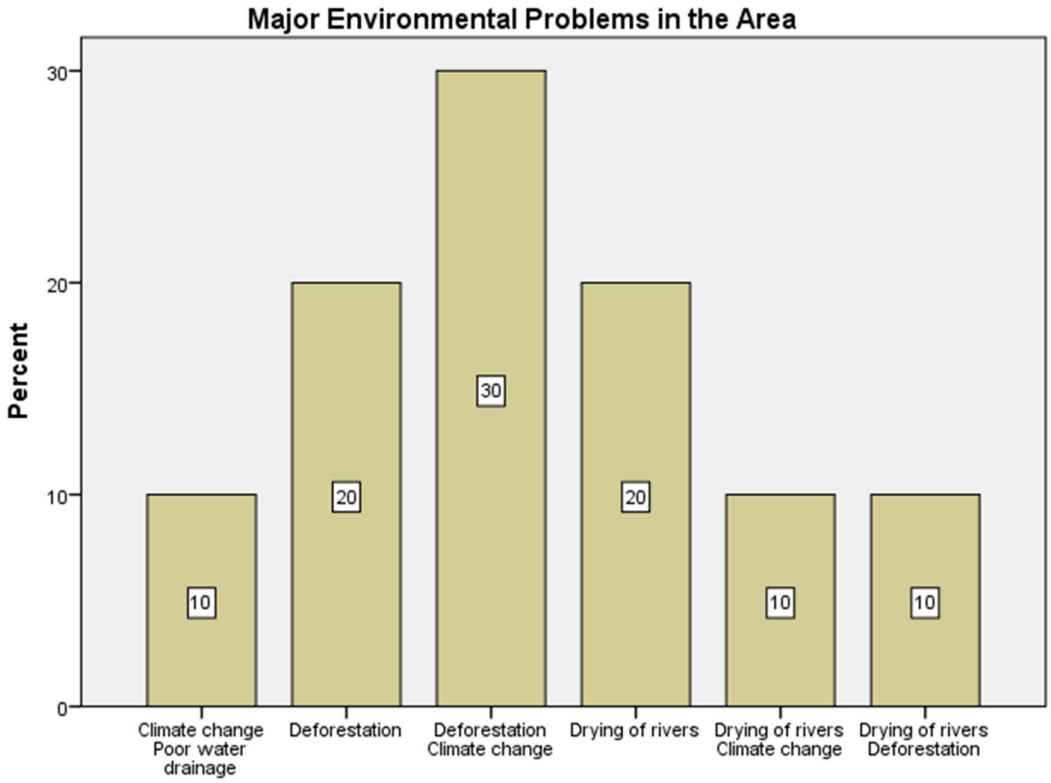


Figure 4-11: Major Environmental Problems in the Area

Mitigation Measures

The residents strongly recommended public education and reforestation (60%) as key strategies for mitigating environmental problems. The project should integrate these preferences by incorporating robust public education components about proper management and its environmental benefits. Additionally, the project could include a tree planting initiative (10%) as part of its environmental mitigation strategy. Other approaches like controlling soil erosion and improving access to clean water (10% each) should also be considered in the project design to address multiple environmental concerns simultaneously.

Project Awareness

The data reveals a significant lack of awareness about the proposed project with 90% of respondents unaware of the project. Interestingly, despite this lack of awareness, all respondents expressed a desire to have the project implemented, underscoring its perceived importance to the community. This presents both a critical challenge and a unique opportunity for the project. The unanimous support, even without prior knowledge, highlights the project's significance in addressing urgent local needs. Extensive community engagement and awareness campaigns are essential to ensure project success. The project team should prioritize transparent communication, community consultations such as village and sub county level barazas to increase awareness from the current 10% to a much higher level. These efforts will not only inform residents but also capitalize on their existing positive sentiment, fostering stronger community support and active participation in the project's implementation and long-term sustainability.

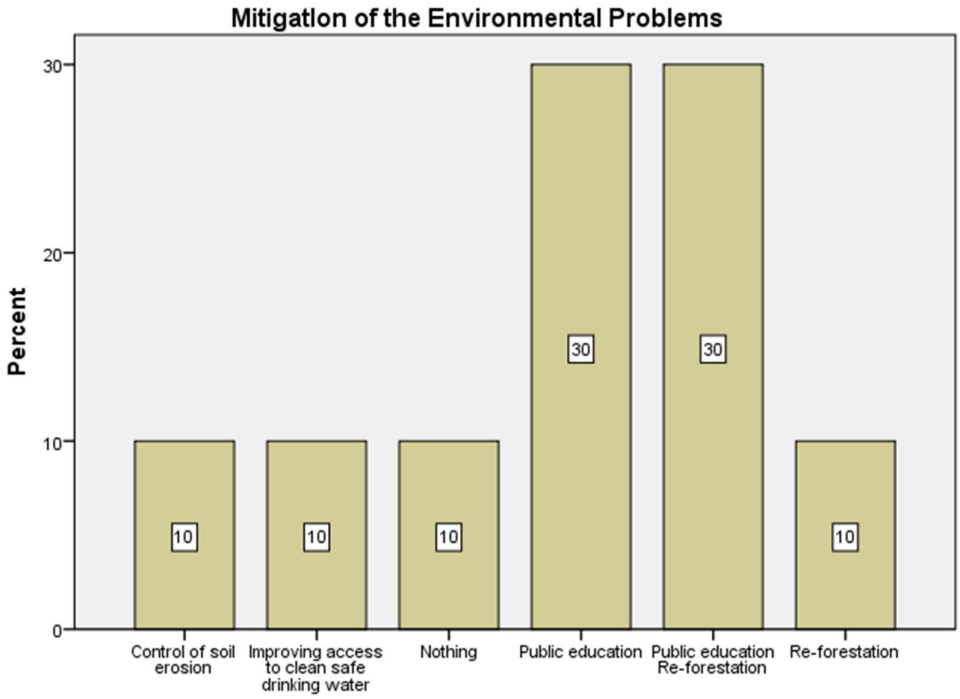


Figure 4-12: Mitigation of the Environmental Problems

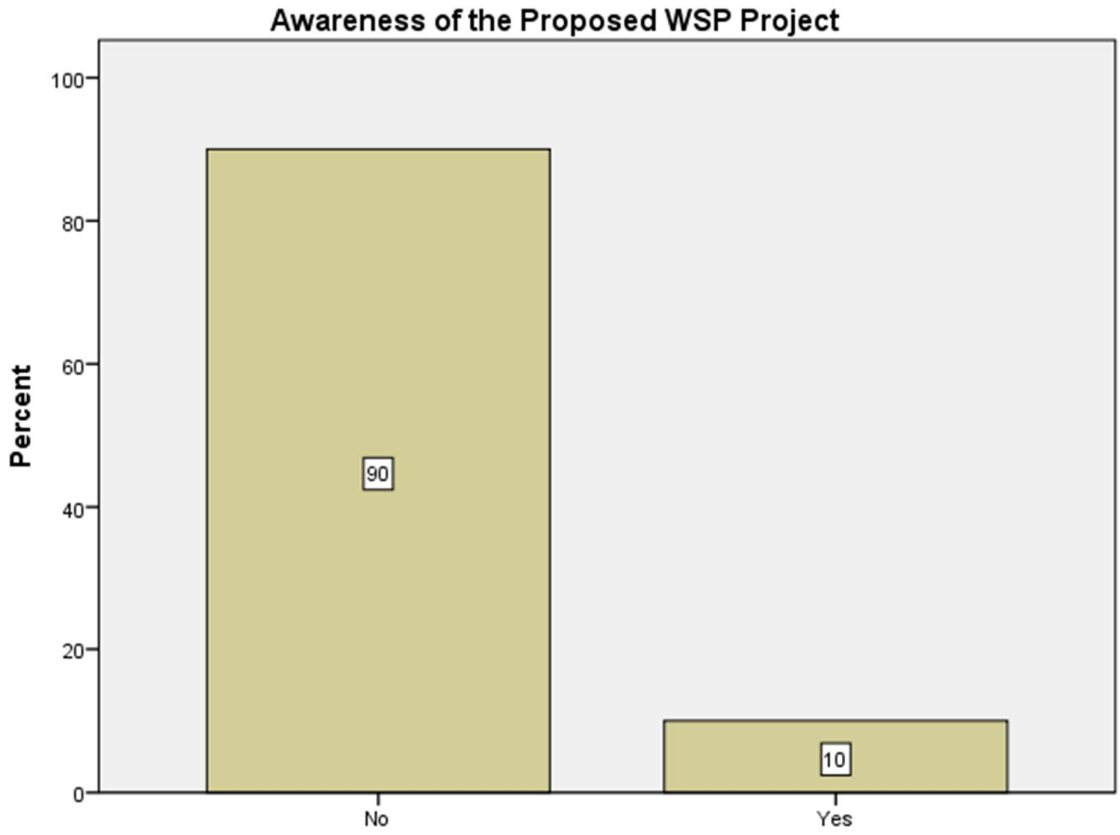


Figure 4-13: Awareness of the Proposed WSP Project

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 5-1: Mapping of Stakeholders

Primary Stakeholders	Secondary Stakeholders
• Waso Primary School Borehole community-teachers • Host community/Neighbours along the project area • Isiolo Water & Sewerage Company (IWASCO) • Water Sector Trust Fund	County Government of Isiolo • Department of Water, Environment & Natural Resources National Government • National Government Administration • State Department of Gender & Social Services • State Department of Early Learning & Basic Education
	• Water Resource Authority (WRA) • Water Resources Users (WRUA) • NGOs / CBOs • Institutions within the area (Schools, Hospitals, etc.)
	Political class • MCA • Ward Administrator
	National Government Administration • County Commissioner • Chiefs and their Assistants

5.4 Stakeholder Analysis

Table 5-2: 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
IWASCO	High	Low	Obtaining water to supply to the public	Communicate with other stakeholders to express their support for the project	Ending their engagement with WSTF	Information and feedback meetings every 6 months
Waso Primary School	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.	Reject the project by refusing give up part of the land for the borehole drilling	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 Isiolo- 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 Social Impact Assessment is undertaken before the project construction	By availing the ESIA report for review and licensing	By not issuing EIA License	Providing ESIA Report and all other 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 the affected land owners, Help in resolution of any complaints that may arise during the project implementation phase.	-	Involving them in KII, focused group discussions and public stakeholder meetings. Communicating all findings during each step of the project. 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 5-3: Methodology adopted in Stakeholder Engagement

Technique	Target Group	Objective	Date Undertaken
Key Stakeholder Interviews	Secondary Stakeholders County Government of Isiolo 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	12/6/2024-13/6/2024
Household Surveys	• Residents within the project area	• To understand the socio-economic status of the affected communities	12/6/2024-13/6/2024
Focused Group Discussion	Key stakeholders	• To obtain their input on the proposed design	12/6/2024

5.6 Household Survey

A household survey was conducted to establish baseline conditions of the study area and to inform the residents on the proposed project. Baseline data was gathered from sample populations in Waso village through a detailed household questionnaire survey administered by research assistants. The survey examined key demographic statistics, socioeconomic conditions, water access, current sanitation methods, public health status, community issues, and awareness, as well as attitudes regarding the proposed project. Both quantitative and qualitative response metrics were collected across these indicators from a representative sample. A total of 20 households were sampled.

5.7 Focused Group Discussion

One focused group discussion was conducted at the village level and a baraza at the Sub County level (Isiolo) to collect indepth concerns regarding the proposed project. The FGD was held at Waso Primary School. It had a total of 31 participants out of whom 10 were men and 20 women. In attendance was the IWASCO staff (3) and WSTF consultant (2). The participants constituted school management (board member & principal), parents, religious leaders, CBOs' leaders, women group leaders and youth representatives. These were selected by the area chief, school management and the IWASCO sub area leader. A summary of the responses is presented below. Minutes are annexed to this report.

i. Will the water be treated? It is a requirement that water meant for human consumption will be treated
ii. The school head indicated that they had discussed as a board on matters regarding benefits and had requested IWASCO for unmetered water.
iii. The school is giving out land for the project, will the water that will be given to the school metered? The water for the school will be unmetered and will not be charged.
iv. There are other partners e.g. USAID that are promoting agriculture in institutions, establishment of small gardens. We understand that IWASCO water should not be used to irrigate, is that the case? The water should be purely for domestic use in the school and not for a major irrigation scheme.
v. The Assistant chief indicated that the area has been experiencing water shortages and this has resulted to poor school attendance as children join their parents in looking for water. The water will assist the women to access water, undertake other chores, reduced domestic violence meted on them when they delay cooking meals because of lack of water and even have some kitchen garden



Plate 5-1: Focused group discussion at Waso Primary School

5.8 Public Baraza

The Consultant undertook public participation through a community public baraza held on 12/6/2024 to create awareness and solicit views and opinions on the proposed project. The community baraza was held at the Sub County level in Isiolo Town CDF Hall to collect indepth concerns regarding the proposed project. The participants were drawn from all the project sites namely: Checheles, Mater area, Mwangaza, Ramadhan, Show ground, Ewaso Comprehensive school and Tulluroba. The baraza had mixed participants drawn from the youth, Men and Women. The area leaders; nyumba kumi and religious leaders drawn from the Muslim and Christian community were also represented.

The IWASCO team introduced the project rationale and justification and the scope. The consultant provided a brief of the project Scope highlighting the importance of ESIA according to EMCA 1999 (Amended 2015), the importance of public participation, upcoming field activities and importance of the community views. The chief gave the areas covered by the project and then there was a question and answer session. They community members indicated

they have suffered water shortages for so long and were all supportive of the project stating that lack of water is a critical issue in the area. The issues that were raised in the baraza include:

5.8.1 Feedback from Public during the FGDs

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.

The boreholes may yield salty water unfit for human consumption. The water from the boreholes will be tested by Isiolo water company to ascertain its safety for human consumption.

Vandalism: The infrastructures particular the solar system may be threatened by vandalism. IWASCO urged community members to adopt community policing and report any suspicious activities on the borehole sites

Construction materials and waste may be dumped carelessly. All waste Materials and spoil will be disposed at NEMA approved sites

Bore hole may interfere with ground water levels (water tables). A hydrogeological survey was done to ascertain the water levels in the water table so as to get the place that will yield the highest amounts of water.

Increased costs of the water tariffs IWASCO confirmed to the community that the unit cost will remain the same but water supply will be improved

5.9 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 Isiolo- 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
   - Possibility of drilling borehole which yield saline water
   - Possibility of not yielding water
   - The need to treat water
   - The project will bear more benefits than negative impacts

b) **County Government of Isiolo- 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 the drilling of 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 business people who will be affected

c) State Department State Department of Early Learning & Basic Education

- The water will be useful to the school for multiple uses -drinking, watering seedlings but this will only be realized if there is no charge on the water
- There is an existing well which risk drying up
- There is need for a clear plan on how the school will benefit
- Consider a revenue sharing plan
- Ensure that the proposed project activities do not disrupt learning during construction, operation and monitoring

6 ANALYSIS OF ALTERNATIVES

6.1 Introduction

The Proposed borehole drilling and solarisation project is set to be implemented in Isiolo Town, Isiolo County. The pumping of water will be done using solar power which will minimize the cost of operation. This chapter analyses the different alternatives considered in selection of the borehole site and water source

6.2 The No Project Alternative

The no-action alternative is often defined by the baseline information and is crucial in the assessment of impact because other alternatives are weighed with reference to it. This alternative would mean that the project does not proceed.

The no project alternative option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from the conservative environmental perspective as it ensures non-interference with the existing conditions. Under no project alternative, the proponent's proposal will not be implemented. This option will however, involve several losses both to the community and the county as a whole. Development of the project on the other hand will improve water provision to the residents of Isiolo.

The no project option will lead to the following (general) major negative and long-term impacts:

a) IWASCO would remain without regular water supply to provide to its consumers. The existing water sources that are not functional will also not be rehabilitated.
b) High operation costs due to electricity bills as result of pumping
c) Water shortage degrading their quality of health and sanitation
d) Stunted economic growth within the urban areas as a result of water shortage and high cost of water
e) Poor economic stimulation as a result of unemployment
f) Skills of the locals will remain underutilized
g) Increased time wastage as a result of travelling long distances to fetch water
h) Increased risk of water related conflicts
i) The proponent will not increase distribution in the service area

This scenario is not appropriate on either social or environmental grounds.

6.3 Location Option

The most suitable site selection for the boreholes took into consideration the following factors;

a) Geological and Hydrogeological Conditions:

Geological Survey: The subsurface geology indicates potential aquifers and formations suitable for groundwater extraction.

Hydrogeological Assessment: Preliminary hydrogeological conditions such as groundwater depth, quality, and flow direction indicate feasibility of groundwater extraction.

b) **Accessibility and Logistics:**

The selected sites are accessible for drilling equipment and logistics support. They are located in close proximity to the road and are all served with basic infrastructures such as electricity.

c) **Environmental Considerations:**

The selected sites are not close to any environmentally sensitive ecosystem such as habitat or wetlands. In addition, the proponent has undertaken this ESIA to mitigate against any negative impact that the project may pose on the environment.

d) **Water Quality:**

The proposed sites are not near land uses that will pose a risk of contamination.

e) **Future Land Use:**

The site selection made consideration of current and future land uses to ensure land use changes will not affect borehole's operation or accessibility.

Based on these factors, two location options were considered: a primary school site and IWASCO-owned land. The primary school option was a result of an engagement between the proponent and the community through the lie managers. The proponent cited the need for increased water volumes as the basis for proposing additional boreholes in the area. The matter was discussed and agreed upon by the school board of management. This board comprises of representatives of the parents, teachers, community among others. The minutes are attached to the report.

The primary school site has the advantage of availability of land, security since the site is fenced and enjoys institutional benefits such as ownership and access control. It is disadvantageous in that there is a perceived lack of direct access ad control by IWASCO and the tenure security may be threatened by changes in school management or policies.

The second option involves acquisition of land by IWASCO. This will be under the full control and management of the IWASCO. However, it is costly and may have regulatory and administrative challenges that characterize land acquisition. Given the level of funding available, the Waso Primary School Borehole site is preferred as it is more affordable and will not require lengthy acquisition processes. Residents of Isiolo will not have to wait for long to benefit from the increased water supply. The project will enjoy the institutional benefits. The issue of tenure security can be mitigated by agreements, engagement of all stakeholders in the school and continued community participation.

6.3.1 Water Source

The main sources of water in Isiolo are surface water from River Ewaso Nyiro and groundwater.

Surface water supply

1. **Reliability of Supply:**
    - Ewaso Nyiro river is one of the main potential water source in Isiolo County. Setting up water extraction from this river may require less initial investment in infrastructure compared to drilling and maintaining multiple boreholes.
    - However, due to the effects of climate change the river has become seasonal hence cannot provide a constant supply of water for a critical municipal function as the one proposed.
    - Additionally, extracting water from rivers can have environmental implications, such as altering downstream flows, affecting aquatic ecosystems, and potentially exacerbating water scarcity in dry seasons.

Borehole Water Supply:

- Boreholes in Isiolo town may yield a more consistent and potentially higher-quality water supply compared to Ewaso Nyiro River as it is less susceptible to seasonal variations.
- Boreholes offer a more reliable water source during droughts or dry seasons when rivers may have reduced flow or quality issues.
- Properly sited and managed boreholes have minimal impact on surface water resources and ecosystems, preserving local hydrological balances.
- Boreholes can be scaled according to local water demands, allowing for targeted water supply solutions that can adapt to changing community needs.

In consideration of the above factors, a borehole will be more favorable compared to surface water abstraction.

7 IMPACT IDENTIFICATION, ANALYSIS

7.1 Potential Impacts and Mitigation Measures

It is envisaged that the proposed borehole drilling & 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 continuouslymonitor 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.

7.1.1 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 7-1: 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 7-2: 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 7-3: 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

7.2 Construction Phase

7.2.1 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 labour and machinery operation
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) In some instances, there may be improvement of infrastructure around the site (through negotiated CSR) e.g. security lighting, water tank or sanitation facilities
f) Improved livelihoods in the area as money generated from increased businesses in the area

7.2.2 Negative Impacts During Construction

The proposed project could result into the following negative impacts:

Noise Pollution

Construction of the proposed Project will result in noise emissions as a result of the machines that will be used during drilling stage, setting up the solar panels and control rooms. Noise will also be generated from the construction workers. The receptors of this impact are the host community where the proposed borehole will be sunk. Noise will also be generated from the construction workers.

Noise Receptors:

- ✓ Waso Primary School learners, teachers and other staff
- ✓ Neighbouring residents within a radius of 500meters.
- ✓ Workers on site who will be involved in the drilling

Noise impacts would 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 not result to a significant increase in noise.

Impact without Mitigation	
Severity of impact	-4
Spatial scope of impact	-1
Duration of impact	-1
Frequency of activity / duration of activity	-1
Frequency of impact	-1
Result	**-12 Very Low**

Mitigation measures

- Install portable barriers to shield the drilling rigs and drilling bits to minimize noise
- Drilling limited to daytime, weekends when there are no learning activities, ensure noise levels are kept to a maximum of 55 dBA 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

(i). Site Safety, Security, and Welfare arrangements

The nature of the project brings into fore safety, security and health issues. These range from accidental falls , injuries from construction equipment or materials, poor hygiene etc. Those at risk are particularly the learners, staff and construction workers. During solar installation, specific risks may include:

- ✓ Risks include electrical shocks from live wires and energized equipment
- ✓ Falls owing to the heights which solar panels are installed
- ✓ Workers may be exposed to extreme heat, leading to sunburn, thirst, and heat fatigue and may come in contact with hot objects like solar cells, which can cause burns

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

- 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;
- Construction vehicles will observe the required speed limit of 50 KM/H within the Isiolo,
- Any accident 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 team shall will include an Environmental Health and Safety officer at the project 'site' to foresee implementation of the EHS and;
- The Contractor shall abide by the all the relevant provisions of OSHA, 2007 and other relevant legislations

For solar related risks the following measures should be taken

- Ensure proper wiring with certified cables, secure grounding, and overcurrent devices
- Lockout/Tagout (LOTO) procedures should be in place to de-energize electrical circuits
- Use protective netting in elevated areas to prevent falls

(ii). 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 sanitation water, accommodation for clothing, portable water supply, first aid facilities etc. Conversely, moral standards require that 'duty of care' be upheld in working situations to prevent injurious conditions.

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/ camp;
- The Contractor shall retain a well trained and experienced EHS officer at the site

(iii). Effects on flora (plants/vegetation)

The proposed borehole site is located in areas with minimal vegetation. However, some tree trimming might be necessary to prevent shading on the solar panels.

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**

Mitigation measures

- The Contractor and other project participants must ensure minimal or no disturbance to existing vegetation by marking out access routes and construction area
- Where there is need to cut any mature tree, the contractor should obtain a permit from the department of environment in the county
- The project will make provision for tree planting within the site restoration activity

(iv). Water Quality

The selected site is not located near waterways hence there is minimal impact on surface water. In the case of ground water, there is a probability of water pollution during the drilling process. This may be caused by fuel leakages from equipment or vehicles and inappropriate disposal of wastes. Groundwater pollution may lead to serious health implications on the community.

Impact without Mitigation	
Severity of impact	-4
Spatial scope of impact	-2
Duration of impact	-1
Frequency of activity / duration of activity	-2

Frequency of impact	-3
Result	**-35 low**

Mitigation measures

- Locate storage areas and compounds away from the borehole site
- Designate an equipment servicing location away from the proposed site
- Appropriate storage of fuel and Materials on site
- The contractor should engage a licensed waste collector to manage all the waste in the 7 sites
- Undertake water quality monitoring after construction to establish any contaminants in the water

(v). Pollution by Waste Water

Improper handling and disposal of wastewater generated during the drilling process can lead to severe consequences for both groundwater quality and the community. The water contains mud drillings and drill cuttings which pose a health hazard to livestock including causing gastrointestinal diseases and long-term chronic conditions due to exposure to toxic substances The contaminated water can introduce pollutants into aquifers posing health risks to communities relying on groundwater.

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-3
Duration of impact	-2
Frequency of activity / duration of activity	-2
Frequency of impact	-4
Result	**-60 Medium**

Mitigation measures

- Engage licensed waste company to handle all drilling wastes including waste water
- The contractor will ensure that all fuel and hazardous materials are stored securely away from the borehole site to prevent leaks.
- Establish designated areas for equipment servicing that are also distanced from the borehole location.
- Conduct regular water quality assessments post-drilling to detect any contaminants in the water
- Inform local communities about potential risks associated with borehole drilling

(vi). Impact on vulnerable and marginal groups

The impacts of construction may create a disproportionately heavy burden on vulnerable and marginal groups such as persons living with disability who may have challenges with blocked access routes, chronically ill persons who be affected significantly by dust emissions, school going children who are at risk of accidents and falls due to ongoing works, the elderly who may experience inconveniences from blocked routes and noise from drilling and solar installation machines.

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

- Create awareness to the community on the proposed project works to increase preparedness & readiness
- Construction Materials and debris should not be stored along access routes
- Construction vehicles should adhere to recommended speed limits in the sensitive zones
- The contractor should have a watering schedule along the access road and on site to minimize dust emissions
- The contractor should engage the host community to establish suitable Corporate Social Responsibility project that will serve the interest of all particularly the marginal groups

(vii). Project Related Conflicts

There may be issues that arise during project construction that can bring conflicts and may need attention. This may range from employment issues, division of supply, project activities, duration of the construction period, engagement of host community etc.

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	-1
Result	**-18 Very low**

Mitigation measures

- Setting up of a Grievances Redress and Mechanism Committee to undertake case by case complaints;
- The project shall have in place a conflict/issues management strategy including engaging an EHS expert who will manage the project related conflicts
- All matters or issues that may arise during construction shall be documented and presented to the relevant persons; IWASCO, 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 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.

Grievances Redress during project construction

The proposed grievances mechanism will entail:

- ✓ Setting a project Grievance Redress Mechanism committee.
- ✓ 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 IWASCO 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.

(viii). HIV/AIDS and STIs and Alcohol or Substance Abuse

The scourge still stands a national disaster. Workers, especially during end months 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

- 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 Violence, Substance Abuse & HIV/AIDS
- Conduct education and awareness campaigns on HIV/AIDS, STIs, and the dangers of substance abuse.

(ix). 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 postponing or delay of 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.

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.

Child Labour

Direct child labour may be limited since drilling and solarisation is a specialised task. However a few casual positions such as carrying materials like sand, cement clearing the site and waste bulking may attract child labour. Indirect child labour may occur when parents get engaged to work in the project and as a result leave their children to take over household activities leading to missing classes.

Impact without Mitigation	
Severity of impact	-4
Spatial scope of impact	-1
Duration of impact	-1
Frequency of activity / duration of activity	-1
Frequency of impact	-1
Result	**-12 Very Low**

Mitigation

- The contractor should adhere to the labour laws;
- The client should conduct regular inspections to ensure no children are working on-site.
- Using law enforcement agencies to monitor and apprehend those who contravene the laws.

Workers Influx

Borehole construction in comparison to a water piping project is a short term project that does not significantly lead to influx of workers in an area. Care should be taken when employing the unskilled workers making sure they are drawn from the community. If this is not observed, there could be conflicts and tensions, increased risk of sexual exploitation, harassment, or abuse. It could also lead to increased pressure on natural resources such as water, land, and firewood. Waste generation and improper disposal near construction sites.

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	-1
Result	**-21 Very Low**

Mitigation

- Hiring of local workers for ease of management of workforce
- Enforcing the code of conduct for workers
- Frequent consultations with local leaders and community members when hiring the local workers
- Establish grievance redress mechanisms to address complaints and concerns

Conflicts over water access and management

With improved water supply , disputes concerning allocation of water especially priority areas, competition for water leading to conflicts between communities or households. Other disputes may arise from mismanagement, corruption and lack of enforcement of water regulations and favouritism and triggers conflicts including along ethnicity.

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-1
Duration of impact	-3
Frequency of activity / duration of activity	-1
Frequency of impact	-3
Result	**-36 Low**

Mitigation Measures

- Having a community driven Water Resources Users Associations committee
- Participatory decision-making involving all stakeholders benefiting from the borehole water.

7.2.3 Operational Phase

POSITIVE IMPACTS

- 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

(i). Vandalism and theft of installed infrastructure

Water utilities often experience theft from residents especially when the system is not functional/no water flow. These activities can affect the delivery and management of the installed system, which results to limited access in the town. They ranging 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

- The implementing agency to ensure good relationship with the local community through continuous engagement
- Foster household ownership of the infrastructure through payment of water by households
- Enforce law against reported cases of vandalism
- The security officers at the school compound should be keen to check on the construction materials and report any case of theft for purposes of apprehending the culprits.

(ii). 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, WTP 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

(iii). 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. Stakeholders noted that the current system has high levels of unaccounted for water.

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

(iv). Impact of climatic changes

Climatic changes in the area are manifested through unpredictable rains, intense floods, prolonged drought. Such extereme weather events may result to a reduction of groundwater and hence limited water supply or destruction of infrastructure in case of floods.

Mitigation

Impact without Mitigation	
Severity of impact	-5
Spatial scope of impact	-4
Duration of impact	-3
Frequency of activity / duration of activity	-5
Frequency of impact	-3
Result	**-96 medium - High**

- ✓ Climate proof all project infrastructure e.g. construct drainage channels
- ✓ IWASCO should integrate climate information applications in water supply scheduling

(v). Risk of Over abstraction

Increased water demand in the project area may result to water over abstraction. This can lead to lowering of water levels and eventually drying up of the same.

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	-1
Result	**-72** Medium to High

Mitigation Measures

- Promoting efficient water use by use of water meters
- Create public awareness about efficient water appliances
- Establishing monitoring systems to promptly detect leakages and making repairs can help to conserve water.
- Implementing and enforcing regulations for water abstraction based on climatic data forecasts

(vi). Energy Use

The proposed project will utilize solar power in pumping water from the borehole. This will enhance sustainability, low operation & 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.

(x). Impact on vulnerable and marginal groups

Borehole construction is a low impact project that may have minimal o no impact on the marginalized communities. However, if not managed properly, the construction may create a disproportionately heavy burden as they would experience challenges with blocked access routes.

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

- 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 Isiolo town.
- 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 co**mmunitie**s, ensuring sustainable access to safe water and improving overall quality of life.

7.3 CUMULATIVE IMPACTS

Positive Cumulative impacts of the project:

a) Increased Water Access: Reliable, sustainable water pumping through solarisation ensures consistent water supply
b) Reduced costs of operation: Solar-power use will reduce dependency on Kenya power energy which is a major operation cost in water provision.
c) Reduced cases of water borne diseases among the locals.
d) Improved local economic development.
e) Institutional strengthening & Capacity building for IWASCO due to increased revenue collection

f) Improved nutrition due to availability of vegetables in kitchen gardens Reduction in
g) Resilience to Climate Change: Solarisation produces clean energy making water access more reliable during power outages or fuel shortages.
h) Energy Resource Conservation: Solar energy is renewable, reducing dependence on non-renewable fossil fuels.
i) Reduction of Noise Pollution during operation since solar systems are quieter compared to diesel generators.

Negative Cumulative impacts

a) Impacts associated with aquifer water availability and water quality including: Intrusion of salt water, Pollution induced by maintenance of other boreholes and Land subsidence, deterioration of water quality
   Mitigation
   i. Water quality should be checked at key times of the year for bacteriological and chemical contamination in accordance with national guidelines
   ii. The borehole yields shall be regularly monitored in line with WRA requirements

b) E-waste from Solar Batteries: improper disposal of solar batteries can lead to environmental contamination.
   Mitigation
   i. Undertake environment audit annually to ensure that an e-waste management system is in place
   ii. Engage waste recyclers to handle recoverable materials from the project
   iii. Purchase electronic materials from authorized dealers to increase durability

7.3.1 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 safety and 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.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT & MONITORING PLAN

8.1 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 Plan (CP-ESMP) that will be implemented during the construction phase of the project.

8.1.1 Management Responsibility of ESMMP

In order to ensure the sound development and effective implementation of the ESMMP, it is necessary to identify and define the responsibilities and authority of the various persons and Organizations that will be involved in the project. The following entities should be involved in the implementation of this ESMMP:

- IWASCO
- NEMA Isiolo County
- Contractor
- Design Consultant;
- County Government of Isiolo

8.1.2 IWASCO

IWASCO 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 ESS unit.

8.1.3 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.

8.1.4 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.

8.1.5 County Government of Isiolo

The relevant departmental officers in Isiolo 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

Impact	Mitigation/s Remedial Action/s	Implementation agency/ies	Monitoring Indicators and Freq. (F)	Mitigation target	Mitigation Cost/s (KShs)
CONSTRUCTION PHASE					
Noise Pollution	• Install portable barriers to shield the drilling rigs and drilling bits to minimize noise • Drilling limited to daytime, weekends when there is no learning, ensure noise levels are kept to a maximum of 55 dBA • Provision of appropriate personnel protective equipment to workers • Observe drilling protocols e.g., use of barricades, notification should be done 14 days to the start of the works • 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 School management	-Presence and condition of barriers around drilling rigs and bits. -Noise level readings at various points below 55 dBA, drilling schedule developed -Availability and enforcement of PPE use. -Drilling protocols instituted -Traffic management policy developed & enforced -Worker's sensitization schedule	Minimal noise levels	50,000 (hiring portable barriers, noise PPEs)
Site Safety, Security, and Health Risks	• Barriers shall be erected to prevent unauthorized access to the project sites by residents and other unauthorized persons • Security personnel shall be deployed to secure the safety of the workers and	Contractor School management	-Presence of barriers around project site. -Security personnel deployed -Safety talks shall be held on a weekly basis;	Safety and secure sites	50,000 (safety PPEs, security personnel, first aid kit)

	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 of 50 KM/H • Any accident, incident or hazardous situation should be reported immediately it occurs or identified; • The Contractor shall ensure that any food served at the sites meets the minimum hygienic conditions; • 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 • The Contractor shall abide by the all the relevant provisions of OSHA, 2007 and other relevant legislations		-Traffic safety policy developed -Incidence book availed -Worker Insurance cover provided -Availability of sanitary facilities on site- -Presence of the EHS officer on site -First Aid Kit availed on site -Emergency contact for a health facility provided to site agent & EHS officer		

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; • 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	Contractor	- PPE provided & distributed -Drinking water points on site -Sanitation facilities availed -EHS officer deployed	Safe and health working environment	50,000 (portable toilets, drinking water PPEs)
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 Contractor	-Maintain records of all mature trees cut, including permit numbers and dates. -Detailed plan outlining species, planting densities, and methods.	Restoration activities implemented	20,000 (landscaping)

	• The project will make provision for tree planting within the site restoration activity				
Water Quality	• Designate an equipment servicing location away from the proposed site • 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	The contractor	-Location maps showing storage areas and borehole sites - Contracts or agreements with licensed waste collectors - Water quality test results (e.g., levels of contaminants, pH, turbidity)	Zero Contamination	30,000 (waste collection, water quality test)
Waste Water management	• Engage licensed waste company to handle all drilling wastes including waste water • Ensure that all fuel and hazardous materials are stored securely away from the borehole site to prevent leaks. • Establish designated areas for equipment servicing that are also distanced from the borehole location.	Contractor WRA	-Waste collector engaged to handle waste water -	No contamination	50,000 (waste water collection, monitoring, sensitization meeting)

	• Conduct regular water quality assessments post-drilling to detect any contaminants in the water • Inform local communities about potential risks associated with borehole drilling				
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 documented and presented to the relevant persons-IWASCO, 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	Contractor	- Contactor's grievances management policy - Complete and accurate documentation of all construction-related issues. - Documentation and tracking of court cases. - Number of unskilled labor positions filled by locals.	EHS expert engaged to handle conflicts Grievances & Redress record book provided Evidence of how grievances are addressed	40,000 (EHS, grievances book etc)

	local 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.				
Effects on livelihoods	• Provide a schedule of works to notify residents and business owners who will be affected by the construction works to allow them to prepare appropriately • Sensitize the community on the existing grievances redress mechanism to report any prolonged disruptions to their livelihoods • Expedite the construction process to minimize the length of time that these impacts are experienced • Implement mitigation measures to control noise and dust emissions in the area	Contractor IWASCO	Percentage of affected residents and business owners who receive the schedule of works in advance. Number of grievances formally reported through the redress mechanism Number of complaints related to noise and dust from residents/businesses.	Minimal effect on livelihoods	10,000 (Sensitization activities)
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.	Contractor	- Grievances redresss policy - Contractor's policy on Sexual Harassment & Gender based violence	Low or zero HIV/Aids prevalence and sober and	20,000

	• Ensure the contractor has an explicit policy on Sexual Harassment, Gender based Violence, Substance Abuse & HIV/AIDS • Conduct education and awareness campaigns on HIV/AIDS, STIs, and the dangers of substance abuse.			productive workforce	
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 good will and support of the politicians shall be encouraged through consultation and involvement in decision making.	IWASCO County Government	-Number of community sensitization meetings held prior to the project -Number of Engagements with Politicians	Encouraging Positive Political Engagement	10,000 (meeting venue)
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. • Awareness creation and community outreach to educate locals about their rights and available reporting mechanisms	IWASCO 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)

Child Labour	• The contractor should adhere to the labour laws; • The client should conduct regular inspections to ensure no children are working on-site. • Using law enforcement agencies to monitor and apprehend those who contravene the laws.	IWASCO	-Employment policy developed	No child is engaged in the project works either directly or indirectly	Inspection/ monitoring fee
Conflicts over water access and management	• Having a community driven Water Resources Users Associations committee • Participatory decision-making involving all stakeholders benefiting from the borehole water.	IWASCO WRA	-WRUA or Water Committee established	-Zero conflicts on water distribution	20,000 (establishment of water committee)
OPERATION PHASE					
Vandalism and theft of installed infrastructure	• Continuous engagement -meetings, liaison staff • Foster household ownership of the infrastructure through payment of water by households	IWASCO	-Frequency of Community Engagement Meetings -Percentage of Households Paying for Water -Number of Vandalism Incidents Reported	Infrastructure is secured	30,000 p.a (meetings)

	• Enforce law against reported cases of vandalism				
Water Quality	• Provide for periodic water quality monitoring at strategic points including the source, WTP 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	IWASCO	- 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)

	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 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	IWASCO	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. • 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	IWASCO	-Quality certifications and warranties from manufacturers. - Performance metrics and visual inspections of panel cleanliness. - Visual inspection for loose connections, and checking for system performance drops.	Reduced energy loss	10,000 p.a (solar system maintenance)

	• 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 marginalized groups	• 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	IWASCO	-Stakeholder Engagement - Feedback Mechanism - Allocation Mechanisms	Ensure equitable and sustainable access to water for vulnerable and marginalized groups	30,000

	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 Isiolo town. • 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.				
DECOMMISSIONING PHASE					
End of project strategy	• 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	IWASCO	Decommission strategy/Plan Freq: End of Project	Environmental Protection	TBD

	• The legislations and best environmental practices prevailing then shall apply.				

9 CONCLUSION AND RECOMMENDATION

9.1. Conclusion

The proposed project aims to establish a sustainable water supply system through a systematic process. It entails surveys and site selection, conducting initial hydrogeological and geophysical assessments to identify suitable groundwater sources and optimal drilling locations. Once permits and approvals are secured, drilling operations commence, utilizing rotary or percussion methods based on geological conditions. Protective measures such as casing and gravel packing will be installed to prevent contamination and ensure borehole stability.

Water quality testing in accredited laboratories will be done to ensure compliance with consumption standards before handing over the operational borehole to IWASCO for maintenance and monitoring. The project also evaluates alternatives including a no-project scenario, highlighting that without intervention, IWASCO would continue facing irregular water supply and high operational costs due to electricity bills. 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 a school compound and there are no livelihood activities within the site selected for the project. Therefore, there are no Persons Affected by the project, no displacement and no need for compensation.

9.2 Recommendations

The recommendation of this study is that the proposed project be allowed to proceed on strict condition that the environmental management 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 & Monitoring Plan should be communicated to all the responsible actors including Contractor, IWASCO
ii. The contractor should develop a Construction Phase-ESMMP for the proposed project

iii. The Contractor should provide relevant policies prior to the start of the work -Grievances Redress Policy; Sexual Harassment & Gender Based Violence Policy; Labour Policy
iv. The Contractor should engage an Environment Health & Safety Expert to implement the ESMMP

The proponent should ensure the ESMMP is integrated in the company structure of managing environment and social issues.

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10 APPENDICES

10.1 Grievances Redress Mechanism

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.
j) Get feedback of whether the complainant is satisfied with the resolution.
k) Close the grievance file if the complainant is satisfied
l) Appeal & escalation Process: If the complainant is dissatisfied, the appeal process should start or the issue presented to a higher level office
m) There should be documentation and detailed records of all grievances, investigations, resolutions, and communications.

10.2 Waso Borehole Bill Of Quantities (BoQ)

WASO PRIMARY BOREHOLE DRILLING

Drilling and Steel Tank Instalaltion

ITEM No	ITEM DESCRIPTION	UNIT	QTY	RATE KSHS	AMOUNT Kshs
1	Allow for acquiring of borehole drilling authorization permit	L/S	1	60,000.00	60,000.00
2	Allow for NEEMA Licence	L/S	1	120,000.00	120,000.00
3	Allow for Hydrogeological Survey	L/S	1	100,000.00	100,000.00
4	Mobilization of drilling unit and assembling the same at borehole site, dismantling and demobilization on completion.	L/S	1	50,000.00	50,000.00
5	Allow all costs involved in providing water for all requirement of the contract drilling ,field camp etc.	L/S	1	68,950.00	68,950.00
6	Drilling of 10 inches diameter hole to provide for finished cased diameter of 152mm (6-inches). Incude for installation and removal of temporary casings.	M	150	5,000.00	750,000.00
7		NO	75	160.00	12,000.00

	Collection of formation samples and geological logging after every 2M				-
8	Supply and install 152mm(6-inches) plain steel casings	M	90	3,000.00	270,000.00
9	Supply and install 152mm(6-inches) slotted steel casing	M	60	3,500.00	210,000.00
10	Supply and install gravel pack of average grain size 2mm-4mm	TON	20	6,000.00	120,000.00
8	Development of borehole by use of chemical and physical method- chemical treatment and high pressure air or water jetting including inserting and with drawing of development equipment until clear water is obtained.	HRS	8	650.00	5,200.00
	Test pumping and recovery measurements				
11	· installing and withdrawing of test pumping equipment	NO.	1	50,000.00	50,000.00
	· Continuous drawdown	HRS	24	800.00	19,200.00
	· Recovery measurements	HRS	8	600.00	4,800.00
12	Carry out borehole sterlization	L/S	1	600.00	600.00
13	**Finishing and securing the borehole;**		1	4,000.00	4,000.00

	1mx1mx0.5m finished slab. Include for grouting surround along annullar space	NO	1	7,000.00	7,000.00
	Mild steel 152mm borehole cap	NO	1	8,000.00	8,000.00
14	Chemical analysis of water samples	NO	2	6,000.00	12,000.00
15	Supply of documentation WRMA completion certificates	Item	1	20,000.00	20,000.00
16	Branding	L/S	1	50,000.00	50,000.00
16	Allow for supervision and contract Management	L/S	1	50,000.00	50,000.00
	TOTAL				**1,991,750.00**
	TOTAL Kshs.				**1,991,750.00**

EQUIPPING WASO PRIMARY BOREHOLE

ITEM				RATE (Kshs)	AMOUNT
	DESCRIPTION	**UNIT**	**QTY**		**KShs**
1	Supply and Install a Borehole Grudfos Submersible Pump complete coupled with Motor capable of delivering 15m³/h against a head of 150m	NO.	1	650,000.00	650,000.00

2	Supply and fix 6mm² 4 core flat submersible drop cable	M	150	600.00	90,000.00
3	Supply and fix 6mm² 4 core underground cable	M	20	500.00	10,000.00
4	Supply and fit 1¼" adapter set	No.	1	8,000.00	8,000.00
5	Supply and fit 63mm dia. PVC Dayliff borehole pipe 3m length	No.	50	3,000.00	150,000.00
6	Supply and install 25mm airline pipes	No.	25	450.00	11,250.00
7	Splicing kit	No.	1	8,000.00	8,000.00
8	Supply and fit cooling sleeve	No.	1	8,000.00	8,000.00
9	Supply and fix 2" x 6" borehole cover complete with sundries	No.	1	8,000.00	8,000.00
10	Supply and install earth rod complete with clamp and earth cable	No.	1	2,000.00	2,000.00
11	Supply and install 63mm diameter water meter complete with all fittings	No.	1	45,000.00	45,000.00
12	Supply and install 63mm Non return valve	No.	1	10,000.00	10,000.00
	TOTAL				1,000,250.00

	GRAND TOTAL				
	DRILLING BOREHOLE				1,991,750.00
	BOREHOLE EQUIPPING				1,000,250.00
					2,992,000.00

Solarisation component

Description		**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Installation of Solar			No.	KSh	KSh
Description					
1	6mm2 4core UG cable	Mtrs	100	350.00	35,000.00
2	1.5mm2 2core UG cable	Mtrs	100	170.00	17,000.00
3	Well probe	No	1	3,700.00	3,700.00
4	Sunverter SV3/7.5T 7.5kw controller	No	1	100,000.00	100,000.00
5	440W Dayliff solar modules	No	29	48,000.00	1,392,000.00
6	PV Disconnect Switch 1000V/40A	No	2	15,900.00	31,800.00

7	10mm² twin solar cable (DC)	Mtrs	100	910.00	91,000.00
8	MS ground mount 4m Support Structure /watt	No	1	200,000.00	200,000.00
9	Lightning arrestor c/w 5m copper tape	No	1	11,700.00	11,700.00
10	Installtion sundries	No	1	50,000.00	50,000.00
11	14 Earth rod c/w clamp & Earth cable	No	1	1,500.00	1,500.00
12	Labour	No	1	30,000.00	30,000.00
				Sub-total:	1,963,700.00
	Add 16% VAT				314,192.00
				Sub-total:	314,192.00
				TOTAL	2,277,892.00

10.3 BOM meetings and Letters of Approval for Borehole Construction

BOM MEETING HELD ON 21 /02/2023 AT WASO PRIMARY SCHOOL AT 10. 00 AM

MEMBERS PRESENTS

1. CHARLES GITHAIGA - SECRETARY
2. NAFTALI MACHARIA-CHAIRMAN
3. TUYE ALI -PTA CHAIRMAN
4. RUTH NGAI
5. FELIX THURANIRA
6. IRENE KAURIA
7. JOHN NGUYO
8. DORCAS KARAMBU
9. DOREEN NKIROTE
10. ERIC BUNDI MOE

WASO PRIMARY SCHOOL 21 FEB 2023 P. O Box 87 - 60300, ISIOLO

AGENDA

1. PREMINARIES
2. READING AND CONFIRMATION OF PREVIOUS MINUTES
3. EXAMINATION
4. DONATING PIECE OF LAND FOR WATER INSTILLTION BY IWASCO
5. GRADE 7
6. ANNUAL BUDGET
7. BUDGET APPROVAL ON GPA AND SIMBA
8. NEMIS

MIN 1/2/09/23 .PREMINARIES

Chairman welcomed all the members present and ask Mr. Felix to lead us with word of prayers which he did.

MIN 2/2/2023 READING AND CONFIRMATION OF PREVIOUS MINUTES

The minutes were read and confirmed to be true of what we discussed it was proposed by RUTH Ngai and Tuye Ali

MIN 3/2/2023 EXAMINATION

We discussed about the examination and general performance of the examination and we realized that we are doing good job and members recommended us for the work we are doing. Especially on grading. Member's emphases on regular quiz to open up the learners.

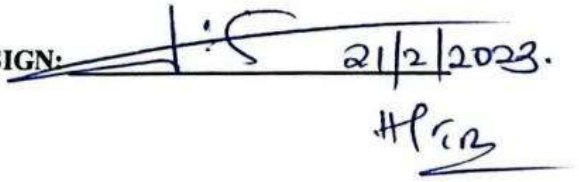
1. MIN 4/2/23 DONATING PIECE OF LAND FOR WATER DRILLING BY IWASCO

Chairman explain about the drilling of water to serve the community, after a lengthy discussion members agreed to give them **but with the condition that they will supply the water to the school without any payments and deploy a personnel to make sure that PROJECT is securer.**

MIN 8/2/2023 NEMIS

After a long discussion we saw a good number of students they don't have the birth certificate therefore we agreed to push the parents to get the necessary document since our school is only getting funds for only 336 pupils which we have 810 pupils.
We agree to have many meeting with the parents to show the importance of documents
The meeting was adjourned at 11:30 am
With the word of prayer conducted by Tuye ALI.

BOM CHAIRMAN **NAFTALI MACHARIA** **SIGN:** 

BOM SECRETARY **CHARLES GITHAIGA** **SIGN:** 

HEADTEACHER
WASO PRY SCHOOL
P.O. BOX 87
ISIOLO

TO DIRECTOR – IWASCO
P.O. BOX
ISIOLO.

Dear Sir,

REF: DRILLING BOREHOLE IN SCHOOL COMPOUND.

I wish to bring to your notice that following the receipt of your letter, requesting us for drilling of borehole in our school to serve the community. The board of management has accepted and are requesting your esteemed office for the following favour:-

(i) The borehole to provide water for school since water is a scarce commodity.
(ii) Provide person taking care of the borehole.

We are asking you to come to school so that we can show you the site.

Thanks and I hope you will do the work the soonest possible.

Yours faithfully,

WASO PRY SCHOOL
23 FEB 2023
Sign:...

CHARLES GITHAIGA
HEADTEACHER

24/2/23

ISIOLO WATER & SEWERANGE COMPANY LTD.
RECEIVED
24 FEB 2023
P O. Box 491 - 60300, ISIOLO
Email:isiolowater@yahoo.com

10.4 Minutes of Community Meetings with the Consultants

MINUTES OF BARAZA ON ENVIROMENTAL AND IMPACT ASSESSMENT FOR A PROPOSED BOREHOLE DRILLING AND SOLARISATION HELD ON 27/08/2024 AT WASO PRIMARY SCHOOL PROJECT SITE

PRESENT

ATTENDANCE (ATTACHED SIGN LIST)

Total Number of Attendees:
Men: 10
Women: 21
IWASCO Staff: Joseph Waciuri, Salod Jattan & Libam Gurach
Consultant team: Rebecca Karanja & Purity Muthoni
Ass Chief : Sarah Kananu

AGENDA

a) Preliminaries
b) IWASCO Brief
c) Consultant Brief
d) Community Concerns, Issues & Recommendations

MIN 1. PRELIMINARIES

The meeting started with a word of prayer from at 12. 40am. The head teacher invited community members to the meeting. One of the board members () in attendance welcomed members and thanked parents for attending this meeting to discuss water matters.

MIN 2. IWASCO BRIEF

The IWASCO gave a brief of the project. It was It would entail a borehole drilling, steel tank and solarization of the pump. Currently, this area is served by surface

water which is unreliable during the dry season. There is a need to augment this source with a borehole hence the borehole project. The school is a public facility hence the preference for this site. The school site will ensure community ownership of the infrastructure. Most of the schools in Isiolo Town are host to boreholes hence this is not a peculiar case.

MIN 3: CONSULTANT BRIEF

The consultant gave a brief of the assignment. She mentioned that the objective of ESIA is to inform members regarding the proposed project. It is also to solicit support from the members.

MIN 4: COMMUNITY CONCERNS

vi. Will the water be treated? It is a requirement that water meant for human consumption will be treated

vii. The school head indicated that they had discussed as a board on matters regarding benefits and had requested IWASCO for unmetered water.

viii. IWASCO: the company has evaluated water needs in Isiolo Town and one of the key areas is Waso area. Towards this, the company identified water. The school will receive unmetered water for their school needs. The project belongs to the community. Their children will benefit from improved water access from this project. The community will also have regular water supply.

ix. The school is giving out land for the project, will the water that will be given to the school metered? The water for the school will be unmetered and will not be charged.

x. There are other partners e.g. USAID that are promoting agriculture in institutions, establishment of small gardens. We understand that IWASCO water should not be used to irrigate, is this allowed? The water should be purely for domestic use in the school and not for a major irrigation scheme.

xi. The Ass chief indicated that the area has been experiencing water shortages and this has resulted to poor school attendance as children join their parents in looking for water. The water will assist the women to access water, undertake other chores, reduced domestic violence meted on them when they delay cooking meals because of lack of water and even have some kitchen garden

MIN 4: A.O.B

There being no other business the meeting ended with a word of prayer from Abdiziaz Ibrahim a teacher in the school at 2.30pm

Minutes signed by:

ISIOLO WATER & SEWERAGE COMPANY LTD
P. O. Box 491 - 60300, ISIOLO
Email:isiolowater@yahoo.com

MINUTES SIGNED BY:

Client ---------- Date 27/8/24

Consultant

Date 27/8/2024

MINUTES OF BARAZA ON ENVIROMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED ISIOLO BOREHOLES DRILLING AND SOLARISATION HELD ON 12/6/2024 at ISIOLO CDF Offices

PRESENT

ATTENDANCE (ATTACHED SIGN LIST)

The meeting was attended by 49 members drawn from all the project areas.

Total Number of Attendees: 49

Men: 11

Women: 16

Youth: 12

Isiolo Water Staff: 6

Consultant team: 4

MIN 1. PRELIMINARIES

The meeting was called to order at 11.00 am and began with a word of prayer Dansoye Abkul.

Introductions

Isiolo water and sewarage company staff present Include:

- ✓ Nura Bonaya- The Finance Manager
- ✓ Catherine Mwenda-Internal Auditor
- ✓ Liban Guracha-Assistant Technical Manager
- ✓ Salod Jattan

Mr Liban gave a brief of the Isiolo area indicating that it's a fast growing area but there is inadequate supply of water. The area experiences recurrent droughts which aggravates the water scarcity. Community members can go for more than one week without water The Isiolo water project involves : Drilling and equipping of 5 boreholes, Solarisation of 7nr bore holes and Purchase and installation of 1,610 DN 15mmconsumer meters.

Ms Catherine Mwenda invited the consultants team to introduce themselves,The team comprised of:

- ✓ Dr. Rebecca Karanja (team leader)– Environmental Expert
- ✓ Dr Purity Muthoni- ESIA Expert
- ✓ Ms. Eunice Wanjiru - Sociologist

- ✓ Dr. Florence Ngari – Biodiversity Expert

The Members present were given a chance to introduce themselves and Rebecca Karanja took the community members through the ESIA requirement. She explained that EMCA 1999 stipulate that projects should have social and environmental compliance. Since 2022 in Kenya, its mandatory to carry out an ESIA for development projects and submit the ESIA report to NEMA for project approval and licensing. Rebecca further elaborated that a comprehensive report should include participant's names and signatures for meetings attended and also photos for community meetings. She introduced the enumerators drawn from the community who were to be involved in household surveys and indicated that they will be visiting households.

MIN 2. PROJECT AWARENESS AND ACCEPTANCE

The community were sensitized on the project components and the requirement for the public participation.

By a show of hands, all the participants indicated that they were aware of the project and they were willing to support it and have it implemented soonest possible.

MIN 3. ANTICIPATED PROJECT IMPACTS

The community members were able to enumerate the impacts of the project on them and the environment. They listed both the positive and negative impacts of the project. Some of the positive impacts include:

- ✓ Continuous water supply
- ✓ Establishment of Kitchen gardens
- ✓ Increased value of rental houses
- ✓ Saving of money and time
- ✓ Reduction of family conflicts
- ✓ Lighting using the solar panel
- ✓ Job creation during the implementation
- ✓ Enough water for domestic animals
- ✓ Water will reach out to the growing population
- ✓ Improvement of academic performance as children will concentrate on their studies
- ✓ Improved security since people will not have to go far to draw water

Some of the concerns highlighted by the community include:

Concern raised by the community	Consultants response
The boreholes may yield salty water unfit for human consumption	The water from the boreholes will be tested by Isiolo water company to ascertain its safety for human consumption.
Clogging of pipes by dirty water	The water will also be subjected to water treatment including sedimentation to make it clean
Construction Materials and waste may be dumped carelessly	All waste Materials and spoil will be disposed at NEMA approved sites
Bore hole may interfere with ground water levels (water tables)	A hydrogeological survey was done to ascertain the water levels in the water table so as to get the place that will yield the highest amounts of water.
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	The client confirmed to the community that the unit cost will remain the same but water supply will be improved

The possible negative impacts from the project include:

Negative Impacts	Mitigation measures
Displacement of persons	The client assured them that some the boreholes are located in Isiolo water company land and the ones that are located in mosques and schools, a memorandum of understanding plus letters of agreements will be availed.
Increased traffic flow	The Contractor will plan vehicle routes to target low traffic hours Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas; Ensuring moving equipment is outfitted with audible back-up alarms;
Devegetation due to access road construction	While opening new areas for access, the top soil shall be stockpiled and preserved for future restoration use; Seeds should be collected from seeding plants, for planting in alternate areas including upstream of the project / in the project catchment area.
Noise and vibration generation from mobilization of equipment	Movement of the heavy machinery should be limited only to day time, e.g. 6 am to 7 pm
Dust pollution	Use of dust control methods, such as covers, water suppression, or increased

	moisture content for open Materials storage piles, or controls; Care must be taken in the unloading construction Materials

MIN 5. COMMUNITY EXPECTATIONS FROM THE PROJECT

1. Provision of jobs during project implementation
2. Involvement project management
3. Reduced water bills
4. Regular water supply

MIN 6. ADJOURNMENT

There being no other business the meeting ended at 1. PM with a word of prayer from one the community members.

Minutes signed by:

ISIOLO WATER & SEWERAGE COMPANY LTD
P. O. Box 491 - 60300, ISIOLO
Email:isiolowater@yahoo.com

Client : ----------

Date ---------- 12/6/24 ----------

Consultant

Date 12/6/2024



EAE 23061620

FORM 7 (r.15(2))

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/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

ATTENDANCE SHEETS

18	Abdia Diba	TULLU ROBA	0720413368	
19	HAWO HASS JIRMA	Chelchele	0701005438	
20	JIRMA-ABDUBA	RaMaDa	0713116309	
21	Suleiman Jaljila	Water Care	0792611667	
22	FRIDAH NTARA	KWASO	0723597691	
23	IBRAHIM HUSSEIN	MATER	0788877817	
24	Margaret Kagure	Water care	0726951516	
25	SARAH KANANU	WASO	0728131666	
26	SARAH OGETO	WASO	0729381342	
27	JOHN EARL.	OOP Interior	0740171451	
28	Rebecca Karanja	water sector consultant	0722601849	
29	Cathrine Mwendwa	IWASCO Cathrine Mwendwa	0710180172	
30	LIBAN GURACHA	IWASCO	0720114662	
31	Nuno Hassan	Tulu Roba	0707007230	
32	Salad Jaffa	CITIZENS	0713119805	
33	EUNICE NDUATI	social consultant Water sector fund	0725894389	
34	FLORENCE NGARI	Bio diversity expert water sector	0700406016	

WaterFund
Financing the Water Sector
WATER SECTOR TRUST FUND

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE PROPOSED INTERVENTIONS FOR ISIOLO NANYUKI AND MANDERA WATER SERVICE PROVIDERS (WSP)

NAME OF THE WSP_____

Name	Designation	Tel/ID Number	Signature
CAROLINE KIMEMIA	Teacher	0726361177	
Linet Moraa	Teached	0721521284	
[illegible]	Teacher	0710429421	
JANE ARITHI	Teacher	0725205871	
CLEMENTINE MAKENA	Teacher	0727808262	
Halima Suleman	Teacher	0716116985	Suleman
ROSEMARY KIBITI	AH TEACHER	0726164932	
KENNETH GIKUNDI	Teacher	0725602524	
David Kabiuki	MZAZI	0717455948	
JOHN mwenda	MZAZI	0712533569	

Name	Designation	Tel/ID Number	Signature

HARAMBEE

WaterFund
Financing the Water Sector
WATER SECTOR TRUST FUND

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE PROPOSED INTERVENTIONS FOR ISIOLO NANYUKI AND MANDERA WATER SERVICE PROVIDERS (WSP)

NAME OF THE WSP_____

Name	Designation	Tel/ID Number	Signature
KMLN KONO	TECHNICIAN	0740822764	