



## Kenya Climate Smart Agriculture Sub-project (KCSAP)



*GPS LOCATION OF SITE: Latitude: 0.53885013 Longitude: 35.87308608*

### **ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT SUMMARY REPORT FOR THE PROPOSED CHEBORUSWO BOREHOLE WATER SUB-PROJECT, CHEBORUSWO VILLAGE, KOITILION SUB LOCATION, EWALEL SOI LOCATION, MARIGAT WARD, BARINGO SOUTH SUB COUNTY, BARINGO COUNTY**

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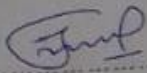
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**July 2021**

**CERTIFICATION**

This Sub-Project Summary Report has been prepared by Dr. Joel Sumukwo, Environmental impact assessment & Audit lead expert Reg. No..... The report has been done with reasonable skills, care, and diligence in accordance with the Environmental Management and Coordination Act 1999, and the Environmental (Impact Assessment and Audit), Regulations, 2003 and legal notice 31 & 32 of 2019. We certify that the particulars given in this Report are correct to the best of our knowledge.

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### **ABBREVIATIONS/ACRONYMS**

CBD	Convention on Biological Diversity
CBOs	Community Based Organizations
CESSCO	County Environment and Social Safeguards Compliance Officer
CoCs	Code of Conduct
COP	Conference of Parties
COVID 19	Corona Virus Disease
CPP	Consultation, Public Involvement, and Participation
CPs	Contracting Parties
CRA	County Revenue Allocation
EIA/ EA	Environmental Impact Assessment/ Environmental Audit
EMCA	Environmental Management and Coordination Act
ESIA	Environment and social impact assessment
ESMP	Environmental and Social Management Plan
GBV	Gender Based Violence
GHG	Greenhouse Gas
GoK	Government of Kenya
GRM	Grievance Redress Management
HIV/AIDS	Human Immune Virus/Acquired Immune Disease Syndrome
KCSAP	Kenya climate Smart Agriculture Project
KIHBS	Kenya Integrated Housing Baseline Survey
MoF	Ministry of Finance
MOALF	Ministry of Agriculture, Livestock and Fisheries
MoU	Memorandum of Understanding
MW&I	Ministry of Water Irrigation
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
PoEs	Panel of Experts
SEA	Sexual Abuse and Exploitation
SH	Sexual Harassment
SOP	Standard Operating Procedure
Sq. Km	Square Kilometers
ToR	Terms of Reference
WA2016	Water Act 2016
WAB	Water Appeal Board
WDD	Water Development Department
WHO	World Health Organization
WRA	Water Resource Authority

## EXECUTIVE SUMMARY

The proposed Cheboruswo Borehole Water Sub-project will be used for supply of water for Cheboruswo community purposes (livestock use, micro irrigation, and domestic). The water proponent: Community Based Organization (CBO) was formed by the community for the purpose of bringing the community together for easy soliciting of resources towards the struggle of accessing water resource. The membership is 560 households which is not static for it is free for all members of the community to join so long as he/she adheres to the CBO bylaws. The domestic water demand is estimated to be 20 m<sup>3</sup>/day. The sub project activities entail borehole drilling and equipping (borehole equipping, construction of a pump house, office, 100M<sup>3</sup>water tank, pipe works, water troughs, water kiosks and community watering point, fencing and solar panel installation). Drilling of Cheboruswo borehole is recommended to minimum depth of 190m and a maximum depth of 210m bgl. The sub project site is 0.8 Acres. The land for the proposed sub project is communal and has been donated freely by the community for the proposed activity.

The proposed sub project site located in Cheboruswo Village, Koitilion sub-location, Marigat Ward, Baringo South Sub County. The GPS coordinates are Latitude: 0.53885013 Longitude: 35.87308608 at an average elevation of 1285 m ASL. According to Environmental (Impacts Assessment and Audit) (Amendment) Regulations, 2019 the proposed project is categorized as a Low risk project based on specific activities to be conducted in the project area and requires a summary Project report. The proposed sub project construction cost is **Kshs 19,955,150**. Kenya Climate Smart Agricultural Project (KCSAP) is implemented through the Government of Kenya (GoK), the Ministry of Agriculture, Livestock, and Fisheries (MOALF), State Department of Agriculture in Baringo County. The project is funded by the World Bank. KCSAP programme focuses on increasing agricultural productivity, enhancing resilience to impacts of climate change and reducing GHG emissions. The overall objective of the proposed cheboruswo borehole is to provide safe and clean water to Cheboruswo community for livestock and domestic use. Water shortage is a major problem in Cheboruswo. The average walking distance to the other sources is 5 km.

The planning of the project entailed a participatory approach where the members of the community were involved in planning, designs, and ESIA processes. This Environmental and Social Impact Assessment (ESIA) has been undertaken in compliance with the Kenya Government environmental regulation, EMCA 1999 sections 138 (b) and 58, and the World Bank Applicable Operational Policies. The ESIA process started by screening, followed by scoping, and then the actual ESIA study. KCSAP (Baringo County) engaged ESIA and EA experts to carry out the environmental and social impact assessment and prepare this ESIA project report and the Environmental and Social Management Plan (ESMP).

This ESIA summary was carried out using several methods including; interviews (those interviewed comprised, the departments of livestock, veterinary and water, local administration (chief), one opinion leader and a youth and woman representative in the community and Cheboruswo sub project committee officials); one stakeholder consultations; site visits and administration of questionnaires. Out of the 40 questionnaires distributed 29 filled in and returned (see annex 2 for sample filled individual questionnaires). Public participation and stakeholders' engagements were done through holding one public meeting attended by 47 people and adhered to Ministry of Health Guidelines for COVID-19 control, namely: keeping social distance, washing of the hands, and putting on face masks provided by the team. Community translators were used to address the language barrier. One stakeholder consultative meeting was

held for technical persons and was attended by 10 participants. Three (3) FGDs were held for men, women and the youths. For the men there were 12 participants (see annex 4 on minutes & attendance), women 14 (see annex 6 on minutes & attendance) and youths 8 with 6 males and 2 females (see annex 5 on minutes & attendance).

Potential environmental and socio-economic benefits expected from the implementation of the proposed project will comprise; improved household nutritional and food security. The negative environmental impacts of the project comprise Disturbance of vegetation, soil erosion, groundwater pollution and vibration generation. Socio-economic- cultural impacts of the proposed project are Sub Project mismanagement, water-borne diseases (human), Outbreak of Livestock Diseases, Sexual exploitation and abuse (SEA) and Gender-based violence at community level. Summary proposed mitigation measures of the predicted environmental and social impacts are: mitigation of soil, water and air pollution control; testing of water to ensure quality standard is met for livestock and domestic use; and installation of auto-shut water taps to reduce water wastage. Also, sensitization on sexual exploitation and abuse (SEA) and gender-based violence (GBV);

The Contractors will develop Standard Operating Procedures (SOPs) in compliance to World Health Organization (WHO), before mobilizing to site. Local community members will be given priority in employment opportunities. The Proponent will train the local project committee, Social accountability and Integrity Committee (SAIC) and administration on GBV incidences monitoring, assessment, prevention and control.

Impacts to be expected in decommissioning are reduction in crop and livestock productivity, reduction in indirect employment opportunities. However, if the decommissioning will lead to the complete abandonment of the project all equipment would be removed under supervision of qualified engineer and the land restored to its original state. The estimated cost of implementing the ESMP is **Kshs 1,570,000**. The ESMP will be implemented by the selected contractor, KCSAP and other stakeholders. The monitoring of the implementation of the ESMP will be by KCSAP through its County Environment and Social Safeguard Officer (CESSCO) and NEMA officers in terms of enforcement and compliance. Considering the positive and negative impacts this project will not result to significant, cumulative, or irreversible negative impacts. All the predicted impacts will be easily mitigated and managed through the ESMP. Based on the assessment the sub project is therefore, recommended for approval by the National Environment Management Authority (NEMA) for issuance of an ESIA approval subject to annual environmental audits after operating for one year.

## **CHAPTER ONE: INTRODUCTION**

### **1.1 General Overview of Proposed sub-project**

The proposed Cheboruswo Water Sub Project is a community-initiated sub project through a public participation and is one of the County identified projects. The County Ward Fund pledged to support in drilling the borehole and the community through the stakeholders to do the equipping. The area is a water deficit zone where most of the people have left the area for search of water and other associated social facilities. The water project Community Based Organization (CBO) was formed by the community for bringing the community together for easy soliciting of resources towards the struggle of accessing water resource. The main sources of water in the area of study are shallow hand –drilled wells, seasonal streams as well as roof catchment during rainy seasons. The main streams in the area of study are Endao which is a permanent river and Keshion which is a seasonal stream. The area is also served by 1 water pan. The residents have to cover an average distance of 5kms to these water sources. The proposed sub project fits with the WB-CSA goal of poverty reduction, food security and accelerating sustainable economic growth in the area through enhanced rural incomes with the main objective of enhancing drought resilience and improving sustainable livelihood of the community. Drought and water scarcity are prioritized as a major problem in Koitilion sub-location.

The project area is situated in Ewalel Soi location with a total population of 1,484 in 366 households in a planned area of 66 sq. Km. the population density of the area is 22 persons per sq.km (Census Reports 2019, Kenya Integrated Household Budget Survey (KIHBS). The hydrogeological survey has already been done for the Cheboruswo community borehole.

### **1.2 Objectives of the Sub-project**

The overall objective of the sub project is to provide safe and clean water to Cheboruswo community for livestock and domestic use

The specific objectives are;

- To reduce trekking distances to water sources
- To Enhance nutrition through the establishment of household kitchen gardens and enhanced fruit growing,
- To improve livestock productivity

### **1.3 Justification**

The site is located in the arid and semi-arid lands of Baringo county Baringo south sub county where prolonged droughts and short and unreliable amounts of rainfall are experienced all year. (Rainfall between 200 and 750 mm) – Even semi-desert (< 200 mm). The people in the area of study travel for long distances to access water (8-15km). The available water sources at times are not clean and safe. The proposed Cheboruswo borehole sub-project is meant to supply water for both Livestock and domestic use. The project is therefore justified on socio-economic development and improved water supply infrastructure. The project will also lead to improved health standards in terms of personal hygiene particularly during incidences of communicable deadly diseases such as the COVID -19.

### **1.4 The Purpose of this ESIA summary Report**

The purpose of this summary report is:

- To ensure adequate identification of potential environmental and social impacts.
- To propose an environmental and social management plan to address the perceived negative impacts with adequate mitigation measures.

### **1.5 The Objectives of this Report**

The overall objective of this summary report is to ensure that all the envisaged environmental and social concerns identified are integrated into the proposed borehole sub-project design, construction and implementation in order to contribute to the sustainable development of the general area. The ESIA has also been conducted to comply with regulatory requirements including requirements of WB environmental and social policies, NEMA regulations and other laws and policies affecting the proposed development.

### **1.6 The ESIA Approach and Methodology**

This ESIA began with environmental and social screening, followed by scoping and the actual ESIA study. The study involved the use of several techniques and methodologies. The techniques and methodologies used were necessary for collating baseline information, understanding the legal and policy framework, predicting the potential impacts, assessing the nature of the impacts and determining the order in which the impacts are to be avoided and or mitigated.

#### **1.6.1 Environmental and Social Impact Study Methodologies**

The team was guided by the requirement of section 58 of EMCA Cap 387 and Environmental (Impact Assessment and Audit) Regulations 2003; legal notice 31 & 32 of 2019 and the World Bank Environment and Social Safeguards Policies Environmental Assessment (OP 4.01), Physical Cultural Resources (OP 4.11), and Pest Management (OP 4.09) in carrying out this ESIA. The methods used in the study are as discussed in the sections that follow;

##### **1.6.1.1 Desktop study**

This involved documentary review on the nature of the proposed activities, sub-project documents, designs, policy and legislative framework as well as the environmental status of the sub project area, beneficiary areas and adjoining sub locations, land use practices in the area, development strategies and plans and case study of similar projects as analogues and references. Key documents reviewed are;

- Water Act 2016
- EMCA 1999
- Baringo County CIDP 2018-2022
- 2019 Census Reports Volumes I and II

##### **1.6.1.3 Field Site Assessment**

Site visits and field assessments involving field sample survey of the area, were meant for physical inspections of the site characteristics and the environmental status of the surrounding areas to determine the anticipated impacts.

##### **1.6.1.4 Public Participation and Stakeholders Consultation**

Public participation and consultation were achieved through holding community barazas, focused group discussions (FGD) and consultative forums with the local stakeholders. Through public participation the sub project was explained to the community members and other local stakeholders in the project area. Oral and written comments were then received about the suitability of the project, concerns about the project that might affect them, the expectations they had about the sub project and their suggestions in addressing what impacts they had pointed out. In this assessment one (1) public baraza and one consultative meeting was held with the local stakeholders. The public participation Baraza was held on 9-2-2021 where 13 females and 34 males making a total of 47 people. (*see annex 3 on minutes & attendance list*). The community

local language (Tugen) was used together with Swahili to enhance understanding and communication by the community. World Bank social safeguards OP/BP 4.01 Environmental Assessment emphasizes on stakeholder and public participation to inform decision makers of the nature of environmental and social risks and to increase transparency and participation of stakeholders in the decision-making process. This report has incorporated all the views and suggestions from public participation as demonstrated in *Chapter 5*.

#### **1.6.1.5 Focused Group Discussions (FGD)**

Three (3) FGDs were held for men, women and the youths. For the men there were 12 participants, women 14 and youths 8 (6 males and 2 females).

#### **1.6.1.6 Key informants Interview method**

This method was used for key respondents including the officials of the Cheboruswo Community borehole drilling sub project, the Marigat sub-county agricultural officer, the WRA officer, livestock officer, 1 local religious leader, 1 women representative from the project area water engineers from the department of water, the local administration including the Chief for Koitilion Sub Location and environmental officer from the county and 2 youth representatives. A total of ten (10) stakeholders were consulted.

#### **1.6.1.7 Filled in Questionnaires**

This involved the use of a list of questions filled in by the local stakeholders and community members in the project area. The questionnaires checklist where the potential impacts listed were used to assess the nature of the impacts i.e. type such as adverse or beneficial (*see annex 2 on sample questionnaires*). Farmers and community members in the project site filled in personal questionnaires to get their views on the sub project such as benefits, potential problems and possible solutions and whether they felt the sub project should be implemented or not (*see annex 2*). Some of the respondents were assisted in filling in the questionnaires by translating the questions into the local language by the literate members in the community. A total of 40 filled in questionnaires were administered to the community members and 29 were filled in and returned. Due to illiteracy by the community members there was assisted filling in of questionnaires from the literate members of the community through translation.

### **1.7 Chapter Outline**

This ESIA has investigated and analyzed anticipated environmental impacts of the proposed development in line with the World Bank Social Safeguards and EMCA Environmental (Impact Assessment and Audit) Regulations, 2003. Consequently, the report is organized into seven substantive chapters. Following this introductory chapter, Chapter 2 presents the nature of the proposed sub-project and project designs activities, Chapter 3 entails the environmental and ecological and social baseline information, Chapter 4 presents the outcome of the public consultation and participation process Chapter 5 identifies and discusses the Potential Impacts and mitigation measures of the project. Chapter 6 presents the Environmental and social management and monitoring plan while chapter 7 gives the conclusion and recommendation of the proposed sub project.

## **CHAPTER TWO: NATURE OF THE PROPOSED SUB-PROJECT**

### **2.1 Introduction**

This chapter presents the proposed sub- project activities, the materials required, the engineers' design, and the estimated project costs.

### **2.2. The proposed sub-project designs and activities**

#### **2.2.1 Project design**

The borehole should have a minimum depth of 190m and a maximum depth of 210m bgl and a minimum diameter of 203 mm and lined with 152 mm casings and screens. The amount of water struck at 150m will determine whether further drilling is required to the next aquifer at 190m. (engineers design)

#### **2.2.2 Project activities**

The proposed sub project activities include:

**Groundwater Survey;** The aquifer potential and groundwater system within this area is considered medium, therefore groundwater prospects for intended purposes are tenable to meet the requirement of the Proponent. **Borehole Drilling;** the borehole should have a minimum depth of 190m and a maximum depth of 210m bgl and a minimum diameter of 203 mm and lined with 152 mm casings and screens. The amount of water struck at 150m will determine whether further drilling is required to the next aquifer at 190m. **Casing and Screens:** The well should be cased and screened, in order to avoid collapsing and sediment intake using mild steel casings and gas slotted screens of 6" diameter. **Grouting/Gravel Pack:** Grouting should be done to reduce their permeability, consolidate them, or increase their strength. **Plumpness and Alignment:** The water well should be straight to determine whether the casings and a properly sized pump can be installed in the well to the desired depth or not. **Well Construction:** In installing screen and casing, centralizers at 6 metres intervals should be used. **Well Development:** Once the screen, gravel pack, seals and backfill have been installed, the well should be developed by airlift. All drilling methods cause some plugging of fractures or crevices in rocks. **Well Testing/Pumping test data:** A step-draw down test, and a 24-hour long-duration well test at a constant discharge rate should be carried out. The pumping test should be conducted for a continuous period of 24 to 72 hours. **Borehole Equipping, Pump house & Fencing:** Pump- Set: This will involve installing a solar driven submersible hybrid pump-set capable of delivering 9m<sup>3</sup>/hr. of water against a total head of 200 m. **Pump House and office/store (3x3) m:** The pump house/ Control panel Housing and store/office will be constructed of dimensions 3mx3 using approved masonry stone walls, gable roofed with pre-painted 2.8-gauge G. Iron Sheets and fixed with steel door and window. **Borehole Fencing - Perimeter 80m:** Excavate for, provide and erect chain-link fence 2.4m high comprising concrete posts set 0.9m below ground level with concrete class 15 (1:4:8) surround, concrete posts at 3.0m centers with 500mm long cranks at top, 12½ gauge chain-link fence, 4No. (refer to the hydrological report and engineers design)

**PIPEWORK: Pumping & Distribution Pipes:** This will involve the laying of main gravity and distribution pipes, excavation and backfilling of pipeline trenches, construction is masonry lockable valve chambers, air valves, and construction of pipe anchors i.e. anchor blocks /thrust blocks. **100 M<sup>3</sup> STORAGE FACILITIES (Tank):** vegetation clearing, excavation for foundation, slabbing shall be carried out. **WALLS:** 225mm thick reinforced masonry wall shall be constructed bedded in cement: sand mortar (1:3) as per design drawing and reinforcement

bars (10 mm and 12mm) fixed in floor @ 150 mm c/c both ways. Plastering with 20mm thick cement: sand (1:3) mixed with water proof cement plaster on walls. Finish smooth. Other works to be undertaken will be the construction of concrete roof slab, masonry valve chamber, threading and welding to secure scour/off-take pipes in concrete slab and painting of walls and roofs. **Water Kiosk, Cattle Troughs and Communal Watering Point:** This will involve the construction of standard 50m<sup>3</sup> storage Tank, 10mx1.2m masonry Cattle Trough and Communal Water Points (Stand Pipes) as directed by the engineer. (refer to BOQ annex 8).

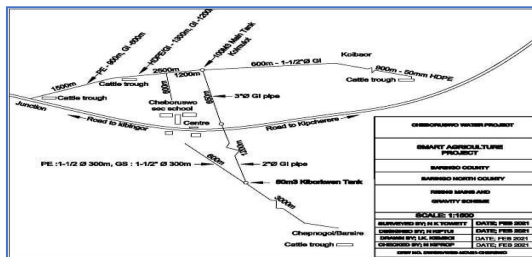


Figure 1 design layout of sub project components

### 2.3. Materials used in Construction and Sub-Project Cost

**Material Input:** The materials to be used fall into two categories: temporary and permanent. **Temporary materials;** They include; **Water:** use clean and of good quality water from a source other than the wetlands or seasonal swamps in the proposed site to avoid problems related to pathogenic and iron bacteria. **Drilling foam:** use Anionic soap mainly comprising sodium alkyl ether during foam drilling. The foam is primarily used to enhance the rate of cuttings removal by preventing them from aggregating so that they can be lifted more easily to the surface. use slightly viscous amber colored fluid with a Biological oxygen demand/ chemical oxygen demand (BOD/COD) ration greater than 0.1 which is readily biodegradable. 1m<sup>3</sup> of the injection fluid is required per 1m<sup>3</sup> of ground removed. Lubricants and Diesel will be used to run the engines of the drilling machine, mud pump, and generator just within the period of implementation.

**Permanent Materials:** These include: **Casings and Screens:** These will be mild steel pipes and will be installed in the drilled hole. They are not corrosive hence the least likely to affect the water quality. **Gravel Pack:** The grain size should be in the range of 2 to 5 mm, rounded to well granules, which should be 95% siliceous. The material is locally available where sand deposition has taken place such as at banks of rivers. **Bentonite:** The material is mixed with water and to be used in sealing some sections of the annular space for sanitary purposes. **Cement:** Cement grout in the annular space and slab on the surface will be used for sanitary purposes. **One-meter (1m) steel casing:** it will be used or the borrehole cap to prevent entry of surfae water into the borehole as well as any forreign materials. **Pipes:** These will be class ‘C’ steel rising main to be connected to the submersible pump and class C steel pipes to connect the water supply to the storage tank. **Inert material:** The drilled material will be reused by filling a section of the annual space during the borehole **Dipper line:** a dipper line 25mm diameter u PVC airline attatched to the rising main should be fitted to monitor the water level using water deeper around seasons and whenever such need arises. **Water Well Design:** a final hydrogeological design should be availed and should ensure that screens are placed against the optimum aquifer zones.

**2.4. Sub Project Cost:** The proposed sub project construction cost is **Kshs 19,955,150**

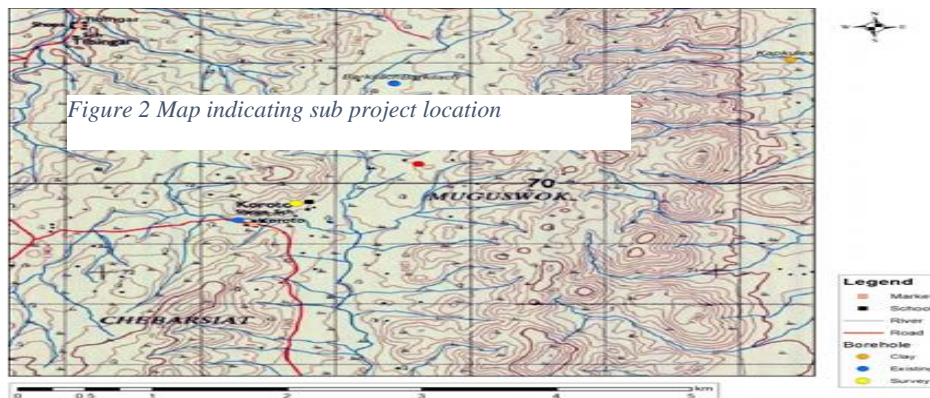
## CHAPTER THREE: THE LOCATION OF THE PROJECT

### 3.1 Introduction

This chapter presents the specific details of the proposed sub project in terms of the project site, the physical environment, and the socioeconomic environment.

#### 3.1.1 Sub-Project Details and Site Location

The proposed sub project is located in Cheboruswo Village, Koitilion sub-location, Marigat Ward, Baringo South Sub County in Baringo County. The site lies within the 1:50,000 Survey of Kenya topographic Sheet for Saimo (No. 90/4). Approximate GPS location coordinates is Lat. 0.53885013, Long. 35.87308608 at an average elevation of 1285 m asl.



### 3.2 Physiographic and Natural Conditions

The sub project area is within the hilly terrain between the Tugen Hills and Lake Baringo. This is composed of mainly hilly N-S trending ridges. The river valleys in the area are characterized by alluvial sediments. The hilly ranges are to the west of the sited points with the sediments covering the eastern lower parts. The hilly ranges are up to 2000m asl. The ridges, like the escarpment is deeply incised by water courses (CIDP, 2018). Rainfall over the greater part of Baringo is moderate characterized with irregular periods. The wettest months are April and October but heavy rains may fall during many other months. The annual rainfall is about 800 mm. The mean annual temperature is about 24°C while the maximum temperature is about 30°C. Due to the high temperatures, the mean annual evaporation is relatively high, approximately 1000 mm. Drainage at the area is eastwards down the ridge, draining into the main river which flows southwards through Chebarsiat into Katorin stream. (CIDP of Baringo, 2018- 2022)

### 3.3 Geology and Hydrogeology of the sub project area

The regional groundwater aquifer system in the sub project area is interconnected through a network of fissures and porous material, which partly composes the sediments and pyroclatics. This system is mainly recharged in the higher areas to the south where rainfall is higher and water enters through permeable sediments lava beds. Much of the water is retained within the sediments (sand and gravel). Based on the hydrogeological report the specific yield of this aquifer material (consisting mainly of sediments) falls within 15 – 25% range. The aquifer potential and groundwater system within Cheboruswo area can be considered as medium. The Borehole waters associated with the volcanic aquifer system will rarely cause sodium/calcium

imbalance in the soils when applied to soils structures and thus cannot infringe on the EMCA 1999 standards in application. There are no known or established parameters of aquifer deterioration or depletion within boreholes systems located in this area. Hydrology of streams have been affected lately due to destruction of forests and human encroachment. Therefore, there is need to reclaim and conserve the catchment of these streams.

### Water Resources and Sources

Water resources in the community are River, streams and Pan Dam. River Endao is the only permanent source of water. Others like Keshion stream and the Water pan are considered not reliable as they dry up during the dry season. The average walking distance to the rivers is 5 km. Table 1 below shows walking distances to water sources by the different HH interviewed. There is no household with piped water in Cheboruswo. The responsibility for water collection is women and girls. Motor cycles transport popularly known as “bodaboda” are used in ferrying water for HHs but a cost depended on the distance.

**Table 1: Distances to water sources**

S/NO	Trekking Distance (KM)	NO. of HHs	% of HH Interviewed (17)
	2 KM	2	12
	10KM	1	6
	2.5KM	1	6
	3KM	3	18
	4KM	3	18
	5KM -6KM	6	35
	1.5 KM	1	6

**Source: KCSAP, 2020**

### Cheboruswo Water Demand

This area has no public water supply system. The communities in the area rely on seasonal streams and roof catchment. These sources are not sustainable since they are much dependent upon weather conditions. In regard to the above, our client seeks to find permanent solution to getting sustainable, economically viable resource which can only be achieved by drilling a borehole. Total population is estimated to be 2,000. Assuming each person uses 100 litres of water per day for domestic. It will mathematically translate to 20,000 litres per day. Considering that only 60% will be abstracted, the borehole should yield on average 2,000 litres per hour to sustainably serve the community. Moderated pumping capacities of 5 m<sup>3</sup>/hr. will conform to the estimated water demand of 20.0 m<sup>3</sup>/day in a controlled pumping regime (hydrogeology report 2021).

### 3.4 Biological Environment

#### 3.4.1 Flora

Common natural vegetation in Cheboruswo comprise *Acacia tortilis*, *Acacia nilotica*, *Acacia nubica*, *Acacia mellifera*, *Balanites aegyptica*, *Sclerocarya birrea*, *Ziziphus Mauritania*, *Euphorbia candilablum*, *Boscia angustifolia*, *Zanthoxylum chalybeum*, *Aloe spp*, and *Cissus rotundifolia*, Disturbance of vegetation will be minimal.

### 3.4.2 Fauna

The area has both livestock and wildlife. Wild animals comprise of antelopes (dik-dik), snakes, monkeys, squirrel, hare, monitor lizard, chameleon, butterflies, hyenas, honey burger, tortoise and mongoose. The proposed sub-project site is not in a protected area and is not home to any threatened or endangered species.

### 3.5. Land Ownership and Land-use

The sub project site is a public land donated by the community freely. Figure 2 below indicates the area plan of the sub project site.



Figure 3 Plan of the project site

Land in the community is individually owned but Land demarcation has not been undertaken. 94% of the representative household in the socio-economic survey indicated they had no title for their land. 6% of households were processing titles for their land. The major form of land acquisition in the area is by inheritance. Average land size per household is 5 acres. The area is ASAL. The main land use being agro-pastoralism. Traditional crops grown include millet, sorghum, green grams, and groundnuts since it is a water scarce area. Population of livestock is cattle (1,500), sheep (400), donkey (1), goats (4,000-5,000), beehives (2,000) and poultry (2,000) (Field data, 2021). Crops grown millet, sorghum, green grams and groundnuts (field data 2021).

**3.6 Demography:** The population of Marigat ward is 58,602 people, with males 29,165 and females 29,435, 13,622 households with an area of 730. 1sq.km and a population density of 80 persons per sq. km. (KNBS, 2019). The proposed site is sparsely populated with a population density of 27 persons per sq. km and about 84 households (HH). Ethnic origin and composition of the population of the community is the Tugen. The population distribution in Ewalel Soi location and Kabusia and Koitilion sub locations is as shown in the table 2 below.

**Table 2: Population distribution in Ewalel Soi location and Kabusia and Koitilion sub locations**

	Sex*			Households			Land	Density
	Total	Male	Female	Total	Conventional	Group Quarters	Area Km <sup>2</sup>	Persons per Km <sup>2</sup>
EWALEL SOI LOCATION	1,484	762	722	366	366	-	66.0	22
KABUSA sub Location	769	396	373	196	196	-	39.8	19
KOITILION Sub Location	715	366	349	170	170	-	26.2	27

(KNBS, 2018)

## **CHAPTER FOUR: PUBLIC PARTICIPATION AND STAKEHOLDERS CONSULTATIONS**

### **4.1 Introduction**

The Constitution of Kenya 2010 (CoK 2010) has enshrined the need for public involvement in project development. This has also been set out in the EMCA, CAP 387 and Environmental (Impact and Audit) Regulations, 2003 and is a requisite in all World Bank funded projects. Public participation and stakeholders' consultation brings out any contentious issues and gives a chance to those who may be affected by the proposed project to give their views. The public participation and stakeholder consultation are the best opportunity to interact with the project components and activities hence ownership is assured and thus leading to project sustainability.

### **4.2 Categorization of Community Participants and stakeholders**

Public participation and stakeholders' consultation comprised the community members, representatives of community groups, government agencies and sub project beneficiaries. The community participants were from Koitilion sub location (Cheboruswo, Koibaor and Chepnogoi villages). The public participation was attended by 48 people comprising of 34 males and 14 females. (see annex 3 on minutes and attendance list). FGDs were also held for men, women and The FGD men were 12 participants, women 14 and youths 8 with 2 females, 6 males (see annex 5 on minutes & attendance list). A total of ten (11) stakeholders were consulted. They comprised one official of the Cheboruswo Community borehole sub project, the Marigat sub-county agricultural officer, the WRA officer, livestock officer, 1 local religious leader, 1 women representative from the project area water engineers from the department of water, the local administration including the Chief for Koitilion Sub Location, environmental officer from the county, and 2 youth representatives. COVID 19 prevention protocols by the ministry of health and WHO were observed during all meetings including sanitizing of hands, proper wearing of facemasks, and observing the 1.5 social distance.

### **4.3 Objectives of Public participation and Stakeholder Consultations**

The main objective of the public consultation is to engage key stakeholders' groups to provide their inputs into the planned development and especially on those impacts that directly affect the community.

### **4.4 Methods for Public Participation and Stakeholder Consultations**

The techniques and methods used in the public participation and consultations were: public meetings (community barazas) for the Cheboruswo community, Key Informant interviews, FGDs, and administering of individual questionnaires. Mobilization of members of the public and other interested parties to attend the public baraza was done through the chief's office. The public baraza was held on 13/01/ 2021 chief's Office ground (see annex 3 for minutes).

Key informant interviews, formal technical meetings for experts for the government agencies were conducted with more insight on project design, impacts, mitigation, and monitoring framework. The role of each government agency in the implementation and project alternatives was well defined during the engagements. 40 filled in questionnaires were administered to the community members and 29 were filled in and returned. (see annex 2 on sample filled in questionnaire). The questionnaires were administered on 10<sup>th</sup> February 2021.

### **4.5 Summary of Issues Raised by the Community and Stakeholders**

The key issues raised by the community and the stakeholders are;

Delays in project implementation, Gender and SEA issues, sub project mismanagement, conflict over pipeline distribution, and water -resource use conflict.

A summary of issues raised and proposed mitigation are shown in table 4 below.

#### 4.6 Summary of Issues Raised by the Community and Stakeholders

**Table 3: Details of Concerns, Recommendations, and Issues Raised**

ISSUE	CONCERN RAISED BY STAKEHOLDERS	Suggested Mitigation Measure
Project delay	There was fear that the sub project would take longer to be completed and be operational	Community was assured that the PMC, KCSAP and the County Government and all the other relevant stakeholders would make sure that the project will be implemented as planned.
GBV/SEA	Concern was raised over exploitation of women through GBV and SEA especially during construction.	Employment will be given to locals unless the required skill is lacking in the community Contract workers will be vetted and will be required to sign code of conduct form Women will be considered for duties they can undertake in the project Local administration will be involved in recruitment Community and contract workers will be sensitized
Mismanagement of the project	Fear were raised over mismanagement of the sub project by the project committee	Community advised to develop constitution for the committee and have by laws Training will be given to the PMC on management of the sub project All beneficiaries will be educated on the sub project sustainability
Pipeline distribution	Concern was raised over some community members wanting the pipeline to pass close to their homestead for strategic advantage to access to water	The community and all stakeholders are involved in all phases of the sub project.
Water resource use conflict	Concern was raised over conflict over sharing of water resources in times of scarcity.	Proposed formulation of bylaws to regulate water use Support formation and training of Water Users Association for the sub project Establish a grievance redress committee & training on conflict resolution.

#### 4.7. Community and future Stakeholder Engagement

There will be continuous stakeholder engagement throughout the sub project cycle to ensure that the community and stakeholders continue to be informed during construction and, where appropriate, during operation of the facility.

#### Project Acceptability

The no objection question was raised to the community who agreed that the sub project should be implemented as has been designed. They said the sub project risks were low and would be easily mitigated or reversed. The Cheboruswo Community Water Project CBO chair said that the land for the sub project had been surveyed, boundaries demarcated and processing of the title deed was ongoing (annex 9 on land document)

## **CHAPTER FIVE: ANTICIPATED IMPACTS AND MITIGATION MEASURES**

### **5.0. Introduction**

The project implementation will bring about both positive and negative impacts on the environment and community at large.

### **5.1. Anticipated Positive Environmental and Social Impacts**

#### **5.1.1 Anticipated positive impacts during construction phase**

##### **1. Creation of temporal/permanent employment**

During the construction stage of the proposed sub-project, there will be direct and indirect employment opportunities for both professionals and unskilled workers. Permanent employment will be through operation and maintenance of the borehole. It is expected that some community members will be permanently employed as borehole attendants. This will offer employment opportunities for youths.

##### **2. Improved businesses**

During construction, there will be temporary establishment of business that will benefit the community in supplying the materials necessary in the sub project as described above. Also, the mama uji (porridge) will get an income by feeding the workers in the sub project. This will lead to the growth of Cheburuswo Centre.

##### **4. Skills transfer**

The interaction between the community and the various expertise involved at the different stages of the subproject lead to knowledge and skills infusion.

##### **5. Increase in tree cover**

The availability of water in Cheburuswo from the borehole will lead to the establishment of a community tree nursery. This will be a source of indigenous and fruit tree seedling contributing to increased tree growing. This will increase tree cover including the benefit of improving the microclimate beside the usefulness of the various trees planted.

#### **5.1.2 The anticipated positive impacts during operation stage**

##### **5. Reduced walking distance to water source**

The current average walking distance to water sources is 5 Km to River Endao. The construction and operation of the borehole will reduce this to 100m for some households. Women and children will most benefit from this as time spent in searching and fetching water will be reduced. Women will have time to engage in other viable economic activities. Children will have enough time for school. The outcome will be increased household well-being.

##### **6. Reduced water cost**

Currently in the project area households spent Kshs. 50 for a 20 litre jerry can of water for domestic use and young goats through hiring of bodaboda riders to ferry water from River Endao. Implementation of the proposed Cheburuswo Water subproject lessens the burden of the community on water access.

##### **7. Reduced Health Related Problems of Ferrying Water**

In households that cannot afford to pay for motorcycles to fetch water for them, women from these households are forced to carry water over long distances on their backs. Women carry a 20liter for about 5km. This has negative health effects on them. As borehole water will be near to the community this burden will lessen.

##### **8. Reduction in Outmigration**

Due to the effect of drought and water scarcity in Cheboruswo youth migrate away from the area to escape the hardship. The completion of the borehole project will attract youths to stay as they will be able to engage in self-employment in agribusiness such as beekeeping, fruit growing (mango trees)

#### **9. Improved Livestock Body Condition**

Availability of water in the area will lead to reduced trekking distance to watering points. This will result in improved health and body condition of the animals. This will translate to better livestock prices in the market and improved productivity.

#### **10. Increased Honey production**

Bees migrate away from Cheboruswo due to water shortage particularly during drought season. This greatly affects honey production in the area. With the Cheboruswo water project bees' migration will greatly be reduced hence resulting in increased honey productivity and household in the sub project area.

#### **11. Improved access and infrastructural development**

The sub project area is a rural setting where roads are not well maintained, with the introduction of the investment, the roads will regularly be maintained to ease access to the water tanks, water kiosks, and the borehole. The borehole may also attract the supply of electricity in the area which is currently lacking.

#### **12. Improved nutrition and food security**

The proposed borehole sub-project aims at supplying water for livestock. Reduced distance in search of water will lead to improved livestock health and productivity in terms of milk and meat. Households will also be able to engage in smallholder irrigation (kitchen garden) and grow a variety of crops including fruit trees and vegetables. The outcome shall be improved food and nutrition security in the community.

#### **13. Improved Health and sanitation**

Among the positive environmental impact on the community is accessibility to quality water and reduction in waterborne diseases. Increased supply of clean water to the community members will contribute to improved hygiene standards in the project area.

#### **14. Increased land value**

The availability of the borehole water in Cheboruswo will result in increased land value and subsequent spur in development of the area. This will boost the economy of the area.

### **5.2. Anticipated Negative Environmental and Social Impacts**

#### **5.2.1 Anticipated Negative Environmental During Construction Phase**

##### **Disturbance of vegetation**

Vegetation clearance for the construction of the water tank at Koimut will result in the removal of 2 acacia trees. This impact is deemed insignificant since the vegetation to be cleared is minimal. During public participation, the community agreed to use the existing structures (Community elders and environment committee) to address the issue of vegetation clearing on the site and the utilization of the felled trees.

**Mitigation measures.** *Contractor to convene a meeting with the elders before removal of trees, support the community to establish indigenous/fruit tree nursery. Limit vegetation clearing to the proposed project site.*

## **2. Soil Erosion**

As machines and people move on the ground, the soil is compacted. This may have negative consequences on soil productivity on a localized scale. Compaction also enhances run-off during the rainy season resulting in soil erosion. Digging of pipeline may also result in soil erosion.

**Mitigation measures.** *Strictly control construction vehicles to ensure that they operate on the designated areas to chances of loosening soil particles. Rip off any compacted areas after construction to allow aeration of the soil and ease the infiltration of water into the soil. Digging of pipeline trenches to be done during the dry season*

### **3. Groundwater pollution**

Poor water quality could be of great concern to human and animal health. The water that seeps into the ground may be contaminated to some degree and eventually affects the quality of the groundwater and indeed, borehole water. Percolation of water from sanitary systems i.e. toilets and refuse disposal sites pose a serious threat to the preservation of groundwater quality.

The protection of groundwater quality depends on the well design and the methods and materials used in well development.

**Mitigation measures** *Ensure that sanitary facilities are constructed according to public health requirements. Use water-based drilling fluid. Case the well as it passes through the water table. Proper housekeeping within and around the rig will be observed before, during and after drilling, while proper cleanup procedures will be undertaken in case of drilling fluid and oil spills. Do not secure a solid waste disposal site within a radius of 50M of the proposed borehole site.*

### **4. Risk of Noise and vibrations**

Noise is unavoidable during the **construction period**. The drilling works and incoming vehicles delivering drilling and construction materials and communication among workers will most likely result in noise emissions. The noise could impact negatively on the workers during the construction phase. Noise can also be a nuisance to the local community if construction works begin too early in the day and continue into the night.

Noise levels from construction activities exceeding **60 Db (A)** at the construction campsite have a negative impact on the environment.

**Mitigation measures** *Adhere to the EMCA CAP 387 (Noise & Excessive Vibration Pollution Control Regulations, 2009) maximum permissible noise levels for silent zones, places of worship, residential (indoor/outdoor), mixed residential; and commercial. Properly servicing and maintaining and tuning drilling machinery such as generators and other heavy-duty equipment to reduce noise generation, and Drilling to be done between 8.00am and 5.00pm and during school holidays when Cheboruswo secondary and ECD are not in session.*

### **5. Risk of oil Spillage/Hazardous wastes**

Accidental oil and diesel spills would be caused by leaking of drums holding the diesel and oil that are stored on the site. The machines being used at the site could also cause oil spill especially if they are not well maintained or during regular maintenance. However, the occurrence of these wastes is expected to be minimal. Seepage of hydrocarbon products such as oils, grease, and fuel if not carefully handled will result in the contamination of water thus rendering it unsuitable for both domestic and animal use.

**Mitigation measures:** *The drilling workforce to be sensitized on the procedures to be followed for dealing with spills and leaks; In case of any spillage, spills to be immediately removed along*

*with all contaminated material and disposed of at an approved disposal site. Spill kit to be availed on site, to be applied to all contaminated areas that will absorb / breakdown the spills. The number of such materials shall be able to handle the total volume of the hydrocarbon stored on-site; and All contaminated material including diesel and oil drums are stored in a banded area with the respective tags like “Danger” or its pictorial representation. Care to be observed when transporting diesel and oil to, from, and within the site. It is recommended that if possible, this be done using qualified oil transporters. Have a garage for repair, maintenance, greasing of vehicles and construction plants off site to avoid fuels and lubricants from spillage.*

## **6. Dust Emissions/Air Quality**

The drilling process is expected to cause dust emissions due to vehicles and trucks driving to and from the site along the rough road leading to the site. Limited dust would be generated by the actual drilling activities. Stockpiles arising from the drilled area could also cause dust emissions if blown away by the wind. Smoke will be generated from the vehicles and the drilling equipment.

**Mitigation measures** *Provide dust masks to people visiting the site and have extra ones for site visitors. Stockpiles of the earth should be watered if dry to minimize dust from blowing. All fuel-powered equipment including the generator should be serviced and maintained in optimal working conditions to mitigate against exhaust emissions. Workers and any other people at the site should wear facemasks at all times to avoid carbon monoxide poisoning*

## **7. Solid and Liquid Waste Generation**

The major solid waste will be the drilled cuttings. There will be some solid containers such as cement, bentonite and gravel bags and other packets with materials and equipment to be used during the implementation of the sub-project. Other solid waste will be generated from the composite housing of the drilling crew.

**Mitigation measures** *Any remaining waste (paper or polythene containers, cement, bentonite and gravel bags, excavation debris, remaining gravel pack, etc.) should be disposed of according to the EMCA CAP 387 Waste Management Regulations of 2006. Some of the drilled materials to be used in the borehole construction by back filling the annular space. Use excavated materials to backfill the opened surfaces. The contractor to provide waste bins and be collected by the county waste collectors.*

### **5.2.2 Negative social impacts during construction stage**

#### **1. work related accidents, health & safety concerns**

During construction activities, it is expected that the construction workers may encounter occupational health hazards as a result of coming into contact and handling waste e.g. engine oil and grease. Because of the clearing water pipelines, setting up and operating the drilling machines, workers will be exposed to the risk of accidents and injuries. Such injuries can result from loading and offloading a truck-mounted drill rig, transportation of the drill rig, hand tools and cuts from sharp objects, slips and fall hazards, among others. The public is also exposed to potential risks of safety from the excavated trenches waiting for pipe laying, access to the work areas by unauthorized members of public and potential road safety risks from trucks and vehicles accessing the site.

**Mitigation measures** *The trenches created to be covered before leaving the site. All workers to easily access first aid kits. All equipment to be inspected before use for appropriate safeguards*

*and that the machine operators are trained on machine safety. Working hours be controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay. Appropriate road safety signage to be strategically placed and drivers adhere to the requirements of such signage (on speed limits, hoarding at or near school among others). Provide adequate manual labor to meet the requirements of the tasks. Provide appropriate barriers along the excavated trenches. Isolate all construction sites from the children, public and their livestock through safety tapes, fixing appropriate safety signage and information. Hire a Security officer to guard the project site and equipment. The site should be fenced off from people, children, and animals. Provision of suitable PPEs and procuring insurance for workers and machinery/ vehicles*

## **2. Pipeline distribution and Project delay**

There was fear that the sub project would take longer to be completed and be operational. Concern was also raised over some community members wanting the pipeline to pass close to their homestead for strategic advantage to access to water

**Mitigation measures** *involve the community and all stakeholders in all phases of the sub project. Follow the planned activities strictly. Provide the planned activities to the community. Training the community on project management*

### **The transition phase from construction to operation**

During the transition phase from the completion of the development to the start of operations, the following should be done: *Any wastes from the site to be removed. Rehabilitation of any areas adversely affected by the construction through spillages of pollutants: liquids, chemicals, cement, and paint among others at the site and any other areas disturbed as a result of the construction outside the site. Plant grasses and ornamental trees at the site. Put up fencing around the site for protection from intruders and unauthorized persons and ensure privacy.*

## **5.3 Negative Environmental and Social Impacts During Operation Stage**

### **5.3.1 Negative Environmental Impacts During Operation Stage**

#### **Groundwater depletion/Lowering of the water table**

This may result from the excessive abstraction of the water from the borehole i.e. beyond the permitted limit. This may result in the lowering of the water table.

**Mitigation measures** *install a Master Meter to the borehole and an Airline/Piezometer to monitor groundwater abstraction and to facilitate regular measurements of the static water level in the borehole, respectively. The maximum groundwater abstraction permitted from the borehole to be limited to authorized volume per day for domestic/irrigation use only subject to availability from 60% of the tested yield for a maximum abstraction period not exceeding ten (10) hours per day. Install auto-shut water taps to reduce water wastage. Prompt repair of broken pipes to prevent leakages*

#### **5.3.2 Risk of soil erosion**

There are possibilities of soil erosion occurring during the operation of the boreholes which may become serious when the topsoil is left bare and agents of erosion become active. This is a serious environmental problem which should be controlled. Lost soil due to erosion is normally deposited elsewhere, and the location of the deposition could alter downstream hydrology and increase flooding. It may also interfere with water quality directly through increasing turbidity

levels, siltation and indirectly from contaminants carried with or attached to eroded soil particles. The proposed sub-project is expected to have minimal risk of erosion as the area to be disturbed is quite small.

**Mitigation measures** *regularly check and maintain pipes to avoid burst pipes and leakages which can lead to massive water losses (and so revenue) as well as soil loss. Apply soil erosion control measures such as levelling the sub-project site to reduce runoff. Ensure compacted areas are ripped off to reduce run-off. Encourage rain water harvesting through roof catchment.*

### **5.3.2 Negative Social Economic Impacts during operation stage**

The following social impacts are expected to arise because of the implementation of the sub-project.

#### **1. Water Related Conflicts**

There might be a possibility of community conflict on the use of this resource as some farmers might have more animals than others for this resource therefore causing conflicts. Conflicts may arise also from disagreements in the distribution of pipeline.

**Proposed mitigation** *Involve the beneficiaries in establishing the pipeline routes. The PMC to design a watering protocol. Training of the management committee and the community on sustainable use of water*

#### **2. Risk of water-borne diseases (human)**

Water spillage around the taps during operation may provide a breeding ground for vectors of waterborne diseases such as mosquitos.

**Mitigation measures** *The wastewater drainage channel be constructed to lead water away from the pump pad. The wastewater may be used for small gardening initiatives by the communities or directed to soak pits. Conduct continuous maintenance of the borehole, pipework, tank and water kiosk. Conduct periodic water quality checks. Sensitize communities on the need to use treated mosquito nets and to clear breeding grounds. Sensitize communities on proper sanitation and hygiene*

#### **3. Outbreak of Livestock Diseases**

Convergence of livestock at watering points from different households will increase the chance for the spread and outbreak of livestock pests and diseases. This will lead to poor animal health, reduced livestock productivity, and even livestock deaths.

**Mitigation measure:** *Regular disease surveillance by the veterinary department and community, sensitization of the community on livestock health, pest and disease control, put livestock disease management plan in place to ensure disease incidences are promptly responded to and addressed*

#### **4. Vandalism and drug abuse**

This include behavior such as such as petty theft, vandalism of the pipeline, and drug abuse due to increased household income occasioned by increased productivity in crops and livestock

**Mitigation measure** *Sensitize the community on the importance of sub project ownership. Sensitize the community on alcohol and drug abuse. Increase community surveillance of the sub project area and community assets/property in collaboration with local administration*

#### **5. Population Increase in the sub project area**

The availability of the borehole water may attract settlement within the project area. This may place increased demand on the borehole water exceeding the water supply, hence denying other users.

**Mitigation Measure** *Promote alternative water sources in the community such roof rainwater harvesting, water ponds, water pan development for livestock. Train the borehole committee on water management. Sensitize the community on sustainable water use*

## **6. Project Mismanagement**

The borehole will be the most common source of water in the sub-project area. However, the borehole can be non-operational if there will be no proper community management framework for operation, repair, and maintenance of the same.

**Mitigation measures.** *The sub project management committee to be capacity build on proper operation, management, and maintenance of the borehole to ensure sustainability. The proponent will consult on reasonable water tariffs to sustain the water supply.*

## **7. Increase to exposure to communicable diseases including HIV/AIDS & COVID 19**

### **a) Health Impact-Increase in incidences of HIV/AIDS and STIs**

The influx of people may bring communicable diseases to the project area, including sexually transmitted diseases (STDs), or the incoming workers may be exposed to diseases to which they have low resistance. This can result in an additional burden on local health resources. Local health and rescue facilities may also be overwhelmed and/or ill-equipped to address the industrial accidents that can occur in a large construction site.

**Mitigation measure** *Contractor to sensitize workers and community members on HIV/AIDS Awareness other communicable diseases to be instituted and implemented as part of the Contractor's Health and Safety Management Plan to be enforced by the Supervising Engineer. This will involve periodic HIV/AIDS and other communicable diseases Awareness Workshops for Contractor's Staff. Restrict access to Contractor's Workforce Camps by outsiders. Contractor to provide standard quality condoms at the construction site during the construction period*

### **b) Health Impact – Spread of COVID-19 amongst construction workers**

Stringent COVID 19 containment measures by the Government including complete cessation of movement to and from areas considered hot spots and night curfew, social distancing guidelines, closure on non – critical and essential enterprises, closure of places of worship and public gatherings, mandatory use of masks in public places, among others were put in place .

During project execution (civil works), a number of workers will be required to assemble together in meetings, toolbox talks and even at work sites; varied number of workforce including suppliers of material and services are also expected to come in from various places in the country which may be COVID-19 hot spots; and interaction of workers with the project host community will happen as workers find accommodation close to work sites, and/or return to their homes after works.

**Mitigation Measures:** *The Contractors will develop SOPs for managing the spread of Covid-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilizing to the site, the SOPs shall be in line with the World Bank guidance on COVID-19. Ministry of Health Directives and site-specific project conditions, mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including workers and visitors, avoid concentration of more than 15 workers*

*at one location, where there are two or more people gathered, maintain social distancing of at least 2 meters, all workers and visitors accessing worksites every day or attending meetings shall be subjected to rapid Covid-19 screening which may include temperature check and other vital signs, the project shall put in place means to support rapid testing of suspected workers for covid-19, install hand washing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used, ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails.*

### **c. Social risk - Spread of COVID-19 amongst community members during consultations**

During implementation of the ESIA, various consultative activities will be undertaken. For efficient and meaningful engagement, a wide range of individual participants, groups in the local community and other stakeholders will be involved. The types of consultations to be used to pass information shall be through public Barraza's, electronic means shall be used where possible and one-on-one basis meetings while observing the COVID-19 mitigation measures to ensure safety stakeholders involved, the community at large and the client. The consultations will involve verification of PAPs covering the occupants of the affected area and vulnerable persons and groups; awareness raising, sensitization of PAPs and gauging attitude to the project; training and capacity building for livelihoods restoration, grievance redress, execution of site - specific surveys among others. If carried out conventionally, these activities would lead to close interaction between the proponent and the community members leading to a high risk of spreading COVID-19 amongst community members during the consultation process. To minimize the risk of spread of COVID-19 amongst community members, alternative means of consultation will be required as mitigation measures to ensure social distancing and appropriate communication measures. The mitigation measures will be supervised by a communications/ stakeholder engagement / social safeguards expert in the project proponent's team.

**Mitigation Measures:** *encourage the use of electronic means of consulting stakeholders and holding meetings whenever feasible. One-on-one engagements for the PAPs while observing social distance and adhering to PPEs wearing shall be enforced. Avoid concentrating of more than 15 community members at one location. Where two or more people are gathered, maintain social distancing of at least 2 meters. The team carrying out engagements within the communities on one-on-one basis will be provided with appropriate PPE for the number of people they intend to meet. Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements, and mail) when stakeholders do not have access to online channels or do not use them frequently. Allow participants to provide feedback and suggestions. Hold meetings in small groups, mainly in form of FGDs if permitted depending on restrictions in place and subject to strict observance of physical distancing and limited duration. In situations where online interaction is challenging, disseminate information through digital platforms (where available) like Facebook and WhatsApp & Chat groups. Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants.*

### **7 Sexual Exploitation and Abuse (SEA)**

Women and girls are in most cases prone to SEA in most communities especially when they are towards accessing resources; for example, when they are looking for job opportunities.

**Mitigation measures:** *The contractor to Develop and implement a SEA action plan with an Accountability and Response Framework as part of the contract as contained in the ESMP. The*

*SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing. The SEA action plan will include how the project will ensure necessary steps are in place for: prevention of SEA; including CoCs and ongoing sensitization of staff on responsibilities related to the CoC and consequences of non-compliance, project-level IEC materials, response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistleblower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.*

## **8 Gender-based violence at community level**

There is possibility of discrimination on how opportunities are distributed among the community members if care is not taken

**Proposed Mitigation** *effective and on-going community engagement and consultation, particularly with women and girls, Review of specific project components that are known to heighten GBV risk at the community level, e.g. employment schemes for women; community level water management, representation or economic activities. Specific plan for mitigating these known risks, by sensitizing around gender-equitable approaches to compensation and employment. The contractor will ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation*

### **5.4 Decommissioning Phase**

Decommissioning could result from the abandoning of the borehole due to water becoming diminished in the borehole or development of another more reliable source of water such as a dam.

#### **5.4.1 Positive Environmental and Social Impacts**

The positive impacts associated with the decommissioning of the project are direct employment for those involved in the demolition work and restoration of the land for other productive purposes

#### **5.4.2 Negative Environmental and Social Impacts**

The negative impacts of decommissioning are: reduction in crop and livestock productivity, reduction in indirect employment opportunities, reduction in household income due to poor, the community and livestock to continue to walk for long distances in search of water, and reduced school attendance and education standards due to drop in household income, risk of falling in the gaping hole, increased burden for the women to get water for households, increase in water borne diseases due to inadequate source of freshwater and increased poverty and reduced community adaptive capacity to climate change effects.

In the demolition phase, there will be increased noise and vibration generation, motor vehicle and machinery emissions, surface water pollution from possible oil/lubricant/fuel spills, generation and accumulation of demolition debris and risk of occupation health and safety for the workers and the community.

**c. Mitigation Measures for the Decommissioning**

Depending on the reason for the decommissioning this ESIA recommends that the mechanisms proposed to mitigate the impacts of decommissioning include due diligence survey, where the proponent will undertake safety and environmental audit to identify and mitigate any impacts that may arise from any left-over material and substances that could be harmful to people and/or the environment. In any case, the hole left behind should be completely filled up and covered.

**CHAPTER SIX:**

**ENVIRONMENTAL AND SOCIAL MANAGEMENT & MONITORING PLAN (ESMMP)**

**6.1. Introduction**

This chapter presents the Environmental and Social Management and monitoring Plan (ESMP) that will be implemented by the proponent to prevent or reduce significant negative impacts to acceptable levels. This plan will be fully followed throughout the sub-project life cycle. Table 6 below shows the ESMP for the mitigation, monitoring, implementation period and cost for mitigation of the predicted impacts during the implementation of the sub project.

**6.2. Environment and Social Management & Monitoring Plan (ESMMP)**

*Table 4: Environment and Social Management & Monitoring Plan*

Potential Environmental Social impacts	Proposed Mitigation	Indicator	Responsibility	Time Frame	Estimated Cost
<b>Potential environmental impacts during construction phase</b>					
Disturbance of vegetation	Contractor to conduct a site meeting with the elders and community environment committee before site clearance and involving removal of trees; Proponent to support community to establish indigenous/fruit tree nursery	No. of Meetings held; No. of tree nursery established; No. of trees planted; No. of community elders consulted	Proponent/ PMC/Panel of Experts (PoE)	5 months	300,000 for establishment of tree nursery and tree planting
Soil erosion	Construction vehicles to operate on designated areas; Rip off any compacted areas after construction to allow aeration of the soil and ease the infiltration of water into the soil; Apply soil erosion control measures such as levelling the sub-project site to reduce runoff; Revegetation of the borehole area to reduce	Number of sites rehabilitated; No. of trees planted; Acreage of land put under soil control measures	Contractor; Proponent CPCU	6 months	130,000 (10,000 for revegetation of BH area 120,000 for training on establishment of pasture

	run off				farm)
Groundwater pollution	Eliminate all potential sources of pollution; Use water-based drilling fluid; Case the well as it passes through the water table; Proper housekeeping within and around the rig will be observed; Do proper cleanup procedures will be undertaken in case of drilling fluid and oil spills; Do not install a solid waste disposal site within a radius of 50M of the proposed borehole site	Distance of sanitation facilities from the borehole; No and Type of drilling fluid; No. of soak pit; no. of waste disposal site	Contractor PoEs	2 months	150,000
Noise and vibration generation	Avoid noise above 80db at the sub project site especially during the night; Properly servicing and maintaining and tuning drilling machinery; Drilling to be done between 8.00am and 5.00pm and during school holidays and weekends when Cheboruswo secondary and ECD are not in session; Operating shorter shift periods for workers who come in direct contact with high concentrations of noise or other hazards; Inform the public of the construction activities, time, and day; Providing workers with ear protective devices	The noise levels; Frequency of servicing; Time scheduled for drilling; No. of shifts a worker take; No of posters; Number of workers provided with correct PPEs	Contractor Supervising engineer and CPCU	1 month	45,000
Oil spillage	Do not carry out vehicle/machinery servicing the construction area; Immediate scooping of any spillage during construction and safely disposing off; Servicing of vehicle at a designated place equip with a sump to contain any spills	a) No of designated storage for fuels and grease b) Presence of designated yards and servicing bays at site c) Number of oil sump at the servicing yard	Contractor Supervising engineer and CPCU	1month	25,000 for supervision

Dust emissions	Provision of suitable PPE/C; Drivers to avoid unnecessary speeding near settlements in the project areas; Apply water sprays and mist by trucks as dust suppression measures on loose soils, freshly excavated sites, and stockpiles.	No. of time water sprayed, No of suitable PPEs procured, No of drivers trained/advised	Contractor	2 months	50,000
Solid and liquid waste generation	provide waste bins/ skips; Sensitizing workers and communities on waste management, Engaging licensed waste handler to regularly empty the bins and dispose the wastes ensuring recycling through waste sorting and separation; Provide sanitation facilities at a good distance from the borehole to reduce the risk of water contamination; et cetera.	Number of wastebaskets; No. of sensitization meetings conducted; No. of waste handlers engaged; No. of sanitation facilities	Contractor PoEs	2 months	150,000
Lowering of the water table	The borehole should be installed with a Master Meter and an Airline/Piezometer to monitor groundwater abstraction and to facilitate regular measurements of the static water level in the borehole, respectively; Limiting the maximum groundwater abstraction permitted from the borehole; Install auto-shut water taps to reduce water wastage; Prompt repair of broken pipes to stop leakages	Number and type of water taps installed; Number and type of water meter installed; Volume of water abstracted per day	Sub-project Management Committee and WRA	12 months	40,000
<b>Proposed negative social impacts</b>					
Pipeline distribution	Involve the community and all stakeholders in all phases of the sub project.	No. People involved in each phase of the project	Proponent, CPCU, engineer, contractor.	7 months	No cost

Project delay	Follow the planned activities strictly; Share the planned activities with the community; Train the community on project management	No. of planned activities presented; No. of trainings done on the community; No. of community members trained	Contractor , CPCU, proponent	2 months	Factored in the training cost
Sub Project mismanagement	Sensitization of the PMC on proper operation, management, and maintenance of the borehole to ensure sustainability; The proponent will consult on reasonable water tariffs to sustain the water supply.	No of sensitizations done; The amount of money charged per 20litre container or collected per month; Number of beneficiaries paying the water fees	Proponent and PMC/PoEs/contractor	6 months	185,000
Water Related Conflicts	The management committee to provide enough watering troughs at strategic points; Involve the beneficiaries in establishing the pipeline routes; Training of the management committee and the community on sustainable use of water	No of watering troughs; No of trainings; Pipeline layout	Proponent/Contractor	2 months	Training cost Factored
Water-borne diseases (human)	The waste water drainage channel to be constructed to lead water away from the pump pad; The wastewater may be used for small gardening initiatives by the communities or directed to soak pit; Sensitize the community on the use of mosquito nets; Conduct continuous maintenance of the borehole, pipework, tank, and water kiosk ;Conduct periodic water quality checks; Clear mosquito breeding ground and drain stagnant water	No of channels for drainage constructed; No of households with mosquito nets; No of people trained on health and safety and use of mosquito nets; No of households practicing safety rules; No of households using waste water for gardening; No. of water quality checks done	Proponent Sub-project Management Committee  department of public Health	12 months	80,000 for sensitization on malaria control

Outbreak of Livestock Diseases	Regular disease surveillance by the veterinary department and community; Sensitization of the community on livestock health and disease control; livestock disease management plan be put in place by the veterinary department to ensure disease incidences are promptly responded to and addressed	Number of disease surveillance conducted; No of Sensitization meetings held; A livestock disease management plan put in place	Department of livestock and veterinary/community	12 months	120,000
Social evils and vandalism	Sensitize the community on the importance of sub project ownership; Sensitize the community on alcohol and drug abuse; Establish community surveillance team; Increase community surveillance of the sub project area and community assets/property in collaboration with local administration; Employ a security personnel	No of sensitization meetings; No. of community surveillance; Surveillance team in place; No. security personnel engaged	Local administration Proponent	1 month	25,000 for sensitization on project ownership
Population Increase in the sub project area	Promote alternative water sources in the community such roof water harvesting, water ponds, water pan development for livestock; Train the borehole committee on water management; Sensitize the community on sustainable water use	No. of alternative water sources developed; No of BH committee trainings; No of community sensitizations on water use	WRA Proponent Water Department	2 years	Training cost factored above
Risk of HIV/AIDS	Develop and integrate into the sub-project implementation Programs for sensitizing the local community and workers on HIV/AIDS and/or other sexually transmitted diseases (STDs); Develop appropriate training and awareness materials for Information, Education, and Communication (IEC) on HIV/AIDS; Identify other players (local CBOs, NGOs, and government organizations)	Number of training and sensitization meeting; number of materials developed; Number of partners identified; No of persons attending VCT; No. of clinics providing VCT and ARVs	Contractor CPCU PMC	12 months	100,000

	on HIV/AIDS for enhanced collaboration; Use existing clinics to provide VCT services to construction crew and provision of ARVs for vulnerable community members, Ensure safety of women and girls in provision of VCT services.				
Work related accidents and health and safety concerns	Ensure that the trenches created are covered before leaving the site; Ensure workers are provided with first aid kits; Ensure all equipment are inspected before use for appropriate safeguards; Ensure the machine operators are trained on machine safety; Ensure the working hours are controlled; Ensure appropriate road safety signage are strategically placed and drivers adhere to the requirements of such signage; Provide appropriate barriers along the excavated trenches to bar the public and livestock; Hire a security guard to be guard the borehole and storage tanks; Ensure the site is fenced off from people, children and animals; Ensure provision of suitable PPEs and procuring insurance for workers and machinery/ vehicles	Length of trenches filled; number of workers provided with PPEs; number of inspections conducted; number of trainings on machine operation safety and first aid; the time schedule of activities; number of signage installed; number of people employed; No of sites fenced and number of sensitization meetings; type of PPEs and number people on insurance covers	Contractor, proponent and CPCU	5 months	50,000
Spread of COVID-19 amongst workers	The Contractors to develop a SOPs for managing the spread of Covid-19. Mandatory provision and use of appropriate Personal Protective Equipment (PPE) for all project personnel; Avoid concentrating more than 15 workers at one location. Where there are two or more people gathered, maintain a social distance at least 2 meters. All workers and	No of SOPs; No. of; Trainings conducted ; No. of correct PPE provided and used; No. of sanitizing facilities provided; No. of installed handwashing equipment etc.	Supervising Eng. & Contractor, PMC, PUBLIC, department of public Health	5 months	150,000

	visitors accessing worksites every day or attending meetings shall be subjected to rapid Covid-19 screening which may include temperature check and other vital signs; The project shall put in place means to support rapid testing of suspected workers for covid-19; Install hand washing facilities with adequate running water and soap, or sanitizing facilities Ensure routine sanitization of shared social facilities and other communal places				
Spread of COVID-19 amongst community members during consultations processes	Electronic means of consulting stakeholders and, holding meetings, whenever possible, shall be encouraged whenever feasible. One-on-one engagements for the PAPs while observing social distance, and adhering to PPE wearing shall be enforced; Avoid concentrating more than 15 community members at one location. Where there are two or more people gathered, maintain social distancing at least 2 meters; The team carrying out engagements within the communities on one-on-one basis will be provided with appropriate PPE for the number of people they intend to meet; Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements, and mail) when stakeholders do not have access to online channels or do not use them frequently; Ensure to provide and allow participants to provide feedback and suggestions; Hold meetings in small groups, mainly in form of FGDs if permitted	No of SOPs; No of Training material; No. of PPE, and sanitizing facilities provided; No. of participants registered online; No of Electronic media used in dissemination/engagement e.g. printed electronic mails, addresses of video links created; No. of participants in any meeting; Type of media adopted	department of public Health Supervising Eng. & Contractor (s)  Communication/engagement expert in the Team	2 months	100,000

	depending on restrictions in place and subject to strict observance of physical distancing and limited duration; In situations where online interaction is challenging, disseminate information through digital platforms (where available) like Facebook and WhatsApp & Chat groups; Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants				
Sexual exploitation and abuse (SEA)	CoCs (Code of Conduct) and ongoing sensitization of staff on responsibilities related to the CoC and consequences of non-compliance; project-level IEC materials; Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; Management and Coordination: including integration of SEA	No of SEA Action Plan; No of staff signed Code of Conduct; Number of staff trainings in SEA FP; No of Community Liaison trained in PSEA; No of IEC materials for workers' sites and community; No of discrete SEA reporting pathway; Relevant policies, e.g. investigations and discipline and whistleblower protection	Proponent and Sub-Project Management Committee CPCU GBV expert	12 months	180,000

	in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistleblower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers; Develop and implement a SEA action plan with an Accountability and Response Framework as part of the ESMP; The SEA action plan will follow guidance on the World Bank's				
Gender-based violence at community level	effective and on-going community engagement and consultation, particularly with women and girls; Ensure employment equality schemes for women; community level water management, representation or economic activities etc.; Sensitization around gender-equitable approaches to compensation and employment; etc.; The contractor will ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation	No of Mitigation plan for GBV occurring at the community level because of project implementation; Number of GBV cases happening at the community level that receive survivor-centered referral and care; Number of trainings for PMC, SAIC, CESSCO on GBV and SEA	Proponent and Sub-Project Management Committee/c ontractor GBV expert	8 months	145,000
<b>TOTAL COST</b>					<b>1,570,000</b>

**Audits and Reviews:** Annual environmental, health, and safety audits and reviews as required by NEMA will be conducted to assess the performance of the environmental, health and safety policies and operational procedures implemented. The CESSCO is expected to carry out quarterly reporting of the sub project together with the M & E officer. These quarterly reports will form the basis for effective auditing and review of the ESMP of the proposed sub project.

## **CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS**

### **7.1. Conclusion**

An Environmental and Social Management and monitoring Plan provided in chapter six charts the path for sustainable sub-project implementation. The plan provides strategies and activities that need to be implemented to avoid the negative impacts. Implementation timelines, responsibilities, and cost estimates are also provided where applicable.

### **7.2. Recommendation**

It is recommended that the Proponent, contractor, and all the stakeholders mentioned in the ESMP implement the recommendations in the environmental and social management and monitoring plan. This is to ensure that the potentially affected environment is well managed and that accidents are prevented in the course of sub-project implementation. The Proponent is expected to comply with the relevant legal and policy requirements with regard to sub-project implementation. During the operation of the borehole, it is necessary that environmental regulations be strictly adhered to. The performance of the borehole will also be monitored against the recommended mitigation measures to ensure sustainability.

### **7.3. Overall Opinion**

The construction of the borehole will have a far-reaching impact on the community in terms of accessibility to quality water. The sub-project area has water challenges that continue to stifle socio-economic development and threaten livelihoods. It is for this reason that the community members are supportive of the sub-project. It was also established that all the identified negative impacts would be effectively mitigated through the full implementation of the ESMP. It is therefore, recommended that upon fulfillment of all other legal obligations identified in this report the Proponent be issued with the ESIA license or approval letter from NEMA.

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30. The Wildlife Conservation and Management Act, 2013 2012 Printed and Published by the Government Printer, Nairobi 27<sup>th</sup> December 2013

Annexes

Annex 1: Screening Checklist

Coordinates  
1300  
V.M. 819824083E  
36596334.578N

**ENVIRONMENTAL AND SOCIAL SCREENING CHECK LIST**  
(Sub-projects screening process by benefitting communities/Agencies)

**Section A: Background information**

Name of County.....	2. A. D. N. G. O.
Name of CPCU/Monitoring Officer/Researcher ..	Nandwa... P. Mupf
Sub-project location.....	Chagbor... S.W.O
Name of CBO/Institution...	CHEBOBU... C.B.O...
Postal Address:.....	77. MARI... G.A.T.
Contact Person.....	J.P.H.N. 2. YAI... H.
Cell phone:.....	0726554719
Sub-project name.....	
Estimated cost (KShs.).....	
Approximate size of land area available for the sub-project.....	
Objectives of the sub project.....	works for... for... for... for...
Activities/enterprises undertaken.....	Equiping of solar panel, water troughes
How was the sub-project chosen?.....	Public participation
Expected sub project duration:.....	

**Section B: Environmental Issues**

Will the sub-project:	Yes	No
Create a risk of increased soil erosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Create a risk of increased deforestation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Create a risk of increasing any other soil degradation soil degradation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Affect soil salinity and alkalinity?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Divert the water resource from its natural course/location?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cause pollution of aquatic ecosystems by sedimentation and agro-chemicals, oil spillage, effluents, etc.?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Introduce exotic plants or animals?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Involve drainage of wetlands or other permanently flooded areas?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cause poor water drainage and increase the risk of water-related diseases such as malaria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Reduce the quantity of water for the downstream users?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Result in the lowering of groundwater level or depletion of groundwater?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

13.79" - N

**Section C: Socio-economic Issues**

Will the sub-project:	Yes	No
Displace people from their current settlement?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Interfere with the normal health and safety of the worker/employee?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reduce the employment opportunities for the surrounding communities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reduce settlement (no further area allocated to settlements)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reduce income for the local communities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Increase insecurity due to introduction of the project?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Increase exposure of the community to HIV/AIDS? / <i>perovans covid 19</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Induce conflict?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Have machinery and/or equipment installed for value addition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Introduce new practices and habits?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lead to child delinquency (school drop-outs, child abuse, child labour, etc.)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lead to gender disparity?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lead to poor diets?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lead to social evils (drug abuse, excessive alcohol consumption, crime, etc.)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

*If the answers to any of the above is 'yes', please include an EMP with sub-project application.*

**Section D: Natural Habitats**

Will the sub-project:		
Be located within or near environmentally sensitive areas (e.g. intact natural forests, mangroves, wetlands) or threatened species?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Adversely affect environmentally sensitive areas or critical habitats – wetlands, woodlots, natural forests, rivers, etc.)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Affect the indigenous biodiversity (Flora and fauna)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cause any loss or degradation of any natural habitats, either directly (through project works) or indirectly?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Affect the aesthetic quality of the landscape?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reduce people's access to the pasture, water, public services or other resources that they depend on?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Will the sub-project:		
Involve the use of pesticides or other agricultural chemicals, or increase existing use?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cause contamination of watercourses by chemicals and pesticides?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cause contamination of soil by agrochemicals and pesticides?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Experience effluent and/or emissions discharge?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Export produce? Involve annual inspections of the producers and unannounced inspections?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

1000



f) If yes, list the negative effects:

- (i) .....
- (ii) .....
- (iii).....
- (iv).....
- (v) .....

g) Do you use any kind of protective clothing while applying or handling pesticides? Yes \_No  
Why? \_\_\_\_

a) If YES, what kind? \_\_\_\_

**2. Knowledge of pesticide handling and storage (tick one in each row)**

a) Do you read labels on the pesticide container before using?

Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_

b) How often do you wear protective clothing and other accessories like nasal mask, eye goggles, and boots when applying the pesticides?

Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_

c) Do you mix pesticides with your hands?

Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_

d) Do you observe the pre-harvest waiting periods after applying the pesticides?

Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_

e) After spraying, do you wait 12 hours before entering the field?

Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_

f) Do you store pesticides in a secure, sound and well-ventilated location?

Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_

g) Do you make a cocktail before applying the pesticides? (i.e., mix more than one chemical and apply them at once?)

Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_

h) Where do you store your pesticides? \_\_\_\_

Why do you store them there?  
\_\_\_\_\_

i) What do you do with your pesticide containers after they are empty? \_\_\_\_  
\_\_\_\_\_

j) Do you know of any beneficial insects (insects that eat harmful insects)?

Yes..... No .....

k) If yes, name them:

i) \_\_\_\_\_

ii) \_\_\_\_\_

iii) \_\_\_\_\_

**3. Pesticides and Health**

a) Do you find that pesticide application is affecting the health of: Persons regularly applying pesticides?

Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_  
 Persons working in fields sprayed with pesticides  
 Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_  
 Persons harvesting the produce  
 Sometimes \_\_\_\_\_ Always \_\_\_\_\_ Never \_\_\_\_\_

**4. Options to Pesticides**

a) From your experience, are you aware of other methods for controlling insect's diseases and/or weeds besides pesticides?

Yes..... No .....

b) If yes, describe these practices:

i) \_\_\_\_\_

ii) \_\_\_\_\_

iii) \_\_\_\_\_

iv) \_\_\_\_\_

**5. Information** *N/A*

a) What information do you think you need for improving your crop production and marketing?  
 \_\_\_\_\_

**6. Training** *N/A*

a) Have you ever received any training on any of the following topics related to crop production?

b) Integrated Pest Management Yes..... No .....

c) No. of times/past yr. ....

d) b).Pesticide Usage Yes..... No .....

e) No. of times/past yr. ....

f) Pesticide Safety Yes..... No .....

g) No. of times/past yr. ....

h) Insect Identification Yes..... No .....

i) No. of times/past yr. ....

j) Disease Identification Yes..... No .....

k) No. of times/past yr. ....

l) Quality aspects of production Yes..... No .....

m) No. of times/past yr.....

7) *Is there anything else that you want us to know about your crop production?*

-----  
 -----

*If the answer to the above is 'yes', please consult the IPM that has been prepared for the project.*

**Section F: Vulnerable and Marginalized Groups meeting requirements for OP 4.10**

Are there:	Yes	NO
People who meet requirements for OP 4.10 living within the boundaries of, or near the project?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Members of these VMGs in the area who could benefit from the project?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
VMGs livelihoods to be affected by the sub project?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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

**Section G: Land Acquisition and Access to Resources**

Will the sub-project:	Yes	No
Require that land (public or private) be acquired (temporarily or permanently) for its development?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Use land that is currently occupied or regularly used for productive purposes (e.g. gardening, farming, pasture, fishing locations, forests)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Displace individuals, families or businesses?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Result in temporary or permanent loss of crops, fruit trees and pasture land?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Adversely affect small communal cultural property such as funeral and burial sites, or sacred groves?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Result in involuntary restriction of access by people to legally designated parks and protected areas?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Be on monoculture cropping?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

*If the answer to any of the above is 'yes', please consult the mitigation measures in the ESMF, and if needed prepare a (Resettlement Action Plan) RAP.*

**Section H: Proposed action**

(i) Summarize the above:	(ii) Guidance
<input type="checkbox"/> All the above answers are 'No'	<ul style="list-style-type: none"> <li>• If all the above answers are 'No', there is no need for further action;</li> </ul>
<input checked="" type="checkbox"/> There is at least one 'Yes'	<ul style="list-style-type: none"> <li>• If there is at least one 'Yes', please describe your recommended course of action (see below).</li> </ul>

**(iii) Recommended Course of Action**

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

- CPCUs and County Director of Environment (CDE) will provide detailed guidance on mitigation measures as outlined in the ESMF; and
- Specific advice is required from CDE and CPCUs regarding sub-project specific EIA(s) and also in the following area(s)

affected groups and disclosure of EIA's conclusions. In seeking views of the public after the approval of the sub-project, the proponent shall avail the draft EIA report at a public place accessible to project-affected groups and local NGOs/CSOs.

Completed by: .....

Name: .....

Position / Community: .....

Date: \_\_\_\_\_

Field Appraisal Officer (CDE): .....



Signature: .....

Date: \_\_\_\_\_

**Note:**

Project category	Characteristics
A	Full and extensive EIA needed- irreversible environmental impacts; impacts not easy to pick or isolate and mitigation cost expensive; EMP design not easily done; Must have the EIA done and future annual EAs instituted
B	Site specific environmental impacts envisaged; mitigation measures easy to pick, not costly and EMP design readily done; need an EIA and future EAs
C	Have minimal or occasionally NO adverse environmental impacts; exempted from further environmental processes save environmental audits

# Attendance list

12.	FRANCIS CHESANG	2343715	M	57	0721908816	
13.	MICHAEL ROTICH	21481693	M	38	0791774556	MRS. A.
14.	VINCENT KIPKECH	28502238	M	29	0713392687	
15.	WILLY CHESIRE	4538657	M	52	0715093941	W. Chesire
16.	JOSEPHAT KIPKECH	32390757	M	25	0717611214	
17.	DUNCAN KIMITEI	33301238	M	33	0716394818	
18.	FAITH KURUI	33943138	F	24	0791774579	
19.	ROBINSON YATICH	34130129	M	25	0715096862	
20.	LUCY KALES	33823352	F	24	0726880711	
21.	VIVIAN CHERUTICH	36089248	F	26	0722069120	Vivian
22.	LUCY KOROS	13067143	F	43	0721295927	
23.	CORNELLIUS K. KULEI	30555823	M	26	0718084308	
24.	LEAH CHESANG	4525314	F	59	0715393763	
25.	JAMES KANDAGOR	22766337	M	44	0728762437	
26.	JOAN TALLAM	22351422	F	35	0727805553	
27.	MARGARET CHEBON	22440172	F	40	0727492950	
28.	WILLIAM KANDAGOR	27489142	M	27	0796670234	
29.	JOYCE KIMITEI	4553377	F	63	0707019079	
30.	ROBERT KIPROP	29197906	M	31	072367054	

## Annex 2: Sample Filled in Individual Questionnaires

**STAKEHOLDERS' PERCEPTIONS ON THE POTENTIAL SOCIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT IN COUNTY**

SUB-COUNTY Bahia WARD Amiswari LOCATION Chikoro SUB-LOCATION Chikoro

This project is anticipated to have effects on the physical, biological and socio-economic environments of the surrounding area and the community. It is important, therefore, to determine these impacts and public participation is a requirement of Environmental Management and Coordination Act, 1999 (Section 58 on Environmental Impact Assessment) in this process. Therefore, as a key stakeholder (i.e. local leader/surrounding institution or organization/ interested person or group), we request for your comments on the potential socio-economic and environmental impacts of the proposed chikoro project.

- Are you a resident of the proposed project area? Yes [ ], No [ ]
- How far is your place of residence from the proposed project area? 1.5 km
- For how long have you resided in this area? 20 years
- Are you aware of the proposed project? Yes [ ], No [ ]
- (a) Do you agree with the proposed project activity? Yes [ ], No [ ]  
(b) IF NO why?

(c) IF YES

- In your view, What are the **Positive** socio-economic and environmental impacts (i.e. to people, land/soil, water, forest, air, wetlands, livestock, wildlife, etc) do you anticipate from the proposed activity?  
 - Water access for livestock will be increased  
 - Water access for domestic use will be increased  
 - Small scale irrigation - vegetables, fruit trees
- In your view, What are the **Negative** socio-economic and environmental impacts (i.e. to people, land/soil, water, forest, air, wetlands, livestock, wildlife, etc) do you anticipate from the proposed demolition?  
 - Will reduce social interaction as time spent while walking to the river is reduced  
 - social exploitation by construction workers
- How can the negative impacts identified above be mitigated?  
 - Putting in place code of conduct to the construction workers  
 - More go rounds to enhance social interaction

- Should the project be implemented? Yes [ ], No [ ]  
If no, why?
- Respondent Name Agnes Yatsish ID No/phone No 0710 268259 sign [Signature] Date 10/2/2021

**THANK YOU FOR YOUR COOPERATION**

1

**STAKEHOLDERS' PERCEPTIONS ON THE POTENTIAL SOCIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT IN COUNTY**

SUB-COUNTY Ward WARD Rural LOCATION Ward SUB-LOCATION.....

This project is anticipated to have effects on the physical, biological and socio-economic environments of the surrounding area and the community. It is important, therefore, to determine these impacts and public participation is a requirement of Environmental Management and Coordination Act, 1999 (Section 58 on Environmental Impact Assessment) in this process. Therefore, as a key stakeholder (i.e. local leader/ surrounding institution or organization/ interested person or group), we request for your comments on the potential socio-economic and environmental impacts of the proposed.

1. Are you a resident of the proposed project area? Yes [ ], No [ ]
2. How far is your place of residents from the proposed project area? 1 km
3. For how long have you resided in this area? 40 years
4. Are you aware of the proposed project? Yes [ ], No [ ]
5. (a) Do you agree with the proposed project activity? Yes [ ], No [ ]
- (b) IF NO why?

(c) IF YES

(i) In your view, What are the **Positive** socio-economic and environmental impacts (i.e. to people, land/soil, water, forest, air, wetlands, livestock, wildlife, etc) do you anticipate from the proposed activity?

people will become self employed when they do farming (irrigation)  
people keep more livestock and bee-keeping

(ii) In your view, What are the **Negative** socio-economic and environmental impacts (i.e. to people, land/soil, water, forest, air, wetlands, livestock, wildlife, etc) do you anticipate from the proposed demolition?

1. Diseases - can may spread by those come and construct may work  
2. in case of leakage stagnate water can cause diseases

(iii) How can the negative impacts identified above be mitigated?

1. Educating people be aware and keep social distance  
2. experts should be given opportunity to built tanks / piping

Should the project be implemented? Yes [ ], No [ ]

If no, why?

Respondent Name JAMES M. MURRAY ID No/phone No. 0718824488 sign JM Date 10/2/2021

**THANK YOU FOR YOUR COOPERATION**

**STAKEHOLDERS' PERCEPTIONS ON THE POTENTIAL SOCIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED CHANGING WATERS PROJECT IN KIPKURU COUNTY**

SUB-COUNTY MURURU WARD KIPKURU LOCATION SDI SUB-LOCATION MOTITILLOT

This project is anticipated to have effects on the physical, biological and socio-economic environments of the surrounding area and the community. It is important, therefore, to determine these impacts and public participation is a requirement of Environmental Management and Coordination Act, 1999 (Section 58 on Environmental Impact Assessment) in this process. Therefore, as a key stakeholder (i.e. local leader/surrounding institution or organization/ interested person or group), we request for your comments on the potential socio-economic and environmental impacts of the proposed

1. Are you a resident of the proposed project area? Yes , No
2. How far is your place of residents from the proposed project area? 3 KM
3. For how long have you resided in this area? 64
4. Are you aware of the proposed project? Yes , No
5. (a) Do you agree with the proposed project activity? Yes , No
- (b) If NO why?

(c) If YES

(i) In your view, What are the **Positive** socio-economic and environmental impacts (i.e. to people, land/soil, water, forest, air, wetlands, livestock, wildlife, etc) do you anticipate from the proposed activity?

1. cows' gone will get water to drink  
2. I will plant crops in my shamba  
3. bees will get water to drink  
in the land will increase in value

(ii) In your view, What are the **Negative** socio-economic and environmental impacts (i.e. to people, land/soil, water, forest, air, wetlands, livestock, wildlife, etc) do you anticipate from the proposed demolition?

standing water may encourage mosquitoes to breed

(iii) How can the negative impacts identified above be mitigated?

Make the community aware about the breeding of the mosquitoes

Should the project be implemented? Yes , No

If no, why?  
 Respondent Name CHAPIN KIPKURU ID No/phone No 4653287 sign Chapin Date 10/01/2021

**THANK YOU FOR YOUR COOPERATION**

STAKEHOLDERS' PERCEPTIONS ON THE POTENTIAL SOCIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED CHROBOKO PROJECT IN EDULUI COUNTY

SUB-COUNTY Makoo WARD Makoo LOCATION ENKEL 301 SUB-LOCATION EDULUI

This project is anticipated to have effects on the physical, biological and socio-economic environments of the surrounding area and the community. It is important, therefore, to determine these impacts and public participation is a requirement of Environmental Management and Coordination Act, 1999 (Section 58 on Environmental Impact Assessment) in this process. Therefore, as a key stakeholder (i.e. local leader/ surrounding institution or organization/ interested person or group), we request for your comments on the potential socio-economic and environmental impacts of the proposed

- 1 Are you a resident of the proposed project area? Yes [  ], No [  ]
- 2 How far is your place of residents from the proposed project area? about 1 KM
- 3 For how long have you resided in this area? 40 yrs
- 4 Are you aware of the proposed project? Yes [  ], No [  ]
- 5 (a) Do you agree with the proposed project activity? Yes [  ], No [  ]
- (b) If NO why?

(c) IF YES

- (i) In your view, What are the **Positive** socio-economic and environmental impacts (i.e. to people, land/soil, water, forest, air, wetlands, livestock, wildlife, etc) do you anticipate from the proposed activity?

1. Domestic animals will get sufficient water to drink  
 2. People will be able to plant the produce fruits  
 3. Because of the project will add value to the land  
 4. People will be able to plant grass for the livestock

- (ii) In your view, What are the **Negative** socio-economic and environmental impacts (i.e. to people, land/soil, water, forest, air, wetlands, livestock, wildlife, etc) do you anticipate from the proposed demolition?

1. by leaving pipes tanks may become or encourage to mosquito breeding hence malaria  
 2. Wild animals i.e snakes etc come close to people endangering life

- (iii) How can the negative impacts identified above be mitigated?

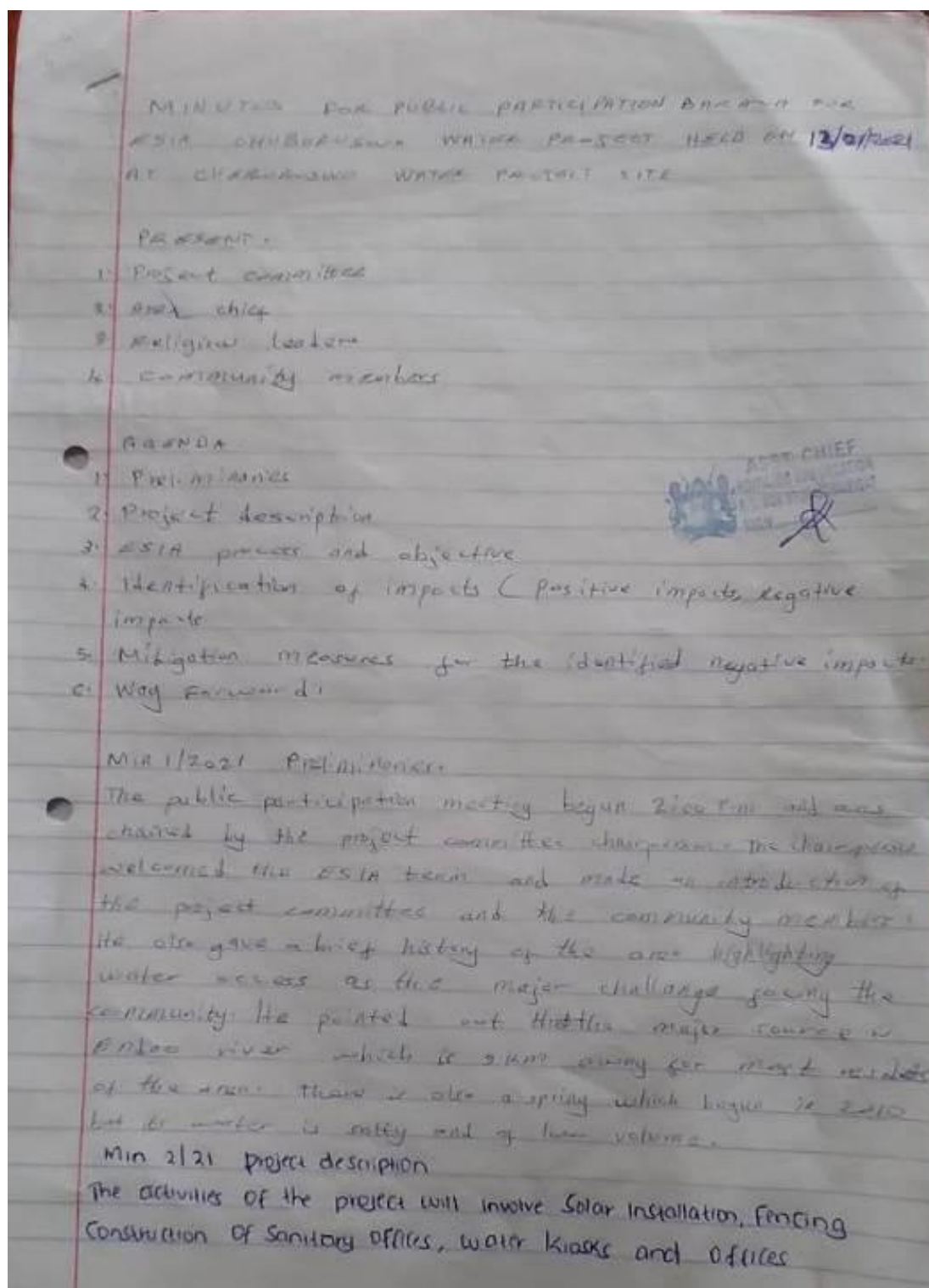
1. involving qualified people in building tanks and installing pipes  
 2. Educating community about mosquitoes presence of dangerous animals like snakes

Should the project be implemented? Yes [  ], No [  ]  
 If no, why?

Respondent Name ABAY K. K. ID No/phone No 19070270 sign [Signature] Date 10/01/2021

THANK YOU FOR YOUR COOPERATION

### Annex 3: Minutes for the ESIA Public Participation and Consultations for the Cheboruswo Community Water Project & Attendance List



Installation of pipes that will distribute water to different households <sup>regions</sup> in the Community

Min 2/21: EIA process and Objective

The EIA team expert led the session to the Community members. He explained the three sections of the project, construction phase, operation phase and decommissioning phase. He highlighted the objectives.

Min 4/21: Identification of Impacts

#### Positive Impacts

- i) Access of water to the people
- ii) Establishment of tree nursery
- iii) Establishment of Home garden e.g. vegetables and fruit trees
- iv) Creation of employment
- v) Improved nutrition
- vi) Improved productivity of cows, bees
- vii) Increased income to the community
- viii) Land appreciation

#### Negative Impacts


- i) ~~Tree~~ Removal of trees during construction (2 trees removed at Komolot)
- ii) Soil erosion due to leakage
- iii) Land conflicts due to availability of water
- iv) Conflicts arising during piping
- v) Mismanagement
- vi) Rise of Silt, HIV and COVID
- vii) Theft of Livestocks
- viii) The water borehole may dry up
- ix) The Mitigation measures
  - i) Socialization to the Community
  - ii) Use of a specific channel for ~~leakage~~ <sup>leak</sup> leading to <sup>leakage</sup>
  - iii) Alternative water sources to be considered (borehole drilling)

#### Way Forward

The meeting ended at 4:30 pm by a word of prayer from Julius. The members agreed that the project should continue.

Confirmed List

1. Project committee

NAME	Position	signature	Date
JOHN E. VAUGH	CHAIRPERSON		13/1/2021

2. Area chief

NAME	Position	signature	Date
PAUL KIPTAI	ASST. CHIEF REPLICATION SUBCOMMISSION P.O. BOX 92 SIGN		13/01/2021

3. PropONENT

NAME	Position	signature	Date
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# Attendance List ESIA Public Participation

## KENYA CLIMATE SMART AGRICULTURE PROJECT (KCSAP) BARINGO COUNTY



### ATTENDANCE LIST

ACTIVITY... ESIA Public Participation for Proposed Cheboronwo Community CH - Baringo

DATE... 13/11/2021

S/N	Name	Age (Year/s)		Gender		Position	Village	Phone number	Signature
		18-35	35-55	Male	Female				
1	JOHN C. YAKICH		60	✓		Chairperson	Cheboronwo	0225559719	[Signature]
2	Benjamin Chemitei		45	✓		V/Secretary	Cheboronwo	0734960508	[Signature]
3	LORDAN R. MUKIT		43	✓			Koitichien	0728340742	[Signature]
4	KIPTOO CHEMITEI		76	✓			Cheboronwo	0726719205	[Signature]
5	Julius Cherogor		68	✓		Member	Koitichien	0728432001	[Signature]
6	Charles W. Limo		58	✓		Member	Koitichien	0702764431	[Signature]
7	Joel Kutto		65	✓		"	"	-	[Signature]
8	David Changweny		65	✓		"	Cheboronwo	0711547637	[Signature]
9	Kipkelwen Chemisi		70	✓		"	Koitichien	-	[Signature]

10	BARNABAS ABEJUL		20	✓		Member	Cheboronwo	0740781570	[Signature]
11	MARHA KIPTOO		70	✓		Member	Cheboronwo		[Signature]
12	JULIUS KIPTOO		28	✓		Member	Cheboronwo	0703500091	[Signature]
13	STANLEY CHEMITEI		64	✓		Member	Cheboronwo	311 62332	[Signature]
14	JACOBS KIPTOO		41	✓		Member	Cheboronwo	219871509	[Signature]
15	CHARLES KIPTOO		64	✓		Member	Cheboronwo	4522357	[Signature]
16	NAOMI CHERONO		40	✓		Treasurer	Cheboronwo	21757272	[Signature]
17	MARY BAKKUTOL		67	✓		Member	Cheboronwo	0722151134	[Signature]
18	JANE CHEMITEI		40	✓		Member	Cheboronwo	071015081	[Signature]
19	SAMONE TALAM		70	✓		Member	Cheboronwo		[Signature]
20	ANN KOMET		50	✓		Member	Cheboronwo	070965222	[Signature]
21	SALWA KANDICE		57	✓		Member	"		[Signature]
22	TARCO TALAM		70	✓		Member	"		[Signature]
23	ESTHER KEITANY		65	✓		Member	"		[Signature]
24	TALO KIPTOO		72	✓		Member	"		[Signature]
25	KOBILA BAWONY		58	✓		Member	"		[Signature]
26	KOBILA CHOSANG		74	✓		Member	"		[Signature]
27	SARAH CHEMITEI		52	✓		"	Kiplimo		[Signature]
28	MARGARET KEMEI		50	✓		VICE CHAIR	Cheboronwo	070200000	[Signature]



ATTENDANCE LIST

ACTIVITY.....

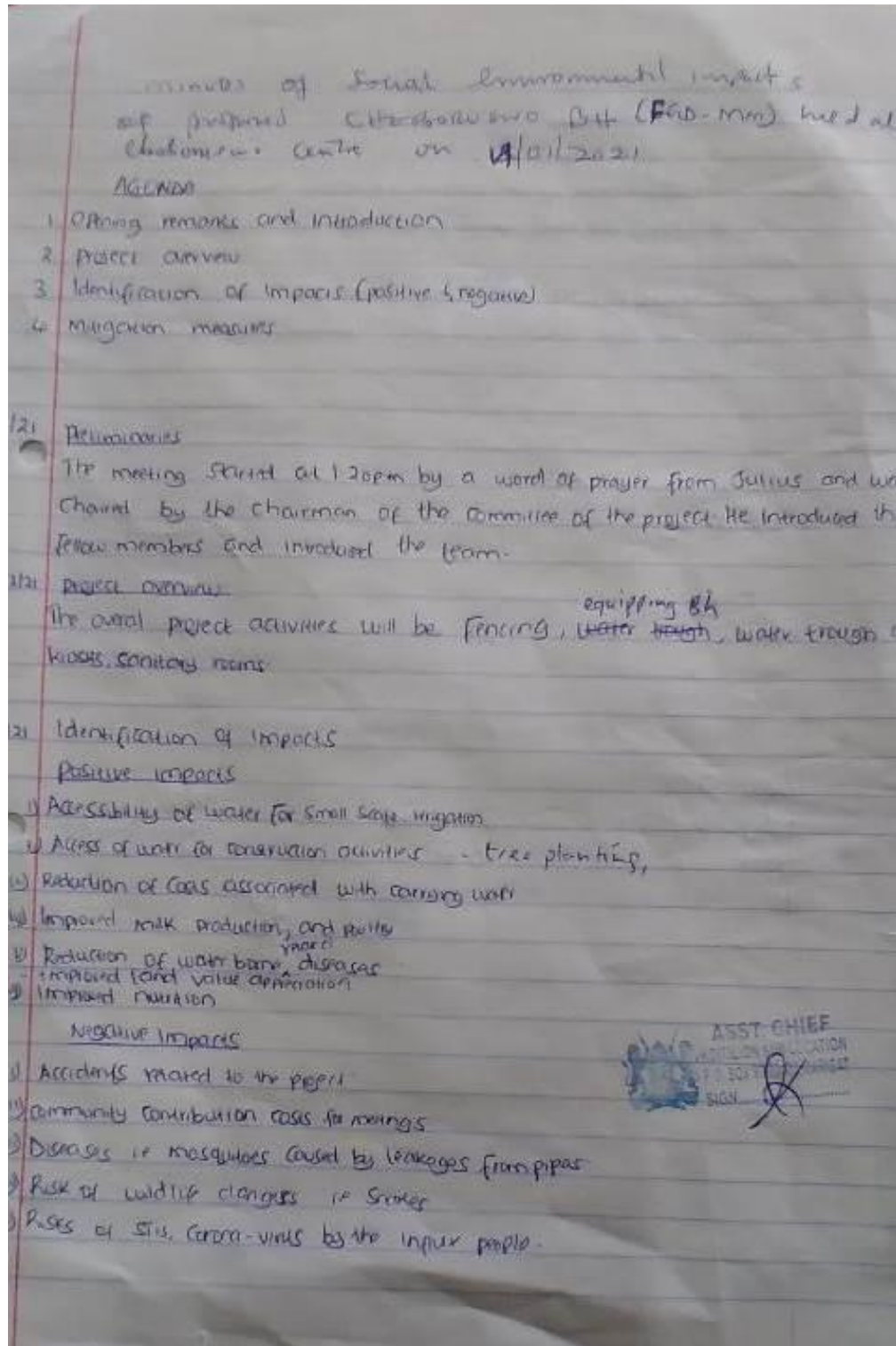
DATE.....

13/1/2021

S/No	Name	Age(Years)		Gender		Position	Village	Phone number	Signature
		18-35	>35	Male	Female				
1	Japhet Anyaberi	30		✓		member	Chetoniwa	072224002	[Signature]
2	Kevin Kasigi	25		✓		member	Chetoniwa	0722210101	[Signature]
3	Benson Mwangi	40		✓		member	Chetoniwa	072224000	[Signature]
4	Josiah Muri	63		✓		Member	Chetoniwa	071111622	[Signature]
5	Tauasis Chason	72		✓		member	Chetoniwa	072224000	[Signature]
6	Edward Tallam	30		✓		member	Chetoniwa	071440160	[Signature]
7	Josiah Mwangi	41		✓		member	Chetoniwa	07150002	[Signature]
8	Edward Mwangi	20		✓		member	Chetoniwa	072221000	[Signature]
9	Joseph Mwangi	61		✓		member	Chetoniwa	07150000	[Signature]

10	BARBARAS ARGIU	20		✓		Member	Chetoniwa	072221170	[Signature]
11	MARKO KIPTAI	70		✓		member	Chetoniwa		[Signature]
12	FILIAS KIPKOR	25		✓		Member	Chetoniwa	072224000	[Signature]
13	SAMUEL CHEMSON	64		✓		member	Chetoniwa	311 62332	[Signature]
14	JACOBS KIPKIT	41		✓		member	Chetoniwa	2195259	[Signature]
15	CHARLES KALAGAT	64		✓		member	Chetoniwa	4032227	[Signature]
16	NAOMI CHERONO	40			✓	Treasurer	Chetoniwa	21787272	[Signature]
17	MARY BAKUTOL	62			✓	member	Chetoniwa	072224000	[Signature]
18	JANE CHEMSON	40			✓	Member	Chetoniwa	071015001	[Signature]
19	SOLANGE TALAM	70			✓	member	Chetoniwa		[Signature]
20	ANN KOMET	50			✓	member	Chetoniwa	0710965322	[Signature]
21	SARNA KANDIY	67			✓	member	"		[Signature]
22	TARCO TALAM	70			✓	member	"		[Signature]
23	ESTHA KEITANY	65			✓	Member	"		[Signature]
24	TALIA KIPKOO	72			✓	member	"		[Signature]
25	KOBILA BOSWONG	68			✓	member	"		[Signature]
26	KOBILA CHOSANG	74			✓	member	"		[Signature]
27	SARNA CHOSANG	52			✓	"	Kiplimo		[Signature]
28	MARGARET KEMEI	50			✓	vice chair	Chetoniwa	071012000	[Signature]
29	PAUL KIPTAI	215		✓			Chetoniwa	071414500	[Signature]

## Annex 4: Men FGD Minutes and Attendance List



4.2a Mitigation Measures

- i) Small zones to the community
- ii) Submission of the work by the community to ensure that they are of standard
- iii) Work be placed far away from the homesteads to prevent animals to drink
- iv) In case there are conflicts the meeting should be conducted
- v) The top of the tank should be covered to prevent animals

Signed by

Secretary

Name

LUBAN K. ARGOT

ID NO

13070270

Sig



Area Chief

PAUL KIPITAT

Name

PI

22441148

ID NO

ASST CHIEF



NATIONAL ASSOCIATION  
OF KENYA  
EST. 1962

Sig



14/1/2021

### Attendance List for Men FGD SPR Public Participation





**ATTENDANCE LIST**

Activity: Esipr Public Participation - Geographical Information Project - HLD MFD

Venue: Chiefs Ground - Office Date: 14/1/2021

Name	AGE(years)		GENDER		Position	station	Phone number	Sign
	<35	>35	Male	Female				
1. JOHN C. YAKHA		60	✓		CHAIRPERSON	CHIEFS GROUND	0726550219	
2. BENJAMIN B. CHEMITEI		45	✓		V/SECRETARY	CHIEFS GROUND	0724260508	
3. JULIUS CHEBOGENT		66	✓		MEMBER	CHIEFS GROUND		
4. KIPRESWON CHANGWONY		65	✓		MEMBER	CHIEFS GROUND		
5. LUKA CHEPYATOR		72	✓		MEMBER	CHIEFS GROUND		
6. SAMUEL CHEPTEGON		62	✓		MEMBER	CHIEFS GROUND		
7. JACOB KITILIT		38	✓		MEMBER	CHIEFS GROUND		
8. MARIKO KIPTAI		73	✓		MEMBER	CHIEFS GROUND		
9. JILLI RUTTO		67	✓		MEMBER	CHIEFS GROUND		
10. LABAN ARLOT		46	✓		Committee	CHIEFS GROUND		
11. CHARLES KIPIAGAT		68			Committee	CHIEFS GROUND		
12. JOSEPH CHEPYATOR		62			MEMBER	CHIEFS GROUND		

Name	AGE(years)		GENDER		Position	station	Phone number	Sign
	<35	>35	Male	Female				
13. CHARLES LIMO								
14. JACKSON CHEPI			✓		MEMBER		0746672758	
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								

## Annex 5: Youth FGD Minutes and Attendance List


Cheboursa

ESIA Public Participation Minutes for prepared a Benchmarks  
Project held at Cheboursa Project site on 14/01/2021  
for FGD youths

Present (Refer to the attached attendance list)

Agenda

1. Introduction
2. Project Overview and ownership
3. Project Effects (Positive and Negative)
4. Mitigation of Negative effects
5. No objection.

  
ASST. CHIEF  
AND PUBLIC PARTICIPATION  
FGD SIGNATURE

① Introduction

Prayer - Margaret Kwech

Julius Kerich made opening remarks.  
Hector Tator welcomed all to the meeting and asked all to participate in the discussion.

② Project overview

This project will come at a time the community need water diversely due to scarcity of water. The youths stated that they were involved in the identification & planning of the project through public participation.


③ ownership

The project name is Cheboursa water project owned by the community. They said they owned the project and were excited by its implementation as it would change their lives positively.


min 3/2021 way forward

- All agreed that the project to continue

Confirmed by  
secretary


NAME	ID	Position	Sign
Naomi Icherono	21787272	Treasurer	

Area ch. 2f


NAME	ID	Sign	Date
PAUL KIFTAI	22441148		14/1/2021

  
CHIEF  
SECTION  
REGISTRAR  
SIGN 

# Youth FGD Attendance List



KCCAP  
Kenya Climate Smart  
Agriculture Project




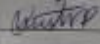






REPUBLIC OF KENYA

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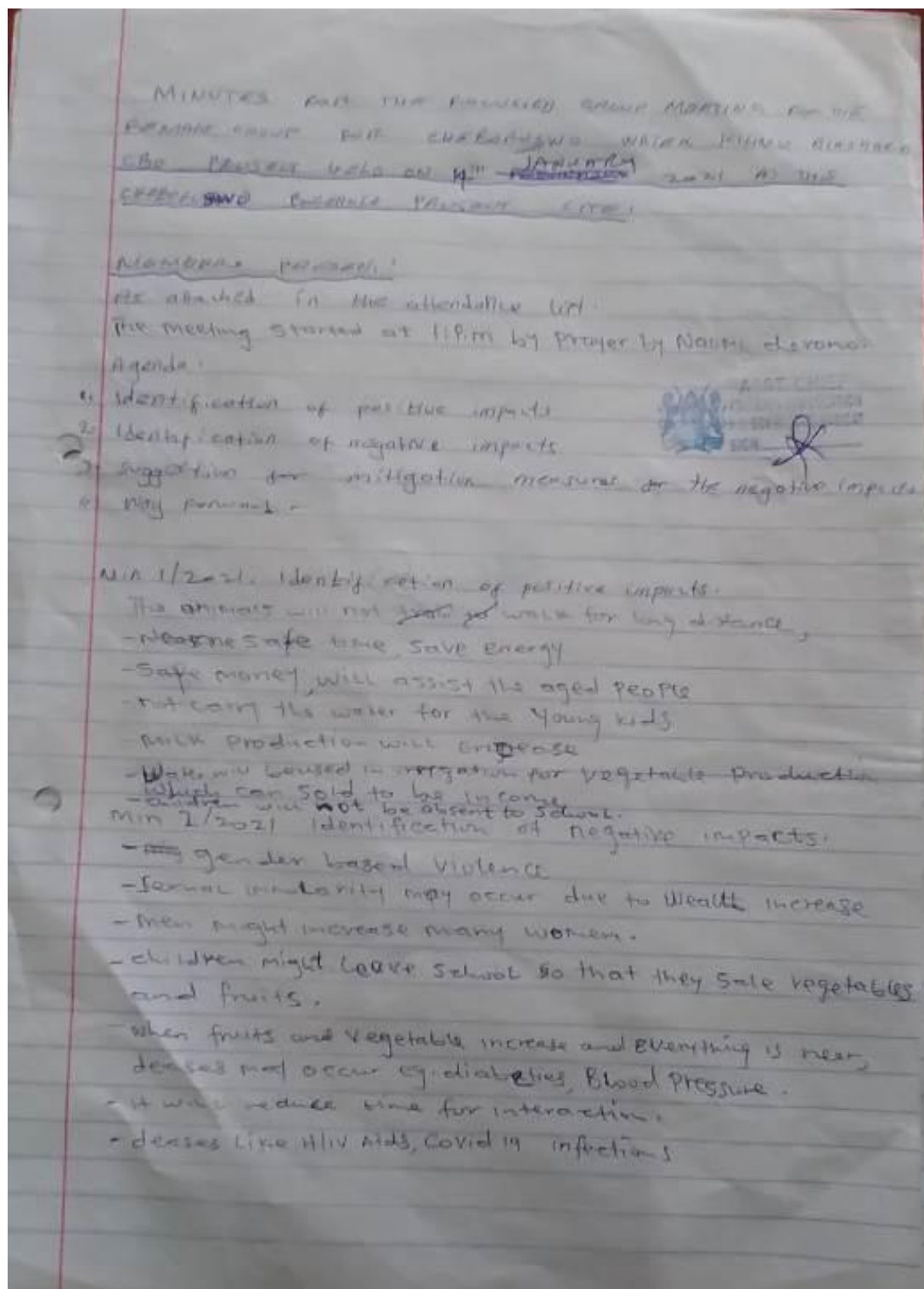
**ATTENDANCE LIST**

ACTIVITY: ESAP Public Participation for Proposed Chelamwera Brook - FGD - YOUTH

DATE: 14/01/2021 Venue: Chios ground


S/No	Name	Age (Years)		Gender		Position	Station	Phone number	Signature
		18-35	>35	Male	Female				
1	Judy Kipsang	28		F	✓		Chelamwera	0711683610	
2	Nelson K. Yator	35		M			Chelamwera	0726504866	
3	Japhet Kiprot	30		M	✓		Chelamwera	070122059	
4	Kevin Kosgei	25		M	✓		Chelamwera	0768211100	
5	Julius Kipfith	33		M	✓		Chelamwera	070332210	
6	Zachary Chelwa	32		M	✓		Chelamwera	071179694	
7	Benson Yegon Tator	40		M	✓		Chelamwera	0720431181	
8	Lawrence Kiprot	28		M	✓		Chelamwera	077781682	

**Annex 6: Women FGD: Record of Minutes and attendance**



Confirmed by:

1. Project committee

NAME	Position	signature	Date
JOHN E. YARICH	CHAIRPERSON		13/11/2022

2. Area chief



NAME	Position	signature	Date
PAUL KIPTAI	ASST. CHIEF PROTECTION SUBORDINATION P.O. BOX 11111 SIGN		13/01/021

3. PropONENT

NAME	Position	signature	Date
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# Women FGD Attendance List

**KENYA CLIMATE SMART AGRICULTURE PROJECT (KCSAP)  
BARINGO COUNTY**

**ATTENDANCE LIST**

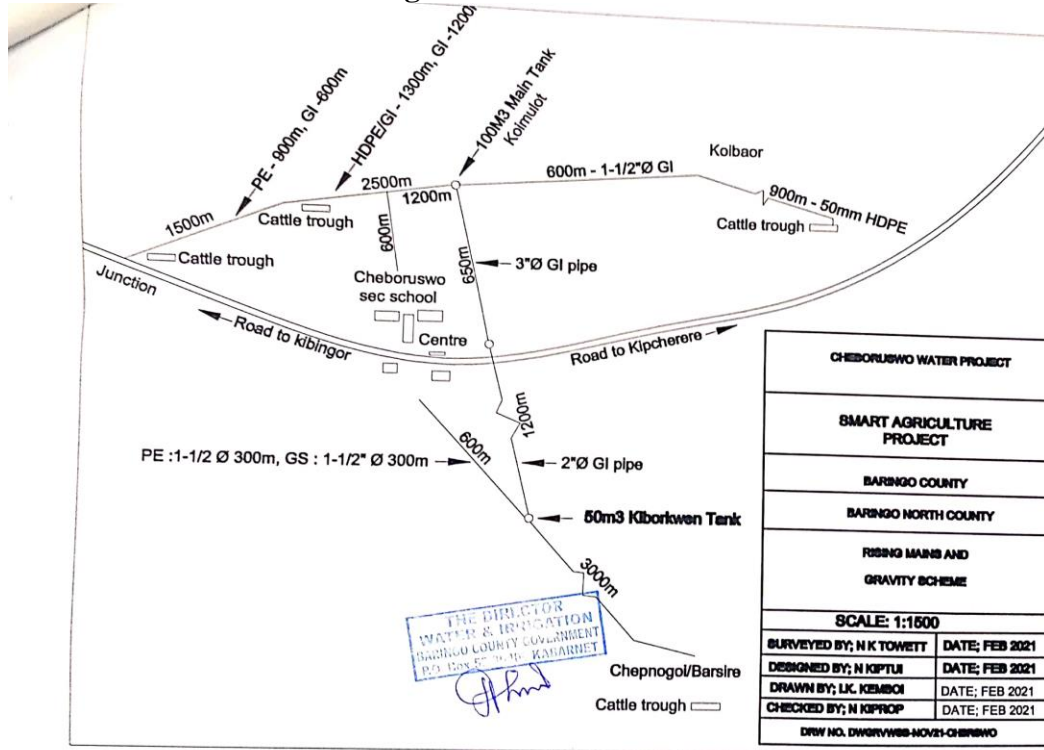
Activity: Public Participation for preparing the business Basehole Project FGD - women  
 Venue: Chwaka Council Date: 14/2/2021

	Name	AGE(years)		GENDER		Position	station	Phone number	Sign
		<35	>35	Male	Female				
1	NAOMI J. CHERONO		✓		✓	Treasurer		0723969258	<i>[Signature]</i>
2	MARGARITE KEMLEI		✓		✓	VICE chair person		0704917307	<i>[Signature]</i>
3	JANE CHESANG		✓		✓	member		0710115081	<i>[Signature]</i>
4	SARAH CHEPESORO		✓		✓	member		0702087661	<i>[Signature]</i>
5	LUCY J. CHUKOR		✓		✓	member		0703592528	<i>[Signature]</i>
6	KOBILU CHEBOSWENY		✓		✓	member		0724224572	<i>[Signature]</i>
7	SALINA KANDIE		✓		✓	member		072073746	<i>[Signature]</i>
8	ANNA YAU CHI		✓		✓	member		0710968232	<i>[Signature]</i>
9	TALAI KIPTOO		✓		✓	member		0716935008	<i>[Signature]</i>

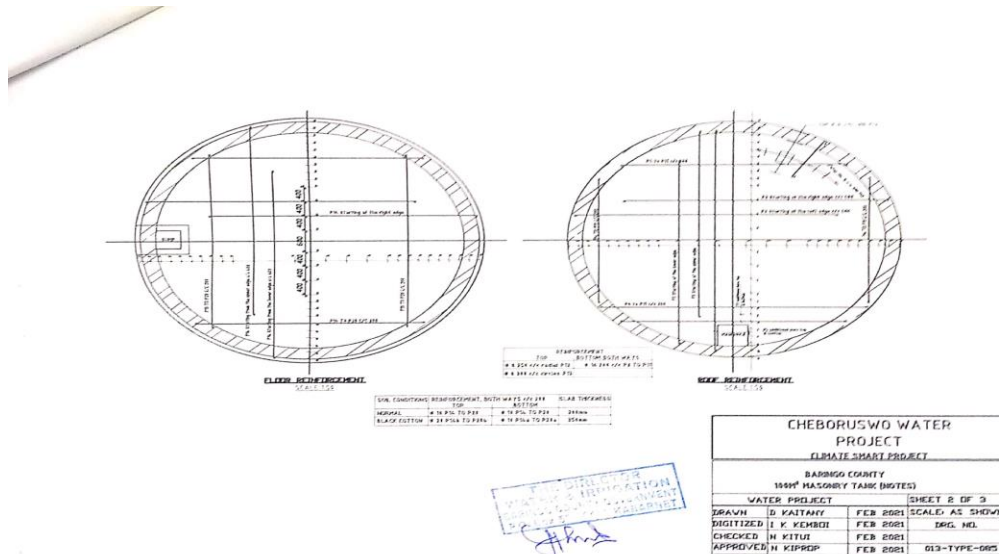
  

	Name	AGE(years)		GENDER		Position	station	Phone number	Sign
		<35	>35	Male	Female				
10	KOBILU CHESANG		✓		✓	member		0716935008	<i>[Signature]</i>
11	MARY BARKUDL		✓		✓	member		0702181134	<i>[Signature]</i>
12	SOKOME TALAM		✓		✓	member		0717269158	<i>[Signature]</i>
13	ESTHER KAITANY		✓		✓	member		0718644203	<i>[Signature]</i>
14	JARKUK CHACHA		✓		✓	member			<i>[Signature]</i>
15									
16									
17									
18									
20									
21									
22									
23									
24									
25									

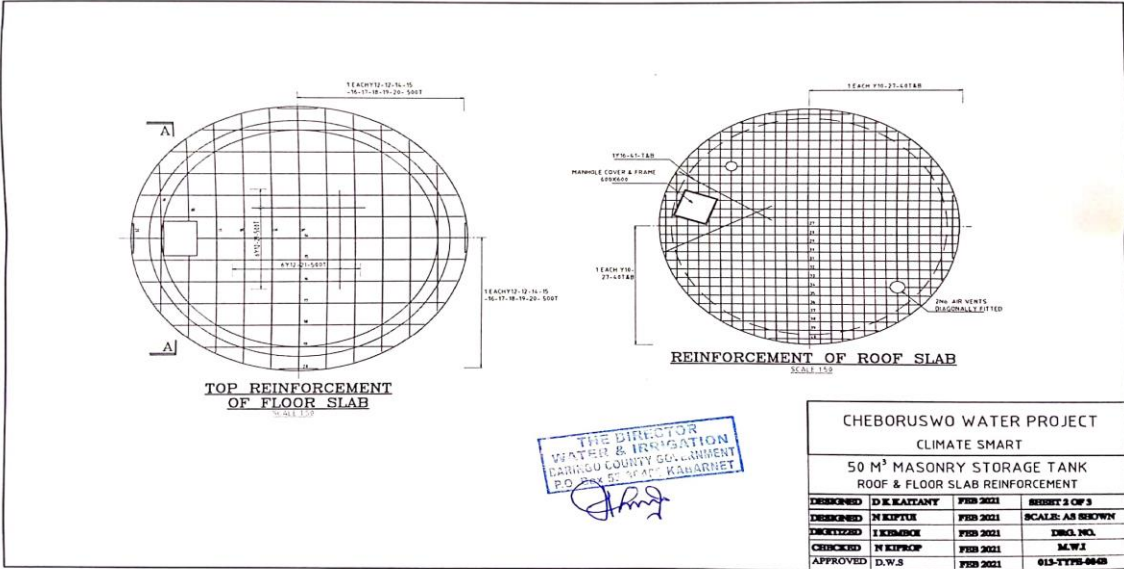
# Annex 7: Borehole Designs



## 100M<sup>3</sup> Masonry Tank



## 50M<sup>3</sup> Masonry Tank

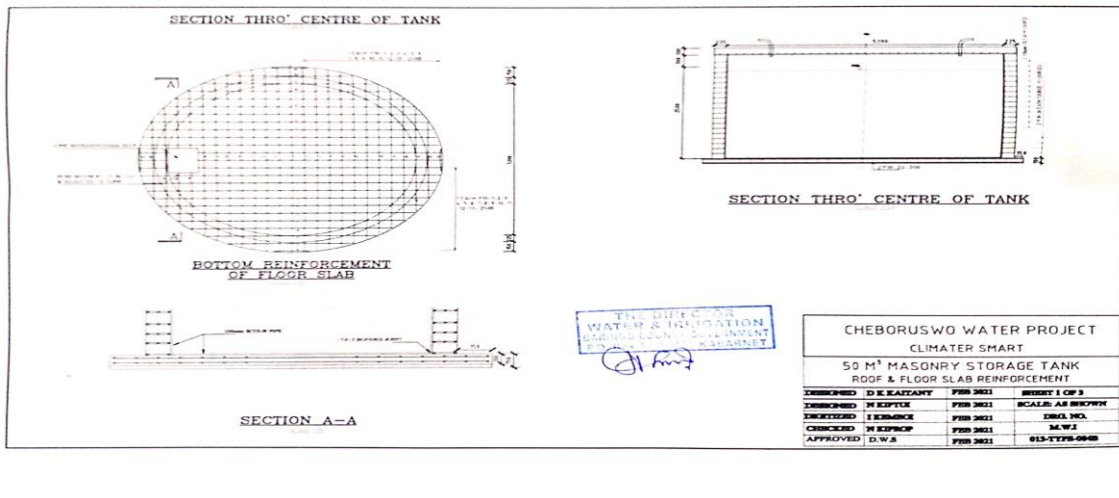


**TOP REINFORCEMENT OF FLOOR SLAB**

**REINFORCEMENT OF ROOF SLAB**

THE DIRECTOR  
 WATER & IRRIGATION  
 DAVENPORT COUNTY GOVERNMENT  
 P.O. BOX 51, DAVENPORT, IOWA

CHEBORUSWO WATER PROJECT			
CLIMATE SMART			
50 M <sup>3</sup> MASONRY STORAGE TANK			
ROOF & FLOOR SLAB REINFORCEMENT			
DESIGNED	D. K. KAITANY	FEB 2021	SHEET 2 OF 3
DESIGNED	N. KIPFUR	FEB 2021	SCALE: AS SHOWN
DRAWN	I. KIRABOK	FEB 2021	DWG. NO.
CHECKED	N. KIPFUR	FEB 2021	M.W.I.
APPROVED	D.W.S.	FEB 2021	013-TTPS-0048



50M<sup>3</sup> MASONRY (Roof and floor slab reinforcement)

50M<sup>3</sup> Masonry tank (Storage Tank Notes)

BAR BENDING SCHEDULE										
MEMBER	BAR MARK	TYPE & SIZE	NO. OF MEMBERS	NO. IN EACH	LENGTH OF EACH	SHAPE	TOTAL MYB	TOTAL MYT2	TOTAL MYT3	TOTAL MYT4
FLOOR SLAB	1	Y10	2	2	6030	4733	1206			
	2	Y10	1	4	6000	6000	24.0			
	3	Y10	1	4	5940	5940	23.76			
	4	Y10	1	4	5910	5910	23.64			
	5	Y10	1	4	5880	5880	23.52			
	6	Y10	1	4	5850	5850	23.40			
	7	Y10	1	4	5820	5820	23.28			
	8	Y10	1	4	5790	5790	23.16			
	9	Y10	1	4	5760	5760	23.04			
	10	Y10	1	4	5730	5730	22.92			
	11	Y10	1	4	5700	5700	22.80			
	12	Y10	1	4	5670	5670	22.68			
	13	Y10	1	4	5640	5640	22.56			
	14	Y12	1	4	6020	6020	24.08			
	15	Y10	1	2	7940	7940	31.76			
	16	Y12	1	4	5880	5880	23.52			
	17	Y10	1	4	5130	5130	20.52			
	18	Y12	1	4	4530	4530	18.12			
19	Y12	1	4	3630	3630	14.52				
20	Y12	1	4	3020	3020	12.08				
21	Y10	1	10	2500	2500	10.0				
22	Y10	1	2	2	1400	1400	5.6			
23	Y10	1	5	5	1700	1700	6.8			
24	Y10	1	4	5	1600	1600	6.4			
25	Y10	1	10	10	1210	1210	4.84			
26	#8	1	3640	100	4000	4000	160			
WALLS	27	Y10	1	4	5370	5370	21.48			
	28	Y10	1	8	5360	5360	21.44			
	29	Y10	1	8	5310	5310	21.24			
	30	Y10	1	8	5260	5260	21.04			
	31	Y10	1	8	5180	5180	20.72			
	32	Y10	1	8	4980	4980	19.92			
	33	Y10	1	8	4810	4810	19.24			
	34	Y10	1	8	4650	4650	18.6			
	35	Y10	1	8	4310	4310	17.24			
	36	Y10	1	8	4010	4010	16.04			
	37	Y10	1	8	3400	3400	13.6			
	38	Y10	1	8	3150	3150	12.6			
39	Y10	1	8	2940	2940	11.76				
40	Y10	1	8	2550	2550	10.2				
41	Y10	1	4	1950	1950	7.8				
TOTAL LENGTH							720	723.47	145.3	1.8
WEIGHT PER M							2.35	16.16	14.88	1.57
VOLUME TOTAL WT							262.4	145.87	12.03	12.32
TOTAL WEIGHT										874.02

**NOTES:**

**CONCRETE:**  
ALL CONCRETE CLASS 25/30. THE AGGREGATE SHOULD COMPLY WITH THE FOLLOWING STANDARDS: BS 882, BS 877, BS 682, BS 3177. MEASURE THE CHARGING CONTENT OF THE AGGREGATE, SHOULD BE CAREFULLY CONSIDERED MINIMUM CEMENT CONTENT TO BE 280KG/M<sup>3</sup> OF THE CONCRETE. IT TO BE EXPOSED TO SULPHATE ATTACK. SULPHATE RESISTING OR SUPER SULPHATE CEMENT SHOULD BE USED.

**ADDITIONALS:**  
NOT TO BE USED WITH PRIOR APPROVAL OF THE ENGINEER.

**REINFORCEMENTS:**  
SPECIFIC REFERENCE IS MADE TO BS 4449 AND BS 4447 CONCRETE NORMALLY SPECIFIED AS S40M.

**CONSTRUCTION JOINTS:**  
ONLY WHEN SHOWN OTHERWISE NOT PERMITTED.

**BUILDING LAYERS:**  
THERE IS RECOMMENDED GRADE IS NOT IF THERE ARE INJURIOUS SOILS OR EXCESSIVE GROUND WATER GRADE 25 IS RECOMMENDED. IT IS RECOMMENDED THAT THE LAST FEW INCHES OF EXCAVATION BE REMOVED BY HAND.

1. THE MASONRY WALL SHALL NOT BE CONNECTED TO EITHER THE FLOOR SLAB OR THE ROOF SLAB. THE WALL SUPPORTING AREA OF THE FLOOR SLAB AS WELL AS THE TOP OF THE WALL SHALL BE TROWEL FINISHED AND PAINTED WITH THREE COATS OF BITUMINOUS PAINT.

2. THE MASONRY WALL SHALL BE BUILT OF GOOD QUALITY LOCAL BUILDING STONES OR CONCRETE BLOCKS. THE SIZE OF THE STONES WILL BE WITHIN THE FOLLOWING:  
LENGTH: NOT LESS THAN 300MM.  
HEIGHT: NOT LESS THAN 200MM.  
THE STONES SHALL BE SOAKED IN WATER FOR 24 HOURS BEFORE BEING BUILT INTO THE WALL. PARTICULAR CARE MUST BE TAKEN TO SEAL THE JOINTS WITH FOOT AN NOT A RATIO 1:3 CEMENT TO SAND. ALL JOINTS TO BE ABOUT 20MM.

3. THE EXTERIOR SURFACE OF THE TANK SHALL RECEIVE ONE COAT OF CEMENT WASH.

4. THE INTERIOR SURFACE OF THE TANK SHALL BE PLASTERED THICKNESS OF PLASTER 20MM WITH POLYMER FIBRE. SAND TO OBTAIN A WATERPROOF PLASTERING. POLYMER CEMENT SHOULD BE ADDED.

THE DIRECTOR  
WATER & IRRIGATION  
BARINGO COUNTY GOVERNMENT  
P.O. BOX 50000 NAIROBI

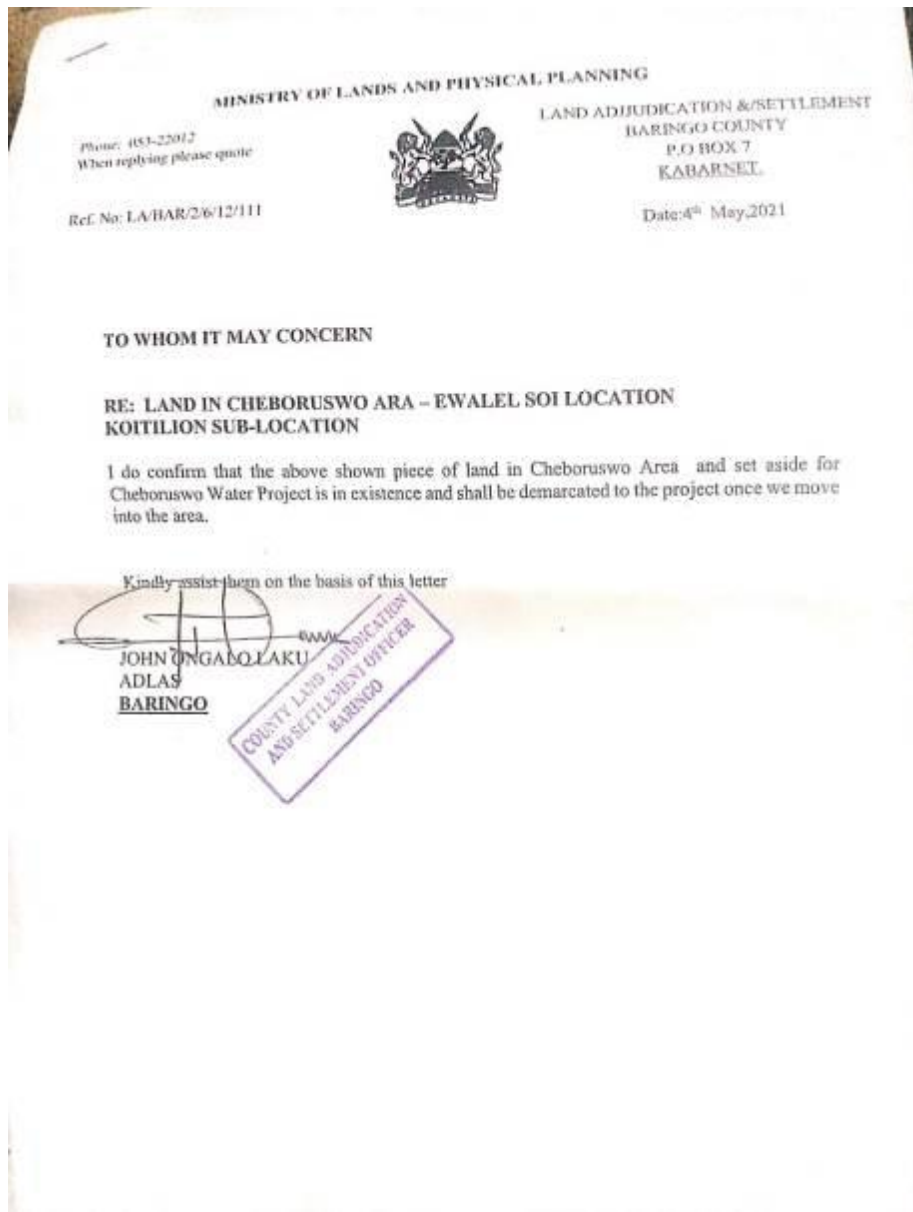
CHEBORUSWO WATER PROJECT SMART AGRICULTURE			
50 M <sup>3</sup> MASONRY STORAGE TANK (NOTES)			
DESIGNED	D. KATANY	FEB 2021	SHEET 3 OF 3
DESIGNED	N. KIPROCK	FEB 2021	SCALE: AS BROWN
CHECKED	I. KIPROCK	FEB 2021	ENCL. NO.
CHECKED	N. KIPROCK	FEB 2021	REVISED
APPROVED	D.W.S	FEB 2021	013-TYPS-08-0



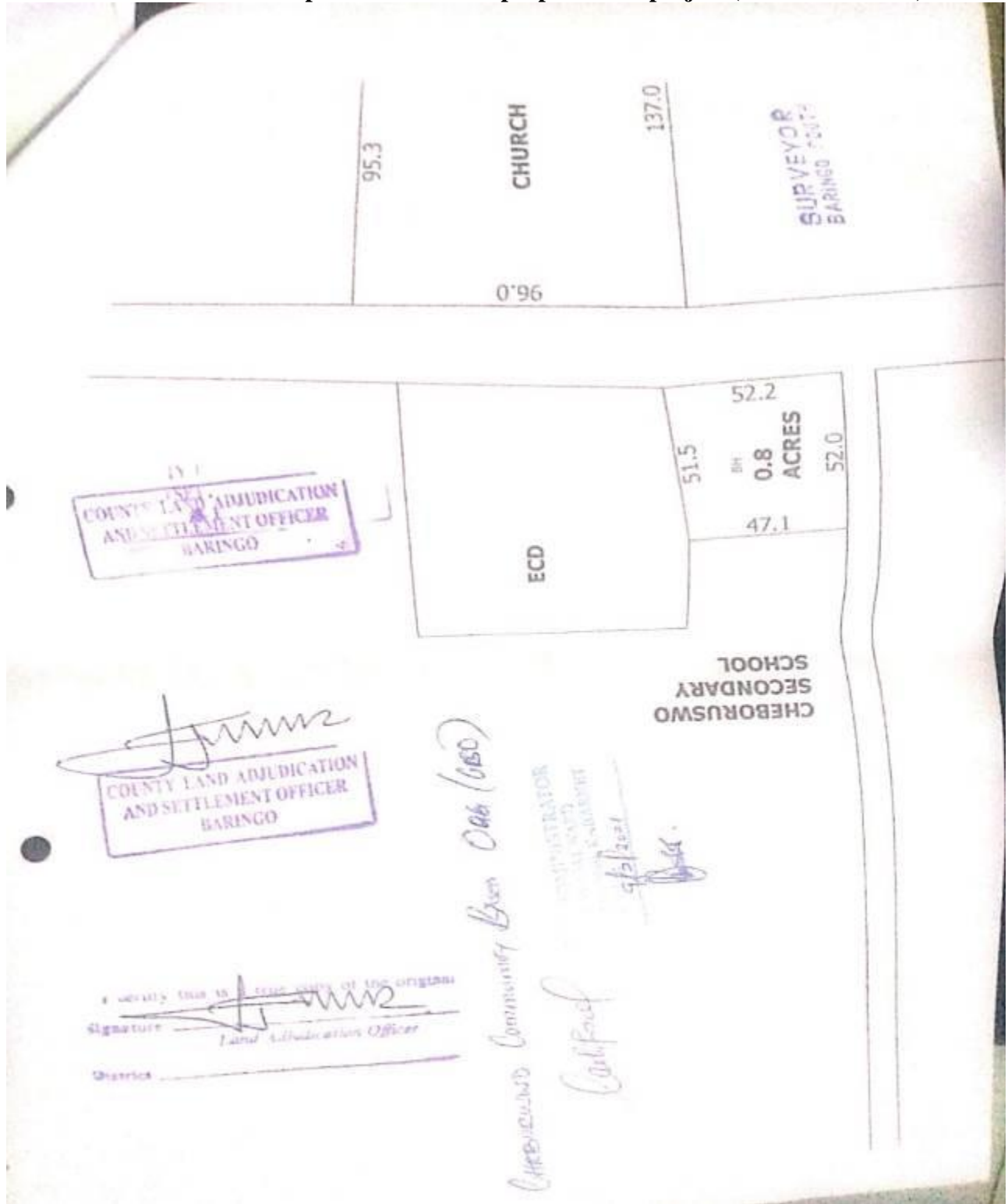
**Annex 8: Bill of Quantities for Cheboruswo BH WATER SUB-PROJECT**

	<b>SUMMARY - CHEBORUSWO BH PROPOSAL</b>				
1	PRELIMINERIES & GENERAL - BILL No.1				
2	BOREHOLE DRILLING & EQUIPPING - BILL No.2				
3	PIPE WORK - BILL No.3				
4	100m3 Masonry Tank - BILL No.4				
5	50m3 Masonry Tank - BILL No.5				
6	CATTLE TROUGHS (5No.) & COMMUNAL WATER POINTS (5No.)				
	<b>TOTAL - CHEBORUSWO BH WATER PROJECT</b>				

**Annex 9: Land Documents**



**Annex 10: Part Development Plan of the proposed sub project (Cheboruswo BH)**



## Annex 11: Chance Find Procedure

### 1. Purpose of the chance find procedure

The chance find procedure is a project-specific procedure that outlines actions required if previously unknown heritage resources, particularly archaeological resources, are encountered during project construction or operation. A Chance Find Procedure, is a process that prevents chance finds from being disturbed until an assessment by a competent specialist is made and actions consistent with the requirements are implemented.

### 2. Scope of the chance find procedure

This procedure is applicable to all activities conducted by the personnel, including contractors, that have the potential to uncover a heritage item/site. The procedure details the actions to be taken when a previously unidentified and potential heritage item/site is found during construction activities. Procedure outlines the roles and responsibilities and the response times required from both project staff, and any relevant heritage authority.

### 3. Induction/Training

All personnel, especially those working on earth movements and excavations, are to be inducted on the identification of potential heritage items/sites and the relevant actions for them with regards to this procedure during the Project induction and regular toolbox talks.

### 4. Chance find procedure

If any person discovers a physical cultural resource, such as (but not limited to) archaeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the following steps shall be taken:

1. Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained;
2. Immediately notify a foreman. The foreman will then notify the Resident/Supervising Engineer and the Environment Officer (EO)/Environmental Manager (EM);
3. Record details in Incident Report and take photos of the find;
4. Delineate the discovered site or area; secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities take over;
5. Preliminary evaluation of the findings by archaeologists. The archaeologist must make a rapid assessment of the site or find to determine its importance. Based on this assessment the appropriate strategy can be implemented. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage such as aesthetic, historic, scientific or research, social and economic values of the find;
6. Sites of minor significance (such as isolated or unclear features, and isolated finds) should be recorded immediately by the archaeologist, thus causing a minimum disruption to the work schedule

of the Contractor. The results of all archaeological work must be reported to the National Museums of Kenya (NMK), once completed.

7. In case of significant find the National Museums of Kenya (NMK) should be informed immediately and in writing within 7 days from the find.

8. The onsite archaeologist provides the NMK with photos, other information as relevant for identification and assessment of the significance of heritage items.

9. The NMK must investigate the fact within 2 weeks from the date of notification and provide response in writing.

10. Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;

11. Construction works could resume only after permission is granted from the responsible authorities.

12. In case no response received within the 2 weeks' period mentioned above, this is considered as authorization to proceed with suspended construction works.

One of the main requirements of the procedure is record keeping. All finds must be registered. Photo log, copies of communication with decision making authorities, conclusions and recommendations/guidance, implementation reports - kept.

## 5. Additional information

### Management options for archaeological site

- a) **Site avoidance.** If the boundaries of the site have been delineated attempt must be made to redesign the proposed development to avoid the site. (The fastest and most cost-effective management option)
- b) **Mitigation.** If it is not feasible to avoid the site through redesign, it will be necessary to sample it using data collection program prior to its loss. This could include surface collection and/or excavation. (The most expensive and time-consuming management option.)
- c) **Site Protection.** It may be possible to protect the site through the installation of barriers during the time of the development and/or possibly for a longer term. This could include the erection of high visibility fencing around the site or covering the site area with a geotextile and then capping it with fill. The exact prescription would be site- specific.

### Management of replicable and non-replicable heritage

Different approaches for the finds apply to replicable and non-replicable heritage.

#### Replicable heritage<sup>1</sup>

---

<sup>1</sup> Replicable cultural heritage is defined as tangible forms of cultural heritage that can themselves be moved to another location or that can be replaced by a similar structure or natural features to which the cultural values can be transferred by appropriate measures. Archaeological or historical sites may be considered replicable where the particular eras and cultural values they represent are well represented by other sites and/or structures.

Where tangible cultural heritage that is replicable and not critical is encountered, mitigation measures will be applied. The mitigation hierarchy is as follows:

- a) Avoidance;
- b) Minimization of adverse impacts and implementation of restoration measures, in situ;
- c) Restoration of the functionality of the cultural heritage, in a different location;
- d) Permanent removal of historical and archaeological artefacts and structures;
- e) Compensation of loss - where minimization of adverse impacts and restoration not feasible.

**Non-replicable heritage<sup>2</sup>**

Most cultural heritage is best protected by in situ preservation, since removal is likely to result in irreparable damage or even destruction of the cultural heritage. Nonreplicable cultural heritage must not be removed unless all of the following conditions are met:

- a) There are no technically or financially feasible alternatives to removal;
- b) The overall benefits of the project conclusively outweigh the anticipated cultural heritage loss from removal; and
- c) Any removal of cultural heritage must be conducted using the best available technique advised by relevant authority and supervised by archaeologist.

**Human Remains Management Options**

The handling of human remains believed to be archaeological in nature requires communication according to the same procedure described above. There are two possible courses of action:

- a) **Avoid.** The development project is redesigned to completely avoid the found remains. An assessment should be made as to whether the remains may be affected by residual or accumulative impacts associated with the development, and properly addressed by a comprehensive management plan.
- b) **Exhume.** Exhumation of the remains in a manner considered appropriate by decision makers. This will involve the predetermination of a site suitable for the reburial of the remains. Certain ceremonies or procedures may need to be followed before development activities can recommence in the area of the discovery.

---

<sup>2</sup> Nonreplicable cultural heritage may relate to the social, economic, cultural, environmental, and climatic conditions of past peoples, their evolving ecologies, adaptive strategies, and early forms of environmental management, where the (i) cultural heritage is unique or relatively unique for the period it represents, or (ii) cultural heritage is unique or relatively unique in linking several periods in the same site. Examples of non-replicable cultural heritage may include an ancient city or temple, or a site unique in the period that it represents.

## Annex 12: Selected Field Photos



**Photo 1: Participants indicating by show of hands they have No Objection to proposed sub project implementation.**



**Photo 2: Women in the foreground respond to the no objection. Culturally women sit aside from men in meetings.**



**Photo 1: Men FGD in progress**



**Photo 2: Women FGD in Progress**



**Photo 4: Youth FGD Participants discussing on the project**



**Photo 3: Stakeholders holding consultations at the sub project site**

Annex 13: ESIA Practicing License

FORM 7

(r.15(2))



**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)  
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT  
ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE**

License No : NEMA/EIA/ERPL/15469

Application Reference No: NEMA/EIA/EL/20485

M/S **Joel Sumukwo**  
(individual or firm) of address  
P.O Box 400 - 30300 Kapsabet

is licensed to practice in the  
capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**  
registration number **11829**

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

Issued Date: **6/16/2021**

Expiry Date: **12/31/2021**

Signature.....

(Seal)

**Director General  
The National Environment Management  
Authority**

P.T.O.



ISO 9001: 2015 Certified

**Annex 14: HYDROGEOLOGICAL SURVEY REPORT**

**HYDROGEOLOGICAL SURVEY REPORT**

**CLIENT: BARINGO COUNTY GOVERNMENT. PROJECT:**

**PUBLIC**

**LOCALITY: CHEBARUSWO AREA, SAIMO SOI WARD GPS POSITION: 36N, 819645,  
59820, Alt. 1285m  
BARINGO COUNTY**

*Compiled by;*  
**ENOCH K. KIPSEBA, JUDITH J.  
KOTUT  
MGSK, R. Geologists, P.O. BOX  
30009-00100  
NAIROBI.**

*Reviewed and edited by;*  
**DIXON KIPTANUI  
Registered Hydrogeologist:  
WD/WRP/269  
P.O. BOX 16097 – 00610 NAIROBI**

**March 2019**

**DATE.....SIGNED.....**

## SUMMARY

The present report describes the results of borehole site investigations at Chebaruswo area. The borehole water is intended to be used for community purposes. The water demand is estimated to be 20 m<sup>3</sup>/day.

The area is situated in a zone with moderate groundwater potential. The study concludes that on the basis of geological evidence, groundwater prospects for intended purposes are tenable.

The site is underlain by volcanic rocks. In this area the volcanic rocks comprise mainly the trachyte and volcanic lapilli, tuffs, blocks and bombs.

The hydrogeological conditions are considered to be determined by geological structures, namely faults that run North – South. The faulted and folded troughs form good aquifers. The proposed borehole should be drilled to a depth of not less than 190m, to a maximum of 210 m bgl. A sustainable yield of approximately 6m<sup>3</sup>/hr is expected.

The water quality of the proposed borehole is expected to be chemically and bacteriologically satisfactory except for fluoride content that is exceptionally high in this area. The water could also be relatively warm due to geothermal activities within the vicinity of this area.

Recommendations are given for borehole construction and completion methods. The importance of correct and comprehensive techniques in this particular aspect seldom receives the attention it deserves.

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Regional Geology	6
Structures	8
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# INTRODUCTION

## Location

The project area of study is located at Chebaruswo Secondary School. It is about 6.2 kilometers to the south east of Kipcherere market. It can be accessed through Kamung’ei – Kipcherere road, which branches from the main Marigat – Kabarnet tarmac road at HZ. The site lies within the 1:50,000 Survey of Kenya topographic Sheet for Saimo (No. 90/4). Approximate location in Marcator scale is UTM 36N 819645, 0059820 at an average elevation of 1285 metres above sea level. See the figure below.

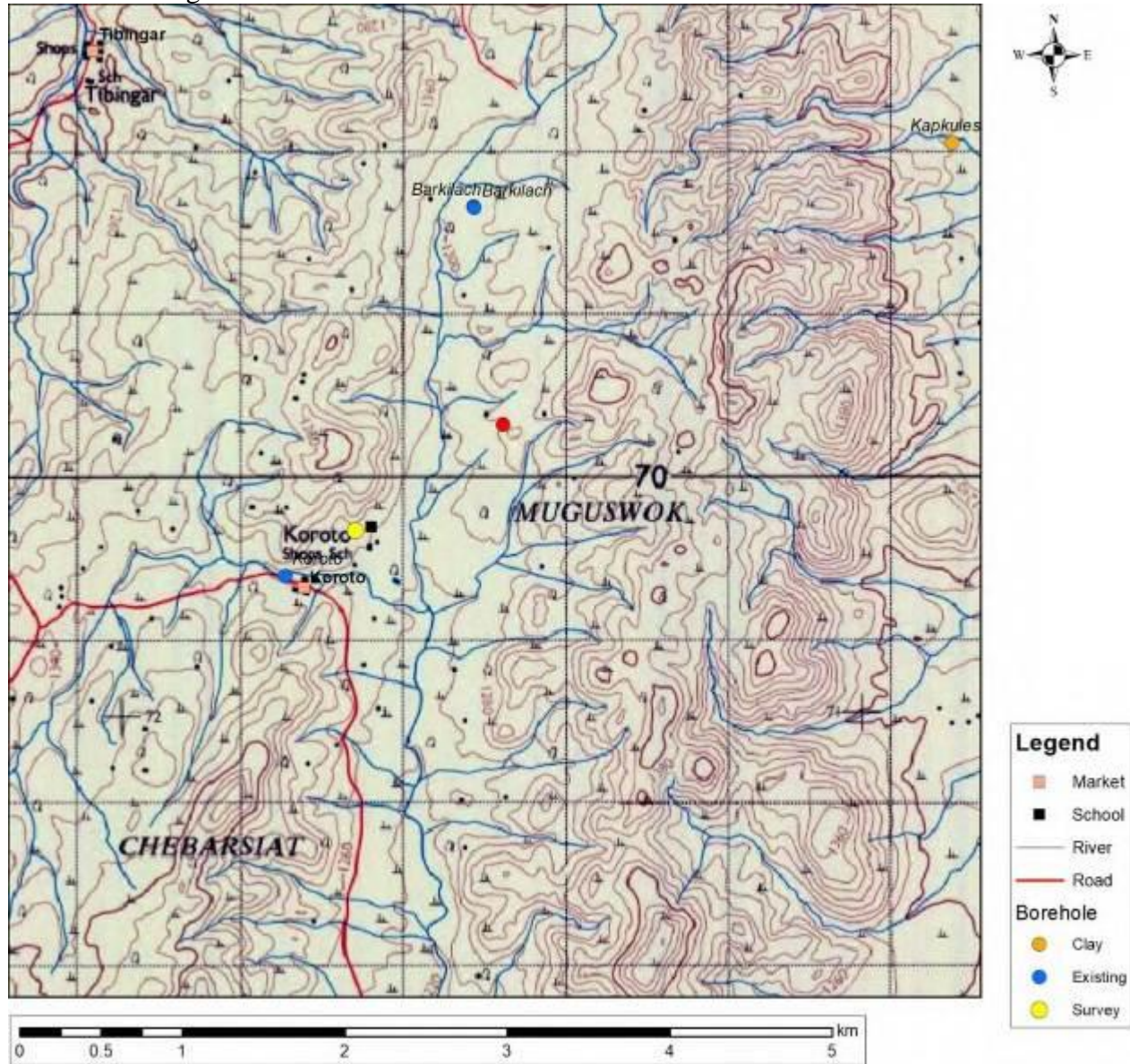


Figure 1. Map extract showing the location of the borehole survey sites

## Physiography

The study site is within the hilly terrain between the Tugen Hills and Lake Baringo. This is composed of mainly hilly N-S trending ridges. The river valleys in the area are characterized by alluvial sediments. The hilly ranges are to the west of the sited points with the sediments covering the eastern lower parts. The hilly ranges are up to 2000m absl. The ridges, like the escarpment is deeply incised by water courses.

#### Details of Climate

Rainfall over the greater part of Baringo is moderate. It is inclined to very local with irregular periods of precipitation. Generally the wettest month is April and October but heavy rains may fall during many other months.

The climate is generally dry. The rainfall is about 800 mm a year. The mean annual temperature is about 24°C while the maximum temperature is about 30°C. Due to the high temperatures, the mean annual evaporation is relatively high, approximately 1000 mm.

#### Drainage

The area situated at the eastern side of the Koroto ridge that divides drainage in two directions. Drainage at the area is eastwards down the ridge, draining into the main river which flows southwards through Chebarsiat into River Kathiorin.

#### Water Supply and demand

This area has no public water supply system. Piped water is not available to residents here and its immediate surroundings. The community in the area rely on shallow hand dug wells, seasonal streams and roof catchment. These sources are in long term economics not viable as they are much dependent upon weather conditions. In regard to the above logical demerits, our client seeks to find permanent solution to getting sustainable, economically viable resource which can only be achieved by drilling a borehole.

Total population is estimated to be 3,000. Assuming each person uses 100 litres of water per day for domestic. It will mathematically translate to 30,000 litres per day. Considering that only 60% will be abstracted, the borehole should yield on average 3,000 litres per hour to sustainably serve the community.

## DETAILS OF GEOLOGY AND STRUCTURES

### Regional Geology

#### *The Mozambiquan Rocks*

The oldest rocks in the area are the Mozambiquan rocks, found at the foot of the eastern escarpment of the Tugen hills. The rocks are of the Archaean Age. The exposures comprise quartzo-feldspathic gneisses (Xhh) and hornblende gneisses (Xgg).

#### *The Tertiary Volcanics*

The Tertiary volcanics is composed of phonolites and other volcanic rocks, which are common all over the area. They are observed at the eastern escarpment of the Tugen Hills, rising from near the base to the top of the hills, with a total thickness of up to 1300m.

The oldest among the Tertiary volcanics are the Sidekh phonolites (b1). They contain thin bands of sediments which include Chepkurno grits/ breccia, Tinerinyer beds, and Aiemo shales and marls.

The Sidekh phonolites are overlain by the Noroyan (b2a) and Saimo (b2b) Formations. These comprise tephrites and basanites.

They are overlain by the Tiim phonolites (b3). The Tiim phonolites have thin intercalations of sediments known as Muruyur beds (b3b), which comprise tuffs, shales and sandstone. The phonolites cover a greater part of the Tugen Hills from Kituro to Bartabwa.

Overlying the Tiim phonolites are sediments of the Ngorora Formation (b4). They comprise tuffs, shales, sandstone and conglomerates.

These are followed by the Ewalel phonolites (b5). These phonolites are spread wide on hills from Barsemoi through the Tugen hills to Keturwo and Bartabwa areas. The Ewalel phonolites also have thin beds of sediments within it.

The Kabarnet trachytes (c2) overlie the Ewalel phonolites. The trachytes cover almost 50% of the area marked by the top of the Tugen Hills ridge, westwards to the sediments of the Kerio Valley beds. Some exposures of the trachyte are seen in the area as exposed by faulting. On top of the Kabarnet trachytes are sediments of the Riwo beds (c2b) and Lukeino Member (c3a).

Kaparaina basalts (c3) overlie the Kabarnet trachytes. The basalts are of Pliocene age. They cover a wide area including the survey site. These rocks extend northwards from Kibingor area to Chemolingot. The basalts have small intercalations of agglomerates and trachytes. They are also intruded by numerous dolerite dykes that are aligned in a north – south direction between Chebarsiat and Chepkewel areas.

#### *Recent Volcanics and Sediments*

On the Kaparaina basalts are the sediments of the Chemeron Formation (d2). These are composed of silts, diatomites, tuffs and basal grits. They are found to the west of the area, having been deposited into the downthrow side of the eastern Tugen hills escarpment. Some of the deposits are also found covering the basalt around Kapkules area and smaller portions towards Arusin area.

On top of the Chemeron Formation and marking the end of the Pliocene rocks is the Chemakilani Formation (e1). It is composed of basalts, trachytes and mugearites. It also has some small intercalated sediments within it.

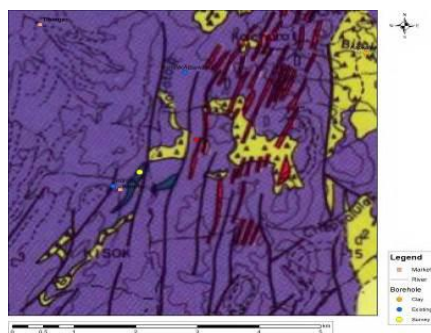
There is an unconformity, which marks the start of the Pleistocene age rocks. On the Chemeron Formation lies the Lake Baringo and the Loyamarok trachytes. They occupy the Kampi Ya Samaki and the area to the north west of Loruk respectively.

Overlying the trachytes are silts, earths and gravels of the Kapthurin Formation (e4). These are found at the lowlands that graduate into the Lake Baringo basin from Marigat to Chebarsiat areas.

The youngest formations are the alluvium of Lake Baringo, covering the entire area around Lake Baringo. These are of Recent age.

#### **Structures**

Faulting common in the area, with the faultlines being the main influencing factor of the topography of the area. The faults have a N – S direction, which explains the reason for the N – S drainage pattern



Faulting common in the area, with the nearest faultline passing 90m to the east of the site.

Geology of the project area.

The project area is on south western side of Barsemoi hill. It lies on the Kaparaina basalts. The area is highly faulted with faults running in a general N-S direction.

## HYDROGEOLOGY AND WATER RESOURCES.

Water Supply and demand

This area has no public water supply system. Piped water is not available to residents here and its immediate surroundings. The community in the area rely on seasonal streams and roof catchment. These sources are not sustainable since they are much dependent upon weather conditions. In regard to the above, our client seeks to find permanent solution to getting sustainable, economically viable resource which can only be achieved by drilling a borehole.

Total population is estimated to be 2,000. Assuming each person uses 100 litres of water per day for domestic. It will mathematically translate to 20,000 litres per day. Considering that only 60% will be abstracted, the borehole should yield on average 2,000 litres per hour to sustainably serve the community.

Hydrogeology and Water Resources.

Storage, porosity and permeability form the most important parameters in groundwater discharge and recharge. The suitability of volcanic and Basement rocks material as aquifers will depend very much on weathering, formation characteristics (cracks, joints or vesicles) and actual rock properties.

Fresh volcanic rocks are not favourable as aquifers since they are not particularly permeable. In volcanic terrain, however, groundwater can occur in fissured/fractured zones, weathered layers and also in the Old Land Surface deposits interbedded between the different lava flows.

The regional groundwater aquifer system in the area is interconnected through a network of fissures and porous material which partly composes the sediments and pyroclastics. This system is mainly recharged in the higher areas to the south where rainfall is higher and water enters through permeable sediments lava beds.

The water which enters the permeable parts of the series must either escape at the surface, or sink downwards through the underlying rocks to the water table and therefore flow, according to the pressure gradient, within the regional groundwater system. Much of the water is retained within the sediments. The water table is unlikely to be far below the level of the principal water courses and as the relief is low.

## AQUIFER CHARACTERISTICS AND ANALYSIS.

Borehole Specific Capacities(S.), Transmissivities (T) and Specific Yields/ Storage Coefficients.

The borehole specific capacities have been calculated based on the formula  $S=Q/s$  (Driscoll, 1986) where Q is the yield during test pumping and s is the drawdown i.e. PWL-SWL. Transmissivity on the other hand is calculated using the formula  $T=0.183Q/s$ . However this formula is applicable where borehole test data is available in log scale.

The available data from the Ministry of Water and Irrigation provides data in summarized form and thus the formula is of little application. It is possible to estimate the transmissivity using the Logan's formula (Logan, 1964) i.e.  $T=1.22Q/s$ . A demerit of this is overestimation of the transmissivity; nevertheless it gives fair indication of the same.

### Specific Yields and or Storage Coefficients

Specific Yield is the ratio of volume of water that drains from saturated material to that of the total material. Specific Retention on the other hand is the ratio of volume of water that does not drain from a material under gravity.

The amount of water stored in the subsurface is a function of the porosity. Specific storage  $S_s$  is related to storage coefficient as  $S = S_s b$  where  $S_s$  is the volume of water an aquifer releases or uptakes per unit volume of an aquifer per unit change of head. It is also known as the elastic storage coefficient and can be calculated as follows

$$S_s = \rho_w g (\epsilon + n\beta)$$

Where  $\rho_w$  is the density of water

$g$  is the constant for the acceleration of gravity

$\epsilon$  is compressibility of the aquifer skeleton

$n$  is the porosity

$\beta$  is compressibility of the water

Due to lack of aquifer tests, specific yields/ storage coefficients of the boreholes in the study area are difficult to derive. The study thus relied on specific yields of various geologic materials as given by Driscoll 1986.

*Table 1 Specific Yields of various geologic materials*

<i>Geological Material</i>	<i>Specific Yield, %</i>
Clay	1 - 10
Sand	10 - 30
Gravel	15 - 30
Sand and Gravel	15 - 25
Sandstone	5 - 15
Shale	0.5 - 5

Limestone	0.5 - 5
-----------	---------

The main aquifer of target in the study area consists of sediments. The specific yield of this aquifer material according to the above table falls within 15 – 25% range.

#### Hydraulic Conductivity and Groundwater Flux

Hydraulic Conductivity is defined as the volume of water at the existing kinematic viscosity that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow (if homogeneous and isotropic).

To date, the above aspects can only be accurately be determined by time consuming and expensive methods like pumping or sampling, isotope methods and laboratory investigations. The results are confined to few locations and they depend on the scale of investigation method applied. Measurements of rock samples in the laboratory can differ significantly from borehole test results. Lack of data at the Ministry of Water and Irrigation complicates the whole situation further.

However hydraulic conductivity can be derived using the formula  $T = kD$  when re arranged,  $k = T/D$ , where  $k$  is the hydraulic conductivity,  $T$  is the transmissivity and  $D$  is the aquifer thickness. A drawback to this estimation in this case however is the cumulative aquifer thickness which is recorded at the strike point rather than as an interval. For the sake of calculations, the aquifer thickness is assumed to 20 m.

On the other hand, groundwater flux can be estimated using Darcy's formula of  $Q = T.I.W$ , where  $T$  is the transmissivity of the borehole,  $l$  is the gradient and  $W$  the width. From the above formula  $i$  is the hydrostatic head difference calculated between boreholes and the distance between the two boreholes.

#### GEOPHYSICAL INVESTIGATIONS METHODS.

A great variety of geophysical methods are available to assist in the assessment of geological subsurface conditions. In the present survey resistivity (geo-electrical) in the VES and HEP modes have been used. Resistivity measurements were thus carried out in form of profiles (Wenner array) and vertical electrical soundings (Schlumberger array).

#### Resistivity Method: Basic Principles

The electrical properties of rocks in the upper part of the earth's crust are dependent upon the lithology, porosity, and the degree of pore space saturation and the salinity of the pore water. Saturated rocks have upper resistivities than unsaturated and dry rocks. The higher the porosity of the saturated rock, the upper its resistivity, and the higher the salinity of the saturating fluids, the upper the resistivity. The presence of clays and conductive minerals also reduces the resistivity of the rock.

The resistivity of the earth materials can be studied by measuring the electrical potential distribution produced at the earth's surface by an electric current that is passed through the earth.

The resistance  $R$  of a certain material is directly proportional to its length  $L$  and cross-sectional area  $A$ , expressed as:

$$R = \rho * L.A \quad (1)$$

Where  $\rho$  is known as the specific resistivity, characteristic of the material and independent of its shape or size. With Ohm's Law;

$$R = \Delta V / I \quad (2)$$

Where  $\Delta V$  is the potential difference across the resistor and  $I$  is the electric current through the resistor, the specific resistivity may be determined by:

$$\rho = (A/L) \Delta V / I \quad (3)$$

### Resistivity Sounding Method

When carrying out a resistivity sounding, also called vertical electrical sounding (VES), an electric current ( $I$ ) is passed into the ground through two metal pegs, the current electrodes. Subsurface variations in electrical conductivity determine the pattern of current flow in the ground and thus the distribution of electrical potential.

A measure of this is obtained in terms of the voltage drop ( $\Delta V$ ) between a second pair of metal pegs and the potential electrodes placed near the center of the array. The ratio ( $V/I$ ) provides a direct measurement of the ground resistance and from this and the electrode spacing, the apparent resistivity ( $\rho$ ) of the ground is calculated.

A series of measurements made with an expanding array of current electrodes (Schlumberger Array), allows the flow of current to penetrate greater depths, providing information on the vertical variation in resistivity. The calculated apparent resistivity is plotted against current electrode half separation on a bi- logarithmic graph paper to constitute the so-called sounding curve. The curve depicts a layered earth model composed of individual layers of specific thickness and resistivity.

Interpretation of the sounding curve is based upon the convolution method of Ghosh, (1971) a mathematical curve-fitting procedure. Without additional data for correlation it can easily lead to a fitting solution that does not quite correspond to reality.

The layered earth model is actually very much a simplification of the many different layers, which may be present. The various equivalent solutions which can be generated a single resistivity sounding should never be interpreted in isolation as this leads to a meaningless result.

### Horizontal Electric (HEP) Method

The horizontal electric profile method is one of a supplement group of geophysical exploration methods that make use of constant probe depth to reveal fracture zones located beneath the surface. For the present survey, the HEP method in the Werner configuration has not been used. Where applied the electrode spacing controls both the profiling depth and the resolution of the survey. The

observed resistivity values are plotted on logarithmic paper and the graph obtained depicts lateral resistivity variation at constant depth.

Geological structures such as faults, fractures, buried stream channels that may conduct groundwater, can be inferred.

**The Combined Werner/VES Method**

The combined Werner/VES method locates suitable groundwater zones by making use of the resistivity contrast, which exists between fresh unproductive rocks and water bearing zones. The resistivity of fresh basement exceeds 1880 Ω-m, whereas that of water-bearing zones is upper, being dependent upon the degree of weathering and the groundwater quality. The method exploits the different operating characteristics of two methodologies.

First HEP configuration is used to carry out a conductivity traverse across the area of interest. In most cases, two parallel profiles are run, in order to assess the significance and the direction of the observed anomalies. Vertical Electrical Soundings are then carried out at the most promising locations on the Wenner profiles, using an ABEM SAS 1000 Terrameter. The VES is used to assess the nature of the feature, because a variety of sub-surface conditions can give rise to similar profiling data.

In addition, the VES is used to predict the thickness of different layers and depth to the aquifer.

By combining VES, and the resistivity profiling, a ground resistivity model can be obtained which best fits both sets of data. The joint computer interpretation helps to reduce the ambiguity caused by equivalence

**SITE INVESTIGATION**

**Fieldwork**

Fieldwork was conducted on Sunday 22<sup>nd</sup> March 2019, which comprised reconnaissance and geomorphological assessment.

Two Vertical Electrical Soundings (VES) were carried out. A Garmin Global Positioning device was used to obtain accurate coordinates of the VES location.

The geophysical investigations were mainly aimed at the determination of the following parameters

Thickness of tertiary deposits

Vertical extent of the waterbody

Depth of weathered zones.

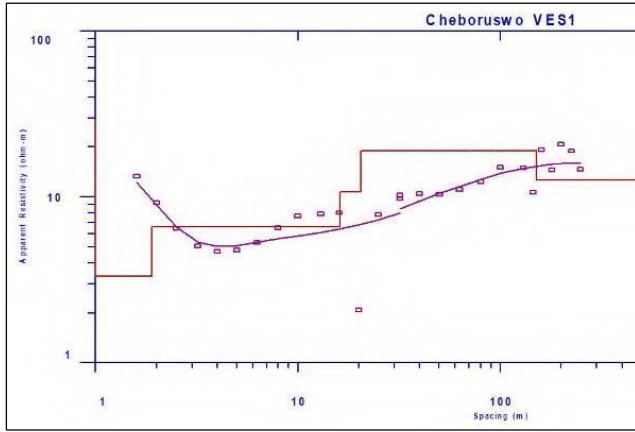
**Resistivity Soundings (VES)**

*Field Data*

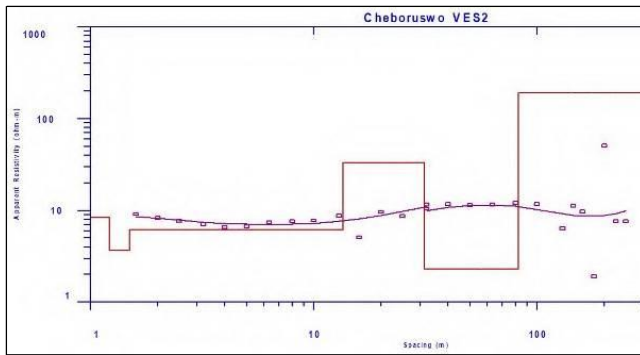
AB/2	MN	Apparent resistivity VES1	Apparent resistivity VES2
1.60	0.50	13.35	9.11

2.00	0.50	9.23	8.30
2.50	0.50	6.47	7.71
3.20	0.50	5.07	7.10
4.00	0.50	4.68	6.59
5.00	0.50	4.79	6.70
6.30	0.50	5.30	7.34
8.00	0.50	6.51	7.57
10.00	0.50	7.70	7.76
13.00	0.50	7.89	8.78
16.00	0.50	8.02	5.09
20.00	0.50	2.08	9.65
25.00	0.50	7.80	8.66
32.00	0.50	9.74	11.52
32.00	10.00	10.29	10.36
40.00	10.00	10.44	11.71
50.00	10.00	10.36	11.37
63.00	10.00	11.12	11.54
80.00	10.00	12.31	12.14
100.00	10.00	15.06	11.72
130.00	10.00	14.93	6.40
145.00	10.00	10.67	11.23
160.00	10.00	19.17	9.70
180.00	10.00	14.54	1.91
200.00	10.00	20.86	50.53
225.00	10.00	18.96	7.63
250.00	10.00	14.64	7.62

# Analysis VES 1



# VES 2



### Interpretation

VES 1 displays a better model with higher chances of striking water.

<i>Depth (m)</i>	<i>Resistivity (Ω)</i>	<i>Formation</i>	<i>Remarks</i>
0.00 – 0.7	29.30	Top soils	dry
0.7 – 1.9	3.31	Superficial deposits	moist
1.9–16.1	6.59	Weathered fragmented basalt with some clay	moist
16.1 – 20.5	10.76	Slightly weathered basalt	moist
20.5 – 151.5	19.02	Fresh basalt with intercalated sediments	Dry but wet where there sediments and fractures
151.5-<	12.63	Fractured trachyte with sediments	Wet at boundary and fractures

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

The wide range of Hydro geological information assembled through the conduct of this assessment – combined with the geophysical investigations points to good groundwater potential. At moderated pumping capacities of 5 m<sup>3</sup>/hr will conform to the estimated water demand of 20.0 m<sup>3</sup>/day in a controlled pumping regime.

The aquifer potential and groundwater system within Chebaruswo area can be considered as medium. The existence of a perched aquifer helps to promote the accumulated yield overall.

The Borehole waters associated with the volcanic aquifer system will rarely cause sodium/calcium imbalance in the soils when applied to soils structures and thus cannot infringe on the NEMA standards in application.

There are no known or established parameters of aquifer deterioration or depletion within boreholes systems located in this area. Hydrology of streams have been affected lately due to destruction of forest and human encroachment. Government efforts to reclaim and conserve this water tower is highly appreciated and has worldwide support.

### Recommendations

From the assembled data, interpretation and conclusions, it is in order to recommend drilling of one productive borehole to minimum depth of 190m and a maximum depth of 210m bgl. The amount of water struck at 150m will determine whether further drilling is required to the next aquifer at 190m.

The selected site coordinates is UTM 36N 819645, 59820 at an elevation of 1285m

The borehole should be drilled to a minimum diameter of 8” or 203 mm and lined with 6” or 152 mm casings and screens.

Proper development should be carried out by airlift immediately after installation of casing, screens and gravel pack into the borehole accordingly.

Further recommendations on borehole construction and completion characteristics are in appendix III.

An Environmental Impact Assessment should be conducted in accordance with the EMCA Act 1999 and the Water Act 2002.

It is anticipated that the borehole yields 10,000 litres per hour.

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Annex 15: CBO registration certificate.

Certificate No. 62272

  
Republic of Kenya

**MINISTRY OF EAST AFRICA COMMUNITY, LABOUR AND SOCIAL PROTECTION**  
**DEPARTMENT OF SOCIAL DEVELOPMENT**

**Certificate of Registration of Community Based Organization (CBO)**

This is to Certify that

CHEBORUSWO COMMUNITY BASED ORGANIZATION  
Group Name / Project

<u>DKSD/MGT/CBO/024</u> <small>Registration No.</small>	<u>MARIGAT</u> <small>Division</small>	<u>9TH OCTOBER, 2019</u> <small>Date of Registration</small>
<u>KOFULLION/MARIGAT</u> <small>Sub-location / Ward</small>	<u>BARINGO SOUTH</u> <small>Constituency</small>	<u>MARIGAT</u> <small>Sub County</small>
<u>EWALIL SOI</u> <small>Location</small>	<b>is registered with the Department of Social Development Office as a Community Based Organization (CBO)</b>	
Name <u>ERIC KIPYATOR</u> <small>County / Sub County Social Development Officer</small>		<u>BARINGO</u> <small>County</small>
<u>9TH OCTOBER, 2019</u> <small>Date of Issue</small>		Signature 

Note: The Content of this Certificate should not be erased, altered or defaced in any way.

KENYA 2030

# Annex 16: WRA permits

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



Form: WRA 004  
Catchment: Rift Valley  
WRMA ID: (ASSIGNED AT RO)  
File: WRMA/20/KAB/2EE/10896/G

## Water Resources Authority AUTHORISATION TO CONSTRUCT WORKS FOR THE USE OF WATER

Dear Sir/Madam;

Rule (33)

I have the honour to inform you that the Water Resources Authority has given you approval to construct the proposed works based on your application dated **01-March-2021** for a Water Permit.

Authorization No. WRMA	WRMA/20/KAB/2EE/10896/G				Dated	30-March-2021		
Type Of Water use	Surface water				GroundWater		Effluent discharge	Swamp Drainage
	Diversion	Abstraction	In-stream Works	Storage	Shallow Well	BoreHole		
Tick Box						X		

PARTICULARS OF APPLICANT		DETAILS	
1. Full name of applicant(s) (In Block letters)		CHEBORUSWO COMMUNITY BASED ORGANIZATION	
3. Category of Applicant - Individual, Group [Association, Society], Company, Institution		Group[Association,Society]	
4. ID Number of Applicant (Individual) or Certificate of Incorporation or Registration for Groups or Companies		62272	
5. PIN Number (where available)		P051848581C	
Physical Address where water is to be used		Contact of Applicant	
6. L/R Number(s)	COMMUNAL LAND	7. Box Number	97
8. Village(s)/Ward(s)	CHEBORUSWO	9. Town	MARIGAT
10. Sub-location(s)	MARIGAT	11. Post Code	30403
12. Location(s)	MARIGAT_MARIGAT	13. Telephone Contact (Landline)	0725554719
14. Division(s)	MARIGAT	15. Telephone Contact (Mobile)	+254725554719
16. District(s)	MARIGAT	17. Email Contact	cheboruswo@gmail.com

WATER RESOURCE DETAILS	
18. Name of Body of Water or Aquifer where water is to be diverted, abstracted or stored	Kabarnet
19. Is the point of abstraction or storage in a Protected Area or a Groundwater Conservation Area? (yes/no)	NO
20. Sub-catchment Number	2EE
21. Class of Water Resource	
22. Name of Body of Water or Aquifer where effluent is to be discharged	
23. Sub-catchment Number (Effluent)	
24. Class of Water Resource (Effluent)	
25. Category of Application (Class of Permit)	B

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



Form: WRA 004  
Catchment: Rift Valley  
WRMA ID: (ASSIGNED AT RO)  
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	Diversion	Abstraction	In-stream Works	Storage	Shallow Well	BoreHole		
Tick Box						X		

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4. ID Number of Applicant (Individual) or Certificate of Incorporation or Registration for Groups or Companies		62272	
5. PIN Number (where available)		P051848581C	
Physical Address where water is to be used		Contact of Applicant	
6. L/R Number(s)	COMMUNAL LAND	7. Box Number	97
8. Village(s)/Ward(s)	CHEBORUSWO	9. Town	MARIGAT
10. Sub-location(s)	MARIGAT	11. Post Code	30403
12. Location(s)	MARIGAT_MARIGAT	13. Telephone Contact (Landline)	0725554719
14. Division(s)	MARIGAT	15. Telephone Contact (Mobile)	+254725554719
16. District(s)	MARIGAT	17. Email Contact	cheboruswo@gmail.com

WATER RESOURCE DETAILS	
18. Name of Body of Water or Aquifer where water is to be diverted, abstracted or stored	Kabarnet
19. Is the point of abstraction or storage in a Protected Area or a Groundwater Conservation Area? (yes/no)	NO
20. Sub-catchment Number	2EE
21. Class of Water Resource	
22. Name of Body of Water or Aquifer where effluent is to be discharged	
23. Sub-catchment Number (Effluent)	
24. Class of Water Resource (Effluent)	
25. Category of Application (Class of Permit)	B

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



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**SUPPLEMENT TO PERMIT/AUTHORISATION**

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

28. Brief Description of Project and Intended Use for Water Type of Water Use		FOR DOMESTIC USE		
		Surface Water (m3/day)		
Type of Water Use	Groundwater (m3/day)	River - Normal Condition	River - Flood Condition	Lake
29. Public				
30. Domestic	20			
31. Livestock				
32. Subsistence Irrigation				
33. Commercial Irrigation				
34. Industry/Commercial				
35. Hydropower				
36. Others				
37. Sub-total	20.00			
38. Quantity Returned				
39. Water Abstracted (row 34 - row 35)	20.00			
40. Effluent Discharge				

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

- The construction of the works hereby authorized shall commence within a period of 0 days and shall be completed within a period of 13 months from the date of this authorization.
- (a) Any person who erects or constructs temporary works shall be entitled to divert, abstract, impound, obstruct, store or use water to such extent only as may be necessary for the construction or erection of the works, and whenever it shall be necessary to divert, abstract or impound water during the erection or construction of the works authorized, such diversion, abstraction, obstruction, impounding, or use of water shall be made at such time and in such manner that the works of other operators are interfered with as little as possible and that no damage will be caused to property of another landholder. Provided that if any damage is caused it shall, failing agreement between the parties concerned, be settled by arbitration under the Arbitration Act.  
(b) Unless empowered thereto by the Water Resources Authority in writing, all temporary works shall be removed within a period of three months from the date of completion of the works authorized or from the date of determination of the authorization (whichever be the earlier) and where any temporary works exist, such as quarries, burrow-pits, excavations, cuttings, tunnels or things of a like nature which cannot be economically removed, efficient precautions to the satisfaction of the Water Resources Authority shall be taken, by the person named in the authorization, to render and to maintain all such temporary works safe in the interest of life and property. The Water Resources Management Authority reserves the right to inspect the works authorized by this authorization, and attention is drawn to section 90 of the Act.
- Any changes between the original proposed design and final as-constructed arrangement has been documented and such documentation submitted to the Authority.

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\*Delete words not required

CONDITIONS OF AUTHORISATION	DETAILS
Measuring device	A MEASURING DEVICE SHALL BE INSTALLED AT THE INTAKE AND A RECORD MAINTAINED OF ALL WATER ABSTRACTED GIVING DATE, QUANTITY AND METHOD OF SUCH ABSTRACTIONS AND THE PURPOSE FOR WHICH THE WATER WAS USED.
Controlling device	THAT CONTROLLING DEVICE MUST BE INSTALLED AT THE INTAKE
Water Quality Report	
Evidence of EMCA Compliance	
Soil and Water Conservation Plan	
Compensation Flow (m3/day)	
Inspection Milestones	
1	
2	
3	
4	
Notification Requirements	
1	
2	
3	
4	
Storage	
Airline	SHALL ENSURE AN AIRLINE /PIEZOMETER IS INSTALLED BY THE CONTRACTOR TO FACILITATE REGULAR MEASUREMENT OF THE STATIC WATER LEVEL
Test pumping	
Other Technical Details	
Effluent Discharge Requirements	

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

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

- (a) **FILL & SUBMIT FORM WRMA 008 Æ CERTIFICATE OF COMPLETION**
- (b) **FILL FORM WRMA 007 BY WRA INSPECTOR Æ INSPECTION REPORT**
- (c) **PERMIT FEES KSHS. 7,500.**
- (d)

SIGNATURE

Yours faithfully,

SUB-REGIONAL MANAGER  
WATER RESOURCES AUTHORITY  
BARRINGO REGION  
P.O. BOX 544, BARRINGO, KENYA

Signature of WRA Officer	<i>[Handwritten Signature]</i>
Name of Officer	WALTER K-TANU
Position	SUB REGIONAL MANAGER
Date of Signature	30/04/2021