



**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT SUMMARY PROJECT REPORT FOR
THE PROPOSED WACHU-RUKICH BOREHOLE PROJECT IN QACHACHA SUB-LOCATION,
DIRIB GOMBO LOCATION, SAKU SUB-COUNTY IN MARSABIT COUNTY**



CLIENT:

**KENYA CLIMATE SMART AGRICULTURE PROJECT
P. O. BOX 384-60500-MARSABIT**

PROPONENT:

**WACHU-RUKICH COMMUNITY PROJECT MANAGEMENT COMMITTEE
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CERTIFICATION

The ESIA-SPR Study has been carried out in accordance with the Environmental Management and Coordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations,



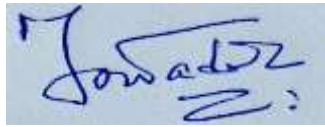

ASSIGNMENT: To carry out an Environmental and Social Impact Assessment and prepare a Summary Project Report for the proposed drilling of a borehole in compliance with the legal requirements.

PROJECT TITLE: Environmental and Social Impact Assessment Summary Project Report for the proposed drilling of a borehole and construction of associated structures and facilities situated in Sagante/Jaldesa area, Qachacha Sub-location, Dirib Gombo location, Jaldesa ward of Saku Sub-County in Marsabit County.

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Disclaimer:

This Environmental Impact Assessment Summary Project Report is strictly confidential to Kenya Climate Smart Agriculture Project (the Client) and Wachu-Rukich Community (the Proponent) and any use of the materials thereof should be strictly in accordance with the agreement between the Proponent and Mugun Holdings Limited (the firm of experts). It is, however, subject to conditions in Legal Notice No. 101 section 4 of the Environmental (Impact Assessment and Audit) Regulation 2003(revised 2019).

ACKNOWLEDGEMENT

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ABBREVIATIONS AND ACRONYMS

"	Inch
°C	Degrees Celsius: Unit for temperature
dB	Deci bells
EHS	Environment, Health and Safety
ESIA	Environmental and Social Impact Assessment
EMCA	Environmental Management and Coordination Act of 1999
ESMMP	Environmental and Social Management and Monitoring Plan
GoK	Government of Kenya
GS/I	Galvanized Steel/ Iron
KCSAP	Kenya Climate Smart Agriculture Project
MoW&I	Ministry of Water and Irrigation
NEAP	National Environmental Action Plan
NEC	National Environment Council
NEDI	North Eastern Development Initiative
NEMA	National Environment Management Authority
OHSO	Occupational Health and Safety Officer
PPE	Personal Protective Equipment
PVC	Poly Vinyl Chloride
WHO	World Health Organization
WRA	Water Resources Authority
WSL	Water struck level

EXECUTIVE SUMMARY

The proposed Wachu–Rukich Borehole project at GPS Coordinates *Latitude 2.268290 and Longitude 38. 218252* is meant to provide sufficient and reliable source of water for supplemental irrigation and domestic use. The project is supported by the Kenya Climate Smart Agriculture Project (KCSAP) through the funding of the World Bank and the Marsabit County Government. Since the project is aimed at increasing production and productivity of (indicate crops) through supplemental irrigation it fits in the KCSAP broad objectives of increasing agricultural productivity and building resilience to climate change risks in the targeted smallholder farming and pastoral communities in Kenya, and in the event of an Eligible Crisis or Emergency, to providing immediate and effective response.

The Environmental and Social Impact Assessment (ESIA) was conducted in accordance with the requirement Environmental Management and Coordination Act of 1999, the new regulation 7 (Environmental (Impact Assessment and Audit) regulations, 2003, vide legal notice of 2019) which provides for preparation and submission of Summary Project reports for low or medium risk projects (as classified under legal notice 31 of April 2019) and the World Bank Safeguard Policy 4.01 on Environmental Assessment. The main objective was to assess the environmental and social impacts of the proposed project, propose mitigation measure for the negative impacts, and develop the environmental and social management and monitoring plan and prepare a summary project report.

The main positive impacts during construction and operation of the proposed Wachu-Rukich community borehole include, increased water supply for domestic and livestock consumption, improved food and nutritional security through supporting small scale irrigation, revenue generation by water user association, creation of employment, as well boosts economy of the local community among others. The minimal negative environmental and social impacts associated with development proposed sub-project will include soil erosion, air and noise pollution, environmental degradation from influx of livestock and people, occupational health and safety risks, risk of spread of COVID-19, Gender based violence at community level, water use conflicts and risk of spread of HIV/AIDS by workers on site. A comprehensive ESMP with appropriate mitigation measure for the negative impacts has been provided in this report to act as a guide during project implementation during construction, operation and decommissioning of the proposed project.

The hydrogeological study for the proposed borehole drilling has already been undertaken. The scope of the proposed sub-project will include the following: drilling of the borehole, installation of a submersible pump, rising main, Elevated water tank (100M³), Construction of pump house, construction of a water kiosk, water tanks and cattle water troughs. From the hydrogeological survey, the proposed borehole will be drilled to a depth of **not less than 250m and to a maximum of 300 m bgl**. A sustainable yield of approximately **1.52 – 8.16 m³/hour** is expected.

The proposed sub project construction cost is Kenya Shillings Thirteen Million, (**Ksh 12,000,000**). The borehole is to supply water within the area for livestock, kitchen gardening (horticulture) and domestic use (2,500 cattle, 4,500 goats and sheep, and 500 Households direct beneficiaries. The daily water demand in the area is estimated to be **70m³/day**. On the basis of geological evidence, from the hydrogeological investigations carried out groundwater prospects for intended purposes (livestock and domestic use) are tenable.

The study was carried out using a number of methods; desk studies and literature review, field visits, Focus Group Discussions and observations, one public participation/sensitization by holding public Baraza and two consultative meetings with stakeholders, discussions with technical representatives. The tools used in collection and recording of data were; questionnaires, interview schedules and checklists. Filled in 10 questionnaires and 5 key informant's checklists matrix have been included in the report. Community public participation was done through a meeting held on 1/03/2021 and attended by 18 people (13 Male and 5 female)

In view of the ESIA (SPR) findings, the proposed project has significant positive impacts the far outweighs the negative impacts. The negative impacts shall be mitigated as outlined in the ESMMP in this report. Further, the project proponent has committed to full implementation of the proposed mitigation measures appended in this report and adhere to directions and advice issued by NEMA. In this regard the consultant's team that the project recommends the project for NEMA approval subject to an annual audit. The team further recommends that the report be shared with the selected contractor for preparation and implementation of the contractors specific ESMMP. The CPCU through County Environmental Social Safeguard and Compliance Officer (CESSCO) shall monitor and report on the progress of implementation to relevant authorities.

CHAPTER ONE: INTRODUCTION

Background Information

The proposed Wachu –Rukich borehole project in Sagante/Jaldesa area, Qachacha Sub-Location, Dirib Gombo Location, Saku Sub-County in Marsabit County located at GPS Coordinates ***Latitude 2.268290 and Longitude 38. 218252***. The project is meant to supply reliable source of adequate and clean water to Sagante/Jaldesa village with a view to augmenting the existing water sources for supplemental irrigation, livestock and for domestic use. The project was proposed by the Sagante/Jaldesa community representatives in consultation with the department of Agriculture, and Livestock. The proposed project will involve drilling for the purpose of utilizing groundwater resources. The drilling depth is approximated at not less than 250m and to a maximum of 300 m bgl and sustainable yield of approximately 1.52 – 8.16 m³/hour from the hydrogeological survey report. The borehole is to supply water within the area for livestock, kitchen gardening (horticulture) and domestic use (3,300 cattle, 6,500 goats and sheep, and 500 Households direct beneficiaries. The daily water demand in the area is estimated to be 70m³/day. On the basis of geological evidence, from the hydrogeological investigations carried out groundwater prospects for intended purposes (livestock and domestic use) are tenable. The proposed sub project construction cost is Kenya Shillings Twelve Million, (Ksh 12,000,000).

1.2 Project Justification

The site where the proposed project will sit has been carefully sited with the help of a Hydro-geologist consultant. The proposed borehole is set to serve the community with water for agricultural use. The area is a recorded water deficit area and is therefore in dire need of water. Despite a plethora of Government Policies on water provision for all, and the quest to meet the rising demands of a growing economy, access to sufficient and reliable water is still a big challenge in Kenya. Similarly, the National Vision 2030 has prioritized water provision as the main engine of economic transformation.

1.3 Justification for Summary Project Report

This ESIA (SPR) was based on the recommendation of the County Director of Environment (CDE) following an initial screening report which classified the Wachu-Rukich borehole project as low risk, the client engaged a team of experts from Mugun Holdings Limited to carry out an Environmental and Social Impact Assessment prepare and submit summary project report to NEMA for approval. This ESIA (SPR) has been prepared in accordance with provisions of EMCA, 1999 and Environmental Impact Assessment and Audit regulations 2003 (revised 2019) and NEMA public notice 31.

1.4 The Objectives of Summary Project Report (SPR)

- To identify and assess all potential significant environmental and social impacts of the proposed sub-project and recommend appropriate mitigation and enhancement measures;
- To analyze and evaluate the anticipated impacts that may arise from implementation of the project on the physical, biological, socio-cultural and socio-economic environment.
- Evaluate the hydrogeological report and designs proposed in the engineering report and consider its effects on safety, comfort and convenience of the users once construction is complete.
- To conduct a comprehensive public participation and stakeholder's consultation with all project affected persons and relevant stakeholders
- To propose measures for mitigating potential adverse negative environmental and social impacts of the project.
- To assess compliance with Environmental laws, regulations and standards.

- To develop an Environmental and social management and monitoring plan(ESMMP)
- To prepare a ESIA(SCR) and make recommendations to NEMA on the findings and implementation for approval.

1.5 Summary Project Report Approach and Methodology

The study approach and methodology for this exercise were structured such as to cover the requirements under EMCA, 1999 (Revised 2015) as well as the ESIA/Audit regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003.

The Environmental and Social Impact Assessment SCR was carried out through:

- **Desk review of related literature.** The primary materials reviewed included hydro-geological survey report, socio-economic reports, district development reports as well as unpublished material concerning the area. This helped create a baseline for the project.
- **Scoping:** This was done as a preliminary physical assessment and surrounding, it helps to narrow down to the most critical environmental and social issue requiring attention at a later evaluation.
- **Field visit:** Field assessment and with preliminary visits, discussion and documentation, the field visits was intended for evaluation of further information including community interviews, physical observation of the project site and its surrounding.
- **Public Participation and stakeholder consultation:** Consultations with relevant government departments, and with the local community were undertaken, to establish the general opinion with respect to the proposed borehole sub-project.
- **Data analysis and Report Writing:** All data and information collected during the process of assessment was processed and analysed to extract useful information from the filled questionnaires, interview with people on the project site, and prevailing condition on the state of the environment This report has been prepared based on the findings of the environmental and social impact assessment for the proposed Wachu-Rukich borehole project. Then there was tabulation of the findings, review and submission of this reports.

1.6 Organization of Summary Project Report

This report is organized into seven chapters.

- Chapter one gives the introduction and background information about the project, project justification, justification and methodology of report preparation.
- Chapter two focuses of the nature of the project, including design parameters, location and project cost.
- Chapter three it gives a description of project location.
- Chapter Four presents the outcome of public participation and stakeholder consultation.
- Chapter five identifies the potential positive and negative environmental, social, cultural, economic and political impacts of the proposed project. The chapter further analyses these potential impacts and proposes mitigation measures to minimize the negative impacts and enhance the positive impacts.
- Chapter Six presents the Environmental and Social Management and Monitoring Plan (ESMMP) for the proposed project.
- Chapter Seven give the conclusion and recommendations followed by the references and annexes.

CHAPTER TWO: NATURE OF THE PROJECT

2.1 Project Design

Groundwater Survey

In compliance with the provisions of the Water Act No. 43 of 2016, Marsabit County Government engaged the services of Hydrogeologists who carried out hydrogeological and geophysical survey aimed at selecting a suitable borehole drilling site at Wachu-Rukich area in Sagante/Jaldesa Ward, Saku Sub- County. 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 to meet the requirement of the Proponent. The report was one of the documents Water Resources Authority required for processing the permit.

Borehole Drilling

Drilling should be carried out at a diameter of not less than 8", using a rotary type machine. The drilling rig should be able to drill to a depth of at least 350 m, at the specified diameter. The rig and the drilling method adopted must be suitable for drilling through both unconsolidated material, and hard, compact volcanic rocks. *The proposed borehole is to be drilled to a depth of not less than 250m, to a maximum of 300 m bgl. Sustainable yield of approximately 8.16m³/hr. is expected. The water demand is estimated to be 70m³/day.*

Table 1: Construction summary

GPS Coordinates	Recommended Depth	Construction Requirements	Expected Yield (m ³ /h)
37N 0413076, 0250739: 555m	300	203/153mm	1.52 – 8.16 m ³ /hour

Drilling additives to be used (e.g. foam or polymer) must be non-toxic and biodegradable. They should have clear labels for ease reading by the supervising team. In no circumstances will bentonitic additives considered to be acceptable, as they may plug the aquifer zones and are extremely difficult to remove during development.

Geological rock samples should be collected at 2 metres intervals. Water struck and rest levels should be carefully recorded, as well as water quality and estimates of the yield of individual aquifers encountered.

Great care should be taken that the water quality of the different aquifers is accurately determined. Upon the first strike, drilling fluids should be effectively flushed, and after sufficient time, a water sample should be taken off the air-blown (rotary) yield. On-site analysis using an EC meter, and preferably a portable laboratory, is recommended.

Once the borehole has been drilled, testing will be done in order to:

- Confirm yield, efficiency, and performance;
- Investigate water quality;
 - Assess whether abstraction can be sustained in terms of yield and quality;
- Identify potential impacts;
 - Characterize the aquifer properties such as transmissivity, hydraulic conductivity, and storage.

Water well Design

The design of the well should ensure that screens are placed against the optimum aquifer zones. The final design should be made by an experienced Hydrogeologist.

Casing and Screens

The well should be cased and screened, in order to avoid collapsing and sediment intake. Considering the great depth of the borehole, it is recommended to use mild steel casings and gas slotted screens (which are cheaper than machine slotted screens) of 6" diameter. However, the screens should be well done, with a uniform slot size.

Grouting/Gravel Pack

Grouting is the act of injecting certain substances into the void of earth materials to reduce or eliminate their permeability, consolidate them, or increase their strength. The use of a gravel pack is recommended within the aquifer zone because the aquifer could contain sands or silts which are finer than the screen slot size. A 8" diameter borehole screened at 6" will leave an annular space of approximately 1", which is sufficient to allow the insertion of fine, quartzitic gravel. The grain size of the gravel pack should be within the range of 2 to 5 mm, and granules should be rounded to well-rounded. Over 95% should be siliceous. The gravel pack should be washed down with copious volumes of water to avoid bridging.

Plumpness and Alignment

Water well should be both straight and plumb, although in practice any borehole of substantial depth may not be perfectly straight or perfectly plumb. A wellbore may be straight but not plumb. A deviation from plumpness of two-thirds the well's inside diameter per 30 meters is reasonable considering the difficulties of drilling in earth materials. The straightness of the wellbore is important because it determines whether or not the casings and a properly sized pump can be installed in the well to the desired depth.

Well construction

In installing screen and casing, centralizers at 6 metres intervals should be used to ensure centrality within the borehole. This is particularly important to insert the artificial gravel pack all around the screen. If installed, gravel packed sections should be sealed off at the top and bottom with clay or bentonite seals (2 -3 m).

The remaining annular space should be backfilled with inert material (drill cuttings may be used), and the top three metres grouted with cement to ensure that no surface water at the wellhead can enter the wellbore and thus prevent contamination.

Well Development

Once the screen, gravel pack, seals and backfill have been installed, the well should be developed. All drilling methods cause some plugging of fractures or crevices in rocks. Borehole development is designed to maximize the good yield.

- Repairing the damage done to the aquifer material during drilling and restore the natural hydraulic properties.

In both cable tool (i.e. percussion) and air hammer drilling, the bit action chips and crushes the rock, and mixes it with water and other fine material into thick mud slurry. The pounding of the bit forces this slurry into the openings in the wall of the borehole, thus blocking the pores and impeding the flow of water from the aquifer. A thick "wall cake" may form, especially when clay additives (such as bentonite) are used during drilling or where natural clays occur in the penetrated formations. This cake, if not removed, may virtually plug the borehole, and significantly reduce the discharge. It should be noted that the maximum yield of a formation can only be realized if all the fractures and crevices are unblocked and able to supply water to the well.

Borehole development techniques are applied to break down and remove the impermeable layer of clayey material from the borehole wall. Swabbing, wall- scratching, airlift rawhiding and polyphosphate dosing are all borehole development techniques.

- Altering the characteristics of the aquifer volume in the vicinity of the borehole, by improving hydraulic contact between the aquifer and the hole. This is essentially aquifer development and is also known as aquifer stimulation.

Polyphosphate dosing, hydro fracturing and acidizing are examples of aquifer stimulation techniques.

The development methods to be applied depend on the available equipment, and differ significantly between percussion and rotary drilling (the latter being superior when it comes to efficiency):

Development with a percussion rig: if a cable tool rig has been deployed the available development techniques are relatively simple but less effective than the methods used in modern rotary drilling. The following measures are recommended:

- Backwashing and bailing: using a surge block with rubber flaps slightly smaller than the internal diameter of the hole, start near the top of the water-bearing zones and surge downwards (surging upwards may lead to the surge block sand-locking, which can jeopardize the hole). Bail the borehole clean periodically. Repeat this cycle until no more material is brought up, bailed water is clear and electrical conductivity is stable.
- Polyphosphate dosing: percussion equipment does not include mud pumps and drill pipe, so jetting is impossible. Polyphosphate dosing comprises no more than simply pouring water with dissolved sodium hexametaphosphate and calcium hypochlorite into a pipe, the base of which is located near the bottom of the hole.
- The polyphosphate is allowed to act for 12 hours or overnight.
- Repeat the backwashing and bailing cycle until the water is clear and electrical conductivity stable.

Development Methods

Borehole development methods include over pumping, backwashing, mechanical surging, air development, high-velocity air or water jetting, and a combination of high- velocity water jetting and simultaneous pumping.

If a rotary rig equipped with a strong air compressor is available, more effective development techniques can be applied:

- Airlift rawhiding, into and through the aquifer zones. This should continue until the water lifted is clean and clear, with electrical conductivity stable. Rawhiding comprises cyclic airlifting: once the airlift has been established, the air supply is cut off and water allowed to cascade down the hole. This creates overpressures across the borehole wall, which agitates the formation and enhances cleaning. The airlift is then started again, and the cycle repeated.
- Water jetting with an on-wall velocity of 30 m/s: at least 0.3 m³ of fluid should be jetted per linear metres of the screen. The water used for jetting must be absolutely clean, and it is dissolved as in the polyphosphate dosing described under Section 4.2. The jetting tool should be so constructed that the jet openings are not more than 1" (25 mm) from the borehole wall. Jetting should start from the top of the water-bearing formation rotating downwards. After the entire saturated zone has been jetted, the hole should be left for at least 12 hours or overnight, to allow the hexametaphosphate to work on the "wall cake" and any clayey material in the aquifer material.

- Airlift rawhiding again, from the bottom of the hole, until airlifted water is absolutely clean and electrical conductivity stable.

During development, an estimate of the bailed or air-blown yield should be made. This usually gives a fair indication of the final range of abstraction that can be expected from the borehole. The use of over-pumping as a means of development is not advocated since it only increases permeability in zones that are already permeable.

Well Testing/Pumping test data

After development and preliminary tests, a step-draw down test, and a 24-hour long-duration well test at a constant discharge rate should be carried out. Pumping tests are conducted to determine the performance characteristics of a well, the hydraulic parameters of the aquifer and the specific yield of a particular aquifer or several aquifers during the course of drilling. Well tests have to be performed on all newly completed wells: apart from providing information on the quality of drilling, design, and development, it also enables the hydrogeologist to compute sustainable abstraction rates, design drawdown, and other important well and aquifer parameters. The results from properly conducted tests are the most important tool in groundwater investigations. Measurements of water levels after the pump is stopped (recovery) is extremely valuable in verifying the aquifer coefficients calculated during the pumping phase of the test.

The pumping test should be conducted for a continuous period of 24 to 72 hours, depending on the type of aquifer. The accuracy of drawdown data taken during a pumping test depends on the following: -

- Maintaining a constant yield during the test.
- Measuring the drawdown carefully in the pumping well and in one or two properly placed observation wells.
- Taking draw down readings at appropriate time intervals.
- Determining changes in barometric pressures; stream levels affect the drawdown data.
- Comparing recovery data with drawdown data taken during the pumping portion of the test.
- Continuing the test for 24hours for a confined aquifer and 72 hours for an unconfined aquifer during constant rate tests level for the borehole must be recorded as well as the intake and the pumping water, levels of the pump during water abstraction.

Pumping Plant

The proposed borehole will be pumped using an electrical solar submersible pumps preferred for its affordability to the community in terms of operation and maintenance. **Other components of the borehole to include;**

- Rising mains
- Storage tank (100M3)
- Pump house
- Water kiosk

The sub-project will be under the management of an elected project management committee (PMC).

2.3 Proposed Project activities

2.3.1 Construction Phase

a) Preliminary Activities

- Mobilisation of the equipment and its accessories to the recommended site as per the baseline hydro-geophysical survey.
- Site clearance.

b) Borehole Drilling

- Drilling the borehole to recommended depth and width by way of rotary drilling rigs engaging mud or biodegradable polymer
- Casing the productive borehole with steel casings of high open surface area and developed to remove the fine particles from the casing screens so as to enhance the aquifer performance.
- The drilled hole shall then be installed with appropriate manual submersible pumps in order to deliver ground water to the surface.
- A gravel pack will be used within the aquifer zone because the aquifer could contain sand or silts which are finer than the screen slot size. This will prevent the pumping of the sand thus protecting the pumping plant from damage by the sand particles. It will also prevent siltation of the well.
- Establishing appropriate pumps and testing to obtain the maximum permissible yields from the borehole
- In order to facilitate the recycling of drilling mud, small and shallow basins (above the upper aquifers) will also have to be dug next to the recommended drilling points.

2.3.2 Operation Phase

After the borehole is drilled, the proponent has further plans of pumping the water to elevation tanks for storage and use. This phase shall involve the following activities:

- Water Supply operations
- Borehole maintenance

2.3.3 Decommissioning Phase

This involves the closing of the borehole after finishing its lifespan. The activities to be undertaken during this phase includes

- Demolition of the structures in full or in part and the rehabilitation of the sites.
- Landscaping will be done to ensure that the environment is returned to or near its original state.
- Disposing wastes so generated during operational stage in accordance with the National Environmental Laws and Regulations.

2.4 Equipment and Material

2.4.1 Materials

The materials to be used during the development of the borehole may be categorised into either temporary or permanent and will include the following: -

- a) **Biodegradable Polymer Drilling Foam:** This is a multifunctional synthetic, biodegradable liquid drilling polymer developed for the use in fresh and salt water based drilling systems. This is a multifunctional synthetic, biodegradable liquid drilling polymer developed for the use in fresh and salt water based drilling systems. It provides the viscosity, fluid loss control, wall stabilization and friction reduction. The liquid helps to uplift drilling cuttings from the borehole and these are deposited in the shallow basins adjacent to the drill sites. Thereafter the drilling mud is recycled in the drilling process

and completely pumped out during test pumping operations and development of the borehole.

- b) **Water:** Clean water from the adjacent Rivers/well/streams will be used to supply any water requirements during the drilling and construction of the borehole.
- c) **Lubricants and diesel:** These are used to run the engines of the drilling machine as well as those of auxiliary equipment such as mud pump and generator as well as in the excavating or other construction equipment during the construction period.
- d) **Casings and pipes/ fittings:** These will generally consist of 6-inch and 2-inch diameter pipes of mild steel or PVC which are vertically installed into the borehole; the former as an outer permanent casing for the drilled hole while the latter for purposes of acting as a raising main which is connected to the submersible pump as well as for the distribution lines. The stainless steel permanent casings are more durable and non-corrosive hence best suited for ensuring good quality borehole water. However, for the raising/ distribution mains use may be made of Class 'B or C' Galvanised Steel/Iron (GS/ I) or PVC pipes or fittings which are relatively durable although lesser resistant to corrosion, but are still recommended for such purposes since the pipes are serviceable after a given period.
- e) **Gravel Pack:** the gravel pack shall be installed into the annular space (1-inch round space between the borehole walls and the casings) of the boreholes. The gravel packing operation shall be conducted so as to ensure that the infiltration of sediment and silt free groundwater to the boreholes is prevented. The installation material should be 95% siliceous granules and its grain size should be in the range of 2 to 4mm, rounded to well rounded. The gravel material will be purchased and transported to the site. However, in all cases washing or sieving of the collected material will be done in order to remove any fines in the gravel. The same is applicable to the choice of building sand for the construction of water tanks/reservoirs.
- f) **Ballast and natural stones:** This will be purchased and transported to the site. As such, in terms of material acquisition for project purposes, these should mainly be locally sourced in as much as possible both from the immediate project surrounds as well as from the larger region in order for maximum environmental and economic benefit to accrue to the project area.
- g) **Bentonite:** This material is normally mixed with water and used in sealing some sections of the annular space for sanitary protection purposes in borehole construction
- h) **Cement:** Cement is a binding material commonly used in constructional purposes such as for water tanks/ reservoirs and water kiosks. It is also useful in grouting in the annular space of boreholes and in the provision of a concrete slab on the surface of completed productive wells so as to serve as impermeable plugs for sanitary protection purposes. The material will be applied for any binding work during construction as well as for maintenance during the operational phase of the project.
- i) **One meter (1 m) steel casing:** This is used for the fixing of borehole caps in order to avoid the entry of surface water into the boreholes as well as prevent anybody from throwing any foreign material into the hole or entry of the same.
- j) **Inert material:** The drilled material will be reused in refilling some sections of the annular space during the construction of boreholes and thus care should be taken to ensure that they are kept clean and safe for effective/ efficient use.
- k) **Dipper Line and Master Water Meter:** It is a legal requirement under the Water Act, 2016 that every borehole sunk should be fitted with a dipper line (a 25 mm diameter uPVC

airline piezometer attached to the rising main) in order to monitor the water level using the water dipper around seasons and whenever such need arises. This is a long-term exercise and is vital because the community Water Management Committee or any stakeholders can assess the performance of a borehole by observing the pumped water level and static water level after the safe recommended yield is pumped for the recommended length of time. For purposes of following up the abstraction levels, the installation of a master water also necessitated by the Water, 2016.

2.4.2 Equipment and Machinery

The construction machinery for use in the sites shall essentially include drilling rigs, compressors and Lorries amongst others. These shall be acquired and used as appropriate so as to allow minimum inconvenience to the workers and residents of the project area. As a normal site requirement, the contractor shall accordingly provide appropriate storage space and facilities for the equipment and other line materials on site. The proponent has already contracted a drilling company whose commitment to adhere to the provisions (letter and spirit intended to protect and conserve the environment) of this EIA report.

2.5 Waste Generated and Waste Disposal

- a) **By-Products:** Most of the blocks, rock and soil wastes that will be generated from the project's construction sites will be reused in road maintenance or landscaping the site. On the other hand, pieces of timber generated during the construction phase will be sold or given to the locals for use as formwork or as kitchen fuel. This will be done by the proponent after the completion of the project. During the duration of construction, a secure space will be set aside near the project site to store any by-product of the construction activity.
- b) **Waste Water:** Waste-water from the facility will be predominantly as spilled-over water and waste water from washing activities.
- c) **Air pollution:** Some possible sources of air pollution are exhaust emission from the machines being used during construction like drilling rigs and lorries hauling materials to the site among others and dust emissions during construction activities including those generated by the automobile transportation to and from the site. This will be limited since the activity will be for a short while and small space will be affected in the process.
- d) **Hazardous Wastes:** Hazardous wastes from the project will include used oil and solvents from maintenance and operation equipment.
- e) **Noise:** Noise levels, especially during construction, can cause a nuisance. As regards, the sources of noise, these will basically be due to traffic and construction work.
- f) **Fire Hazard:** Electric equipment such as generators may cause fires due to explosions or electric faults. Necessary fire precautions will be adhered to throughout the construction and the operation of the project.

2.6 Project Cost

The proposed Wachu-Rukich Borehole project is estimated to cost is Twelve million Kenya Shillings only (**Kshs 12,000,000**) as per the Bill of Quantities developed.

CHAPTER THREE: THE LOCATION OF THE PROJECT

3.1 Introduction

This chapter present information of the project location, the GPS coordinates, proof of land ownership, conformity to environmental management infrastructure and conformity to land use plan and zonal plan.

3.2 Description of the Location of the Project

3.2.1 Project Location

The proposed borehole project is located in Sagante/Jaldesa area, Qachacha sub-location, Dirib Gombo location, Jaldesa ward of Saku sub-county in Marsabit County. The sub-project area lies in a sparsely populated area with livestock keeping being the main land use. The area is ASAL and lies within a marginal mixed farming livelihood zone. The nearest reliable water sub-project is more than 10km away. The area is sparsely distributed with bush, shrubs and a few scattered trees. The GPS coordinates of the sub-project site are **Latitude 2.268290 and Longitude 38.218252**. The sub-project area is found in Qachacha sub-location, Dirib location, and Sagante/Jaldesa ward in Saku Sub County. The inhabitants comprise Boran community



Figure 1: project site courtesy of google earth map

3.2.2 Land Ownership

The land on which the borehole project will sit upon belongs to Dirib Gombo community. Area local leaders, chiefs, ward administrators, MCA and community opinion leaders were involved in siting for project site in the area. The community local leaders made an agreement through filling of Community Land Resolution Consent form willingly and freely donated the land for the sub project. The sub-project is owned by the community but implemented through the Kenya climate-smart programme and managed through a project management committee.

3.3 Environment, Water and Sanitation

Key environmental issues in the entire project area include: erratic and poorly distributed rainfall and frequent rainfall failure leading to recurrent droughts. Overstocking by the pastoral communities' results in rangeland degradation through compaction, soil pulverization and soil erosion. Other environmental issues in the County include forest and woodland degradation, poor sanitation, solid waste pollution and loss of biodiversity. The town is served by one

dumpsite, however the County contracted solid waste handler regularly collects waste at the project site.

3.4 Conformity to land use plan

Most of the land in the project area communally owned. The main economic activities in the project area is agro- pastoralism and few commercial activities in centres. Currently there is existing borehole within surrounding area, hence conforms to the land use plan

CHAPTER FOUR: PUBLIC PARTICIPATION AND STAKEHOLDER CONSULTATIONS

4.1 Introduction

Public participation is an essential and legislative requirement for environmental authorization. The firm of experts together with KCSAP office undertook the public participation and stakeholder consultation with regard to the proposed drilling of Wachu-Rukich borehole and construction of auxiliary structures. The public consultation was undertaken to obtain information from interested and affected parties (stakeholders), solicit their views and consult on sensitive issues. The output is incorporated in the development of mitigation measures. Different stakeholders were of different opinion regarding the proposed water pan.

Public participation and stakeholders' consultation is a very important aspect of the ESIA process and community development. This brings out the 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 is the best opportunity to interact with the project components and activities hence ownership is assured and finally leading to sustainability of the project.

4.2 Objective of Public Participation and Stakeholders Consultation

The main objective of the consultations with stakeholders was to discuss the proposed project environmental and social implications and to identify alternatives for consideration.

Specifically, the consultations sought to achieve the following objectives:

- To provide information about the proposed sub project and its objectives;
- Build up confidence between the stakeholders and the proponent to minimize the risk of delays in the implementation of the sub project.
- To seek views, concerns and opinions of people in the area concerning the sub project;
- To provide forum for discussions on identified concerns;
- To identify and verify significance of environmental, social and health impacts; and
- To inform the process of developing appropriate mitigation and management options.

4.3 Methodology

Public participation for the proposed Wachu-Rukich community borehole project was conducted through holding a public Baraza bringing together people affected by the project, key relevant department, such as lands, public works, agriculture & livestock, social service, water, and WRA. Other key stakeholders present during consultation forum were ESIA Expert, Hydrogeologist, area local leaders as well as KCSAP staff. The consultations were carried out on 1st March, 2021 in Dirib Location. The technical team conducted free, prior informed consultation and Presentation of the project scope was outlined, after which an open discussion forum followed during which all pertinent issues were raised and agreed upon with all stakeholders and all groups within the community. These included the adult males and females as well as male and female youth from all the communities in the village. A total of 87 participants of 56 males and 31 females attended the consultation meeting. (see attached attendance list, photos and minutes of the meeting).

Consultation was also conducted through admission of questionnaires to the locals to allow for systematic understanding and interaction of the Potentially Affected Persons (PAP's) and

the Proponents. A total of 15 questionnaires were administered and were filled in by the stakeholders during the public forum.

Summary of Issues Raised by the Community and Stakeholders and Response

Stakeholder	Issue	Aspect/Concern Raised by Stakeholders	Suggested Mitigation Measure
Ward Administrator	Security	Possibilities of human and wildlife conflicts in the event all the nearby water sources dry the wild animals might be tempting to use the water in the pan, insecurity related to people over the water.	Fencing of the water pan, peace mission sensitization between communities living around the borehole, on peaceful coexistence
Saku Sub county administrator	Employment of locals	Job opportunities for the skilled and unskilled during and the construction of the water pan	Provide opportunities to the available local skills especially the youth, elderly women and widows
Chairman PMC	Water pollution	It was raised because of livestock drinking water directly from the water pan and lack of sanitary facilities at the water pan	Consider fencing of the water pan and having only one entry with a gate.
Area Chief	Increased livestock disease incidences	There was concern over increased disease incidence due to the livestock converging at the drinking points due to mixing of animals.	Suggested measures included sensitization of the community on livestock disease control and prevention and provision of extension, intensify disease and pest surveillance
Community Member	Water demand	Concern was raised whether the water from the borehole would be enough for livestock and domestic use	From Hydrogeological survey assessment report water is sufficient for both livestock and domestic use. Water quality testing will be done. Assured quality expected to be suitable as nearby boreholes Dololo Dokatu had yielded water meeting required quality for human and livestock

The following Recommendation came out clearly during the public participation;

- Hydrogeological investigations had been undertaken in the site for the drilling of the borehole and indicated water would be yielded.
- Dololo Dokatu boreholes located 10km form the proposed Wachu-Rukich boreholes had yielded water safe for both livestock and domestic use.
- Drought being a major hazard in the proposed borehole area would address the community water needs
- Construction of livestock water troughs.
- The issue of water related conflicts was raised.

No objection to the sub-project was raised during the consultation with the community and the stakeholders.

CHAPTER FIVE: ANTICIPATED IMPACTS AND MITIGATION MEASURES

5.1 Introduction

The implementation of the project is expected to bring about impacts that have both positive/beneficial and negative aspects. The negative impacts will be largely minimum and mostly experienced during the project construction phase, while the positive impacts will be immense and will be experienced during all phases of project implementation.

5.2 Anticipated Positive Impacts during Construction Phase

a) Creation of temporal employment

During the construction stage of the proposed sub-project, there will be direct and indirect employment opportunities for both professionals and unskilled workers.

b) Injection of money into the local and national economy

A substantial sum of the sub-project money shall be released into the local economy due to the construction activities. This money will be informed of payments for skilled and unskilled labour; purchases of construction materials; and payments for local provisions including fuel, foods, and accommodation.

c) Improved businesses

There will be temporary establishment of business that will benefit the community in supplying of the materials necessary in the sub project as described above. Also the mama uji will get an income by feeding the workers in the sub project.

d) Skills transfer

The employment of the skilled personnel will have both from the economic and social point of view. The community members will learn new skills in handling water structures and this will enhance the community skills.

5.3 Anticipated Negative Environmental and Social Impacts during operation phase

5.2.1 Soil Compaction and Erosion

As machines and people move on the ground the soil is compacted. Compaction has the undesired effect of hindering air and water penetration beneath the soil surface and thus limiting aerobic activities of soil-dwelling organisms. 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.

Mitigation measures

- Strictly control construction vehicles to ensure that they operate judiciously and over designated areas to reduce soil compaction.
- Rip off any compacted areas after construction to allow aeration of the soil and ease the infiltration of water into the soil.

5.2.2 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 affect 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 to construct the well.

Mitigation measures

- Groundwater quality must be safeguarded by correct spatial planning and protection of surface waters since these are strictly linked to groundwater resources.

- Ensure that all potential sources of pollution are eliminated for example by ensuring that sanitary facilities are constructed according to public health requirements
- The proponent will adhere to the regulations set by the Water Act 2016 Management and development on the amounts to be extracted from a borehole and the number of pumping hours. This helps to reduce wastage and misuse of this resource.
- 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.

5.2.3 Risk of Noise and vibrations

The drilling works and incoming vehicles to deliver drilling and construction materials and communication among workers will most likely result in noise emissions. The noise could impact negatively on the workers and the local community if construction works begin too early in the day and continue into the night.

Mitigation measures

- Adhere to the EMCA (Noise & Excessive Vibration Pollution Control Regulations, 2009) maximum permissible noise levels for silent zones, places of worship, residential (indoor/outdoor), mixed residential; and commercial Minimize noise at the site and in the surrounding areas through
- Properly servicing and maintaining and tuning drilling machinery such as generators and other heavy-duty equipment to reduce noise generation; and
- Minimize the impacts of temporary drilling noise and vibration by: Planning the drilling work to take place only during the weekends at day time when the neighbours are also at work.

5.2.4 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. During the dry season spilled fuel, oils and lubricants could result in fire risks.

Mitigation measures

- Make sure that the drilling workforce is aware of the procedures to be followed for dealing with spills and leaks;
- Make sure that spills are immediately removed along with all contaminated material and disposed of at an approved hazardous landfill site;
- Make sure that all contaminated material is stored in a banded area before being disposed of;
- Make sure that a suitable spill kit is available 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
- Ensure that all 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
- Repairing and maintenance and greasing of vehicles and construction plants must be carried out off the site (petrol station or garage) to avoid fuels and lubricants spill at the sub-project site and contamination of the water.

5.2.5 Dust Emissions/Air Quality

The drilling process is expected to cause a lot of 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. The magnitude will, however, depend on the condition of the machines and the vehicles during the drilling period.

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 will be serviced and maintained in optimal working conditions to mitigate against exhaust emissions.
- Workers and any other people at the site should wear face masks at all times to avoid carbon monoxide poisoning.

5.2.6 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. At the time of the assessment

Mitigation measures

The following mitigation measures have been proposed.

- 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 NEMA's Waste Management Regulations of 2006.
- Some of the drilled materials will be used in the borehole construction by back-filling the annular space. All excavated material from the draining channel will be used to refill it.
- The contractor to be advised to provide waste bins and be collected by the county waste collectors.
- Do not secure a solid waste disposal site within a radius of 50M of the proposed borehole site.

5.2.7 Removal of vegetation

Before the drilling and installation of the boreholes, pipeline works and construction of water kiosks and elevated steel tanks, clearing of part of the existing vegetation cover will be done. This disturbance may cause changes in the natural community ecosystem or lead to invasion by non-native plant species. Loss of plant communities may also result in soil erosion and/or compaction. The loose soil material may also be washed down into the lower areas (streams and valleys).

Mitigation measures

- Ensure proper demarcation and delineation of the sub-project area to be affected by construction works;
- It is recommended that indigenous trees or other fast-growing trees be planted in strategic locations where the vegetation cover will be cleared as part of landscaping initiatives;
- Sub-project implementation plans will be developed such that section excavated are worked on and completed before moving to other areas;
- Re-vegetation of exposed areas around the site will be carried out rapidly in order to mitigate against the erosion of soil through surface water runoff and wind erosion; and
- Identify and restrict the movement of vehicles to areas of disturbance.

5.2.8 Risk of accidents and health and 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 hazardous waste e.g. engine oil and grease. Because of the clearing of access roads and 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 unloading truck-mounted drill rig, transportation of the drill rig, hand tools and cuts from sharp objects, slips and fall hazards, among others.

Mitigation measures

- 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 and that the machine operators are trained on machine safety;
- Ensure the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay;
- Ensure appropriate road safety signage are 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. All construction sites shall be isolated from the children, public and their livestock. This will be done through temporary fencing and fixing appropriate safety signage and information;
- The site should be fenced off from people, children and animals
- Provision of suitable PPEs and procuring insurance for workers and machinery/ vehicles.

5.2.9 Risk of Spread of HIV/AIDS

The sub-project will attract new people to the sub-project area, and this can lead to several repercussions leading to the spread of the virus. An influx of new people to the sub-project area especially construction workers can affect the number of new cases of HIV because they often interfere with an otherwise stable situation, but the contrary can also happen where the newcomers find themselves at higher risk.

Mitigation measures

- Programs will be developed and integrated into the sub-project implementation for sensitizing the local community and sub-project workers on HIV/AIDS and/or other sexually transmitted diseases (STDs);
- Review the construction activities to integrate with the HIV/AIDS campaigns.
- Develop appropriate training and awareness materials for Information, Education, and Communication (IEC) on HIV/AIDS and identify other players (local CBOs, NGOs, and government organizations) on HIV/AIDS for enhanced collaboration.
- The contractor shall be tasked through the ESMP to comply with the Code of conduct for workers which outlaws sexual relations with underage children.

5.4 Positive environmental and social impacts during Operations Impacts

5.3.1 Increased access to water

The current water sources rapidly deplete during the dry season. Consequently, the community members have to travel increasingly far distances in search of water. This wastes a lot of time that could have been used for other productive purposes. It is expected that the construction of boreholes will greatly improve access to water in the area.

5.3.2 Permanent employment opportunities

Permanent employment opportunities are one of the long-term major impacts of the sub-project that will be realized during the operation and maintenance of the borehole. It is expected that some community members will be permanently employed as borehole attendants.

5.3.3 Improved nutrition and food security

The proposed borehole sub-project is developed to supply water for irrigation and livestock. Reduced livestock distance in search of water will lead to improved livestock health and productivity in terms of milk and meat. Farmers will also be able to engage in smallholder irrigation and growth of a variety of crops. The outcome shall be improved nutrition and food security in the community in the sub-project context.

5.3.4 Increased participation of women in socio-economic development

The proposed borehole when completed will provide a ready and reliable source of water to the community. 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.

5.3.5 Improved Health and sanitation

Positive environmental impact on the community in terms of 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.

5.3.6 Reduced travel times to water points

From our discussions with community members, most families spend almost 2 hours to one hour in search of water. It is expected that the construction of the borehole will lead to significant time savings due to reduced distances to water points. It is expected that the same will improve the economic and social status of women and children since there will be more time for other activities for example for farming.

5.4 Anticipated negative environmental and social impacts during Operations

5.4.1 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

- 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
- The maximum groundwater abstraction permitted from the borehole is limited to the authorized volume per day for the 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.

5.4.2 Risk of water-borne diseases

Water spillage around the taps during operation may provide a breeding ground for vectors of waterborne diseases such as mosquitos. This may come about as a result of poor management of sanitation and waste water.

Mitigation measures

- The waste water drainage channel be constructed to lead water away from the pump pad;
- The waste water may be used for small gardening initiatives by the communities or directed to soak pits;

- Ensure that any stagnant water is drained
- Conduct continuous maintenance of the borehole, pipework, tank and water kiosk; and
- Conduct water sampling at least every 3 months for water monitoring record base on this facility
- Sensitize communities on the need to use treated mosquito nets and to clear bushes around water areas vii). Sensitize communities on proper sanitation and hygiene.

5.4.3 Change in Settlement patterns

The construction of the borehole is likely to encourage permanent settlements leading to livestock and human concentration near the water points. A large concentration of domestic animals may result in heavy grazing and accompanying vegetation changes in the vicinity of the boreholes.

Mitigation measures

- Sensitizing the community on importance of not selling their land to the influx population.
- Distribution of watering points and water troughs in the sub project area.

5.4.4 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. Soil erosion 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; and
- Ensure compacted areas are ripped off to reduce run-off.

5.4.5 Inadequate sub project Management

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 proponent will train the community members on proper operation, management, and maintenance of the borehole to ensure sustainability; and
- The proponent will consult on reasonable water tariffs to sustain the water supply.

5.4.6 Conflict over scarce water commodity

There is possibility of community conflicting on the use of this resource here some farmers might have more animals than others for this resource therefore causing conflict

Proposed mitigation

- The management committee to provide enough watering troughs at strategic point
- Training of the management committee and the community on sustainable use of water.

5.4.7 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
- Controlled access to Contractor's Workforce Camps by outsiders.
- Contractor to provide standard quality condoms at the construction site during the construction period.

5.4.7 Health Impact – Spread of COVID-19

During project operations there is increased risk of spread of Covid-19 since people will be meeting at the watering point.

Mitigation Measures

- The proponent 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 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 people at the watering point. Where there are two or more people gathered, maintain social distancing of at least 2 meters;
- Install handwashing 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;

5.4.8 Sexual Exploitation and Abuse (SEA)

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

Mitigation Measures

- The contractor to Develop and implement an 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.

5.8.9 Outbreak of Livestock Diseases

The coming together and mixing of livestock from different households will increase the chance for the spread and outbreak of livestock pest and diseases. Possible outcome of this if not well managed will be poor animal health, reduced livestock productivity and even livestock loss.

Mitigation Measure

- Regular disease surveillance by the veterinary department and community
- Monitoring of the livestock by the community/farmers
- Sensitization of the community on disease spread, monitoring and control a livestock disease management plan be put in place by the veterinary department to ensure disease incidences are promptly responded to and addressed.

C. Decommissioning Phase

Decommissioning is a controlled process used to safely retire facilities that is no longer needed. During decommissioning, facilities or structures are demolished so tha the facilities does not pose a risk to the environment and health of the general public. Following completion of the proposed sub-project, demolition shall reinstate; the state of the environment for sustainable future use.

Mitigation Measures

- Landscaping and re-vegetation of all disturbed areas
- Termination of water connection and demobilisation of materials from the site.

CHAPTER SIX: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

6.1 Introduction

This chapter presents the Environmental and Social Management Plan (ESM &MP) 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.

- The purpose of the Environmental and Social Management Plan (ESMP) for the proposed borehole Sub-project is to provide mitigation measures for the significant negative environmental and social impacts. The objectives of the ESMP are:
 - To clearly show how the sub-project will manage the negative impacts while enhancing the positive ones to ensure a sub-project that is economically, socially, and environmentally sustainable.
 - To provide evidence of practical and achievable plans for the management of the proposed sub-project.
 - To provide the Proponent and the relevant Lead Agencies with a framework to confirm compliance with relevant laws and regulations; and

6.2 Monitoring

The ESMP implementation and performance shall be monitored continually; performance, conformance and non-conformance audit will be applied in order to adapt the plan by adopting effective corrections whenever needed. ***An environmental audit will be conducted on an annual basis as required by NEMA.*** The environmental and social issues included within the mitigation measures will be monitored and supervised by the project beneficiaries, chosen contractor, engineering team and the KCSAP County Environment and Social Safeguards Compliance Officer (CESSCO) and the Projects Monitoring and Evaluation Officer.

The monitoring system will provide technical assistance and supervision when needed, early detection of conditions related to mitigation measures, follows up on mitigation results, and provides information of the project progress. The KCSAP Project Coordinating Unit in Marsabit will comply with the provisions of any other environmental and safeguard requirement provided by legislation and conditions of the main funding agency (WB).

Environmental and Social Management and Monitoring Plan (ESM&MP)

Table 3: Environmental and Social Management and Monitoring Plan

Potential Environmental/Social impacts	Proposed Mitigation	Indicator	Responsible Individual/Institution	Means of Verification	Time Frame	Estimated Cost
	A. CONSTRUCTION PHASE					
1. Soil Compaction and erosion	<p>a. Strictly control construction vehicles to ensure that they operate judiciously and over designated areas to reduce soil compaction.</p> <p>b. Rip off any compacted areas after construction to allow aeration of the soil and ease the infiltration of water into the soil.</p>	<p>a) No. of designated routes used.</p> <p>b) No. of sites rehabilitated.</p>	Contractor	Site rehabilitation Reports	3months	80,000/=
2. Groundwater pollution	<p>a. Ensure that all potential sources of pollution are eliminated.</p> <p>b. Adhere to the regulations set by the Water Act 2016 Management and development on the amounts to be extracted from a borehole and the number of pumping hours.</p> <p>c. Use water-based drilling fluid</p> <p>d. Proper a soak pit for safe disposal of drilling foam.</p> <p>e. Case the well as it passes through the water table.</p>	<p>a. Distance of sanitation facilities from the borehole. b) No and Type of drilling fluid</p> <p>c. No. of soak pit.</p>	Contractor NEMA WRA Dep. of Lands	water quality analysis Reports	2months	150,000

<p>3.Noise and vibrations</p>	<p>i) Avoid noise above 80db at the sub project site especially during the night.</p> <p>j) Properly servicing and maintaining and tuning drilling machinery such as generators and other heavy-duty equipment to reduce noise generation; and</p> <p>iii). Minimize the impacts of temporary drilling noise and vibration by:</p> <ul style="list-style-type: none"> • Planning the drilling work to take place only during the day when the neighbours are also at work. • Maintaining reasonable working hours so as to reduce the number of complaints concerning noise from the workers and neighbours. • Operating shorter shift periods for workers who come in direct contact with high concentrations of noise or other hazards. • Posting notices at the construction site informing the public of the construction activities, time, and day. 	<ul style="list-style-type: none"> • The noise level Frequency of vehicle/ machine servicing e.g. once a quarter, a fortnight, etc. • Time scheduled for drilling • number of shifts each individual is allocated • No of posters • Number of workers provided with the PPEs <p>Number of machine operators with ear plugs</p>	<p>Supervising engineer, PMC Contractor</p>	<p>Vehicle maintenance Records</p> <p>GRM/Complainants Records</p> <p>Reports</p> <p>Notice posted</p>	<p>Ambient air quality Reports</p>	<p>1 month</p>	<p>50,000</p>
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4.Oil spillage/Hazardous wastes	i) Vehicle/machinery servicing not to be done in the construction area. ii) Immediate scooping of any spillage during construction and safely disposing off. iii) 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. No. of oil sump at servicing yard	Contractor		1 month		0
5. Dust emissions	i) Provision of suitable PPE/C ii) Drivers to avoid unnecessary speeding near settlements in the project areas. iii) apply waters sprays and mist by trucks as dust suppression measures on loose soils and stockpiles	a. Water sprays and mists b. No. of suitable PPE c. No. of drivers trained/advised	Contractor	Air quality reports Training Reports	2 months		20,000/=

<p>6. Solid and liquid waste generation</p>	<p>i) provision of 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; providing sanitation facilities are a good distance from the borehole to reduce the risk of water contamination; et cetera.</p> <p>ii) Some of the drilled materials will be used in the borehole construction by back-filling the annular space. All excavated material from the draining channel will be used to refill it. Drilling crew to be encouraged to dump their personal wastes in designated covered wastebaskets.</p> <p>iii) Do not secure a solid waste disposal site within a radius of 50M of the proposed borehole site.</p>	<p>Number waste of baskets/ receptacles</p>	<p>Contractor NEMA WRA, CPCU</p>	<p>Waste receptacles installed</p> <p>Sanitation facilities built</p>	<p>2 months</p>	<p>50,000/=</p>
<p>7. Removal of vegetation</p>	<p>i) Ensure proper demarcation and delineation of the sub-project area to be affected by construction works.</p> <p>ii) It is recommended that indigenous trees or other fast-growing trees be planted in strategic locations where the vegetation cover will be cleared as part of landscaping initiatives.</p> <p>iii) Sub-project implementation plans will be developed such that section excavated are worked on and completed before moving to other areas.</p>	<p>a) No. of indigenous trees planted</p> <p>b) No. of sites revegetated / Area of excavated sites revegetated</p> <p>c) No. of restricted sites</p>	<p>Contractor CPCU</p>	<p>Trees planted Reports</p>	<p>7 months</p>	<p>60,000/=</p>

	iv) Re-vegetation of exposed areas around the site will be carried out rapidly in order to mitigate against the erosion of soil through surface water runoff and wind erosion.					
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8.Accidents and health and safety concerns	<p>i) Ensure that the trenches created are covered before leaving the site</p> <p>ii) Ensure workers are provided with first aid kits;</p> <p>iii) Ensure all equipment are inspected before use for appropriate safeguards</p> <p>iv) Ensure the machine operators are trained on machine safety;</p> <p>v) Ensure the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay;</p> <p>vi) Ensure appropriate road safety signage are strategically placed and drivers adhere to the requirements of such signage</p> <p>vii) Provide appropriate barriers along the excavated trenches. All construction sites shall be isolated from children, public and livestock. This will be done through temporary fencing and fixing appropriate safety signage and information; involved the local people for enhanced ownership and management; and</p> <p>viii) Upon completion and commissioning of the works, public safety in regard to water quality will be important. Security</p>	<p>a) Length of trenches filled</p> <p>b) No. of workers provided with PPEs</p> <p>c) No. of inspections conducted</p> <p>d) No. of trainings on machine operation safety and first aid</p> <p>e) The time schedule of activities.</p> <p>f) Number of signage installed</p> <p>g) Number of people employed</p> <p>h) Sites fenced and number of sensitization meetings</p>	Contractor PMC Community and CPCU	Inspection Reports	5 months	50,000/=
				First Aid Kits Public Health Records		

9.Risk of HIV/AIDS	a. 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). b. Develop appropriate training and awareness materials for Information, Education, and Communication (IEC) on HIV/AIDS. c. Identify other players (local CBOs, NGOs, and government organizations) on HIV/AIDS for enhanced collaboration	a) Number of sensitization meeting b) Number of materials developed c) Number of partners identified	Contractor CPCU PMC	Minutes Training Reports	4 months	160,000/=
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10.Spread of COVID-19 amongst workers And during Public Participation	a. The Contractors to develop a SOPs for managing the spread of Covid-19 during project execution in line with the World Bank guidance on COVID-19, Ministry of Health Directives, and site-specific project conditions. b. Mandatory provision and use of appropriate Personal Protective Equipment (PPE) for all project personnel. c. Avoid concentrating of more than 15 workers at one location. Where there are two or more people gathered, maintain social distancing at least 2 meters. d. The project shall put in place means to support rapid testing of suspected workers for covid-19.	Availability of SOP(s), Training material, PPE, sanitizing facilities, installed handwashing equipment etc.	Supervising Eng. & Contractor, PMC, Public Health	Training Reports PPEs provided Handwashing equipment's installed	5 months	50,000/=
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	e. Install handwashing facilities with adequate running water and soap					
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<i>B. Operation Phase</i>						
1.Lowering of the water table	<p>i) 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.</p> <p>ii) The maximum groundwater abstraction permitted from the borehole is limited to the authorized volume per day for the 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.</p> <p>iii) Install auto-shut water taps to reduce water wastage.</p>	<p>a) Number of type of water taps installed</p> <p>b) Number of the type of water meter installed</p> <p>c) Volume of water abstracted per day</p>	<p>PMC WRA CPCU</p>	<p>Water taps installed</p>	<p>12 months</p>	<p>40,000/=</p>

2. Waterborne diseases	<ul style="list-style-type: none"> i) The wastewater drainage channel be constructed to lead water away from the pump pad. ii) The wastewater may be used for small gardening initiatives by the communities or directed to soak pits. iii) Sensitize the community on the use of mosquito nets iv) Conduct continuous maintenance of the borehole, pipework, tank, and water kiosk v) Conduct water sampling at least every 3 months for water monitoring record base on this facility. 	<ul style="list-style-type: none"> -No of households with mosquito nets -No of people trained on health and safety and use of mosquito nets -Incidences of water-borne diseases -No of households practicing safety -No of times water sampling is done 	PMC Community Public Health	Mosquito Nets provided Health Records Training Reports water sampling Records	12 months	75,000/=
3. Change in Settlement patterns	Sensitization of the community on expected social changes Decentralize livestock watering points	No of community sensitizations No. of livestock watering points	Dep. of lands	Minutes Photos	12 months	120,000/
4. Soil erosion	<ul style="list-style-type: none"> a. 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. b. Apply soil erosion control measures such as leveling the sub-project site to reduce runoff c. Ensure compacted areas are ripped off to reduce runoff. d. Planting of indigenous trees e. Establishment of pasture farms f. Sensitize communities on soil and water conservation measures 	<ul style="list-style-type: none"> •No of leaking pipes Frequency of inspection and maintenance •Area of the site levelled and ripped off •No of trees planted •No of pasture established 	Contractor Proponent PMC	Trees planted reports	12 months	200,000/ =

5.Inadequate sub project Management	i) The sub-project proponent will train the community members on proper operation, management, and maintenance of the borehole to ensure sustainability; and ii) The proponent will consult on reasonable water tariffs to sustain the water supply.	<ul style="list-style-type: none"> •No of trainings done on operations, management and maintenance of borehole •The amount of money charged per 20litre container or collected per month/ Number of beneficiaries paying the water fees 	PMC CPCU Contractor	PMC established Sales Reports Training Reports	6 months	165,000/=
6.Spread of communicable diseases, STIs and HIV/AIDS	I Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS and sexual health and rights through staff training, awareness campaigns, multimedia and workshops or during community Barazas. ii. Use existing clinics to provide VCT services to construction crew and provision of ARVs for vulnerable community members iii Ensure safety of women and girls in provision of VCT services.	<ul style="list-style-type: none"> •No of persons attending VCT •no of trainings •No of clinics providing VCT and ARVs 	PMC Contractor public Health	Public Health Records VCT centres installed	12months	50,000/=

7.Sexual Exploitation and Abuse (SEA)	<p>i. The SEA action plan will include how the project will ensure necessary steps are in place for:</p> <ul style="list-style-type: none"> Prevention of SEA: including CoCs (combined oral contraceptives) 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 	<p>SEA Action Plan Code of Conduct Number of staff trainings SEA FP Community Liaison trained in PSEA IEC materials for workers' sites and community</p>	<p>PMC CPCU Contractor</p>	<p>Minutes Reports GRM reports Awareness Reports</p>	<p>12 months</p>	<p>150,000/</p>
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	<p>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;</p> <p>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.</p> <p>I. Develop and implement an 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</p>	<p>-Discrete SEA reporting pathway</p> <p>-Relevant policies, e.g. investigations and discipline whistleblower protection</p> <p>-Monthly SEA coordination meetings</p>	<p>PMC</p> <p>CPCU</p> <p>GBV expert</p>	<p>GRM Records</p> <p>Minutes</p>		
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9. Outbreak of Livestock Diseases	<ul style="list-style-type: none"> • Regular disease surveillance by the veterinary department and community • Monitoring of the livestock by the community/farmers • Sensitization of the community on disease spread, monitoring and control • livestock disease management plan be put in place by the veterinary department to ensure disease incidences are promptly responded to and addressed 	<ul style="list-style-type: none"> • Number of disease surveillance conducted • No of Sensitization meetings held • A livestock disease management plan put in place 	Livestock and Veterinary Dept. Community PMC CPCU	Vaccination Reports Minutes Training Reports	12 months	185,000/ =
	TOTAL COST					1,380,000

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1 introduction

It is recognized that the Kenya Climate Smart Agriculture Project borehole-based water supply project proposed is an important development and will go a long way in reducing water eliminating water shortages and efficient supply of water to the community. As regards the environmental impacts, the following brief provides is a summary of the conclusions and recommendations on the Project.

7.2 Conclusion

- The proposed project will have no significant negative environmental, occupational health and safety impacts as there are only low quantities of wastes which will be generated by therein, but the same will be disposed-off safely during the construction, operation and decommissioning phases. This too shall be minimized through strict supervision and adherence to set professional practices
- The activities during the three phases will be undertaken in compliance with the provisions of the Environmental Management and Coordination Act of 1999 and with strict observance to the ESMMP.
- All the concerned parties are advised to strictly follow the Environmental and Social Management and Monitoring Plan (ESMMP) as contained herein.
- The project is of positive socio-economic significance and hence recommended for approval by the National Environment Management Authority (NEMA).
- In addition to the above measures, the project proponent should adhere to the recommendations by Hydro-geologist.

7.3 Recommendation

It is therefore the considered view of this ESIA Expert and his team that the project be cleared for implementation provided the recommended mitigation measures are strictly adhered to by all the parties involved and hence be issued with the License.

Training and awareness creation

The efficient implementation and operation of the ESMP require competent capacities, wise management, environmentally and socially sound employees.

Each responsible person will be trained and motivated to appreciate the need for the ESMP and how to implement the mitigation measures. Training and awareness will be done in the preconstruction phase in order to have the employees acting as per the stated course of procedures and actions. Adequate training of personnel is also considered as a cost-effective means to reduce impacts.

Training includes communication of the following:

- Requirements of the ESMP and the importance of regulatory compliance with policy;
- Potential effects of the employee's work, both negative and positive and
- Responsibility in achieving compliance with policies, regulations and ESMP requirements.

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ANNEX 1: LEAD EXPERT PRACTISING 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/13928

Application Reference No: NEMA/EIA/EL/18297

M/S **Mugun Holdings Limited**
(individual or firm) of address

P.O.Box 33170-30100, Eldoret

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts**
registration number **8332**

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

Issued Date: **2/8/2021**

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

Signature.....




(Seal)

**Director General
The National Environment Management
Authority**



ANNEX 2: PUBLIC PARTICIPATION ATTENDANCE LISTS

PUBLIC PARTICIPATION ATTENDANCE LIST - WACHU-RUKICH BOREHOLE

KENYA CLIMATE SMART AGRICULTURE PROJECT

ATTENDANCE LIST

ACTIVITY: CITIZEN ENGAGEMENT MEETING - WACHU-RUKICH BOREHOLE PROJECT MANAGEMENT COMMITTEE (PMC) SELECTED DURING PUBLIC PARTICIPATION BME

DATE: 1st MARCH 2021

S.NO	NAME	P/NO/ID NO	GENDER	ORGANIZATION	DESIGNATION POSITION	EMAIL	PHONE NO.	SIGNATURE
1	Jansen Ginyu Gup	32732007	M	PMS/WA	V. chairman		074313866	
2	Guto Jaso Balle	13727676	M	"	Secretary		071903141	
3	Geigallo Duta Duvon	0592625	M	"	Chairman		079061338	
4	Hoo maku Jillo	22207071	M	"	Member		0726149714	
5	Tathu Agutu Duta	0632866	M	"	Member		021849374	
6	Jillo Wama Guro	9558246	M	"	Member		07094926	
7	Halaku Wario	8205626	F	"	Member		071814143	
8	Elena Jatteni	20325061	F	"	Member		070513692	
9	Dato Guro	20610986	F	"	Member		0112613602	
10	Geleto Guro Guro	8736501	F	"	Treasurer		070666113	
11	Tadi Huku Halaku	13709675	M	"	Member		070363454	
12	Bernard Aoba Jora	31586367	M	"	V. Secretary		0798773015	

KENYA CLIMATE SMART AGRICULTURE PROJECT

ATTENDANCE LIST

ACTIVITY: PUBLIC PARTICIPATION AND STAKEHOLDERS CONSULTATION MEETING

DATE: 1/03/2021

S.NO	NAME	P/NO/ID NO	GENDER	ORGANIZATION	DESIGNATION POSITION	EMAIL	PHONE NO.	SIGNATURE
12	Duta Geigallo	33562759	F		Member		-	
13	Geleto Huro	13729675	F		"		07	
14	Dumeta Guro	27393168	M		Member		071151281	
15	Guro Dabacha	26912931	M		"		0716185337	
16	Adi Wario	0129785	F		Member		-	
17	Wario Wario	29290892	F		Member		-	
18	Sudo Wario	0501157	F		Member		071111207	
19	Saxi Wario	0215511	F		Member		-	
20	Duta Duta	0212000	F		Member		-	
21	Wario Guro	9170785	F		Member		070104511	
22	Huro Wario	13729675	F		"		071618534	

PUBLIC PARTICIPATION & STAKEHOLDERS CONSULTATION - WACHU-RUKICHA VILLAGE

01/03/2021: COMMUNITY MEMBERS

No	Name	ID No	Gender M/F	Age	Contact	Signature
1.	Dani Jarso Gafole	27968677	F	22	0715392633	
2.	Abdub Jarso Gafole	33326558	M	26	0728752462	
3.	Dadach Boru Barago	95597977	M	36	0790689905	
4.	Galgallu Bante Galgallu	23403860	F	32	0710438484	
5.	Galm Boru Barago	20002720	M	34	072914304	
6.	Fatuma Liban Nurs	27967768	F	25		
7.	Boru Patah Garo Patah	12756012	M	32	0712317157	
8.	Malich biid buba	12429684	F	31	0740441054	
9.	Boru Zub kinn	0599620	F	37	0701561038	
10.	Guyo Zub Gindole	12429964	M	36	0704764144	
11.	Galgallu Barago Elema	27968048	F	32	0718788255	
12.	Patah Ziba Roba	25228692	M	28	0703636966	
13.	Hawo Mulu Guyo	26193121	F	29	0705875784	
14.	Darmi Mulu Boru	23393859	F	29	0717412705	
15.	Jarso Barika Zada	81511445	M	41	0711676499	
16.	Elema Gufu Zalachu	26148391	F	31	0700421463	
17.	Paballe Garo Patah	24814983	F	35	0714362472	
18.	Mumina Jarso Gafole	26856317	F	32	0728752572	
19.	Sora Zub Guyo	247604936	M	34	0715252495	
20.	Tume Zub Gindole	24825931	F	34	0714664459	
21.	Malich Boru Tatu	21667589	F	35	0705850961	

PUBLIC PARTICIPATION & STAKEHOLDERS CONSULTATION
WACHU-RUKICHA VILLAGE

01/03/2021 - COMMUNITY MEMBERS

No	Name	ID No	Gender M/F	Age	Contact	Signature
1.	WADO CHANA DIDO	36203074	M	25	0703389130	
2.	GEZIGALE ABUBA GEORNA	35453894	M	22	0796026318	
3.	BONAYA DATI JALDESA	33386977	M	23	0790216055	
4.	ABDULLAH GEORNA WARIO	32627514	M	25	0705638211	
5.	ABDULLAH WARIO GEORNA	35335954	M	21	0721999523	
6.	WADO GEZIGALE	36425872	M	20	0703850398	
7.	BONAYA TADOLE GEZIGALE	30411687	M	26	0798053746	
8.	MOHAMMED ROBA IMAN	36395426	M	21	0742630013	
9.	ROBA GURA GEZIGALE	25992524	M	32	0718847269	
10.	GEZIGALE BOYO WAKO	29764649	M	27	0746958220	
11.	ROBA WARIO GEZIGALE	36376411	M	21	0718910894	
12.	HAKLAWO KATELO ^{WANCHOB} KACHORO	35444083	M	21	07176449231	
13.	JARSO LUKE GUYO	36425683	M	22	0791441249	
14.	WAKO CHANA	37301618	M	20	0743317620	
15.	BORU BUGA SALESA	35438200	M	21	0799667528	
16.	ALI MOHAMMED GEORNA	33326550	M	25	0707995061	
17.	MOHAMMED NOOR GEORNA	32620317	M	23	0713937947	
18.	BORU WAKO LIBAN	37301635	M	21	0745752355	
19.	ABO. GUYO	33326511	M	24	0741289718	
20.	ABDIKADIR GEORNA	36376012	M	21	0745897715	
21.	JAWO JITTANI	38095762	M	23	0744072264	
22.						

ANNEX 3: HYDROGEOLOGICAL SURVEY COVER PAGE



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

**HYDROGEOLOGICAL ASSESSMENT
REPORT**

FOR

**WACHU RUKICHA IRRIGATION SCHEME
BOREHOLE**

**SPONSORED BY;
KENYA CLIMATE SMART AGRICULTURE PROJECT,
P.O. BOX 384 – 60500,
MARSABIT.**

**LOCATION;
SAGANTE/JALDESA ward – MARSABIT COUNTY**

**Compiled and Reviewed by:
MICHAEL M. NGOTHO and ANN J. KAPKIAI,
P.O BOX 49720 – 00100,
NAIROBI.**

(Hydrogeologists, Ministry of Water, Sanitation and Irrigation)

Date: 07th August, 2020

ANNEX 4: WATER RESOURCE AUTHORITY(WRA) RECEIPT FOR PERMIT



WATER RESOURCES AUTHORITY

Sub Regional Manager,
Water Resources Authority,
North Ewaso Laggas (Marsabit) Sub - Region,
P.O. BOX 207 - 60500, MARSABIT

Tel: 06922102122
Cell: 0725092449

Email: marsabitwrma@gmail.com

WRMA/ENNCA/MBT/PERMIT/VOLI/ (145)

8th March 2021

The Project Coordinator
Kenya Climate Smart Agriculture Project
P.O Box 8073 - 00200
NAIROBI.

RE: Application for Groundwater Permit for Proposed Loglogo and Wachu Rukich Sites

I refer to your application on the above mentioned subject seeking borehole construction Authorization from this office.

This is to inform you that the proposed 2No. Boreholes fall under Class C as per the Water Resource Management Rules 2007, Water Resources Allocation Threshold for Classification of permits (WI/15/1)

You are therefore requested to make payments as stipulated below, per borehole site.

- Assessment fees Kshs. 20,000.00 (x2)
- Permit fees Kshs 25,000.00 (x2)

Total Kshs. 90,000.00

A handwritten signature in blue ink, appearing to read 'Hussein W. Guyo', is written over a faint circular watermark.

Hussein W. Guyo
Sub Regional Manager

ANNEX 5: COMMUNITY LAND CONSENT FORM



COUNTY DEPARTMENT OF AGRICULTURE LIVESTOCK AND FISHERIES
KENYA CLIMATE SMART AGRICULTURE PROJECT (KCSAP)
COMMUNITY LAND RESOLUTION AND AGREEMENT FORM

ITEM	DESCRIPTION
PROJECT NAME	DOKATU-WACHU COMMUNITY BOREHOLE WACHU-RUKICH
COMPONENT 1:	UPSCALING CLIMATE SMART AGRICULTURE PROJECT
ACTIVITY CODE:	
OUTPUT 1.2:	
NAME OF INVESTMENT	DRILLING OF BOREHOLE AND CONSTRUCTION OF AUXILIARY STRUCTURES
PROJECT LOCATION:	SAGANTE/JALDEGA - QACHACHA WARD SUB-LOCATION
GPS COORDINATES	Easting 413076 Northing 0250739 - 555 Athlaku
ESTIMATED COST OF THE INVESTMENTS	12,000,000 K
SOURCE OF FUNDING	IDA
FINANCIAL YEAR	2020/2021

TERMS OF THE AGREEMENT

1. We the resident/users of the investments area (specify) WACHU-RUKICHA VILLAGE..... discussed and agreed that, WACHU-RUKICHA W. GACHACHA LOCATION..... shall be site of the proposed .. WACHU-RUKICHA COMMUNITY BOREHOLE..... and that:
2. We all aware of the **Kenya Climate Smart Agriculture Project** and this proposed sub-project... BORE HOLE DRILLING FOR LIVESTOCK WATER
3. We all aware that the land set aside for the investment is community land and no one is claiming individual ownership because it belongs to all of us and negative impacts on particular individuals using the land will be addressed by the community, and no alternative claims will be made later on the land
4. We all have no problem with the site of the investment and its conversion to public land.
5. We have all agreed unanimously that the project implementation should continue.
6. We will allow other neighbouring and cross-border communities access to the investment as agreed between elders of both communities.
7. We all shall strive to peacefully resolve any conflicts with other communities concerning the investment and that we would strive to peacefully co-exist and resolve any conflict arising out of the investment facility following due process provided by the laws of Kenya.
8. The land to be donated was identified in consultation with all residents and users of the land;
9. We all understand the likely impacts of proposed activities on donated land.
10. We all understand that the community could have refused this investment.
11. We all agreed to this investment and donation of the land without coercion, manipulation, or pressure on the parts of public or tradition authorities.
12. We all agreed that we not require any monetary or non-monetary benefits or incentives as a condition for the donation.
13. The land being donated will not reduce the remaning land area to a level below that required to maintain the livelihoods of occupiers and users of land at curent levels and will not require the relocation of any household.
14. If any structure will be moved or any access to land be limited as a result of the sub-project, the individual affected will be compensated so their livelihood will be affected.
15. The land is free of encumbrances or encroachment and is not claimed by any individual and its ownership is not contested.

We have been designated by the community of DIRIB-GOMBO LOCATION IN PRESENCE OF AREA confirm the above information to be true and that we have resolved to abide by ALL the terms of this agreement. (Please attach minutes of community meeting, where the community agreed to the use and conversion of this purpose).

No.	Name	Location/Village	ID No.	Phone No.	Signature
1	Grigallo Dida	Dimb	0597665	0790051536	<i>[Signature]</i>
2	Grillo Grigallo	Dimb	32752007	0745130866	<i>[Signature]</i>
3	Jaldasi Wario	"		0711849545	<i>[Signature]</i>
4	Wako Jerso	"	13384457	071894455	<i>[Signature]</i>
5	Boru Dida	"		079877305	<i>[Signature]</i>
6	Elena Jattuni	Dirib-Gombo	20525061	0700593602	<i>[Signature]</i>

Witnessed on this 10th Day of August in the year 2020:by:

1. Area chief

Name	ID No.	Phone No.	Signature/Stamp
Katsalo Grigallo	0632585	0710676045	<i>[Signature]</i>



2. Ward administrator

Name	ID No.	Phone No.	Signature/Stamp
Bilanga Diba		0726129768	<i>[Signature]</i>

ANNEX 6: MEMBERSHIP OF WACHU-RUKICH BOREHOLE PROJECT MANAGEMENT COMMITTEE

S/N	Name	Gender	ID. No.	Contact	Organization	Designation
1.	James Galgallo	M	32752007	0743130862	PMC- W.R	V/Chairman
2.	Guyo Jarso Balla	M	13729674	0725907145	PMC- W.R	Secretary
3.	Galgallo Dida	M	0597665	0790051336	PMC- W.R	Chairperson
4.	Haro Molu Jillo	M	28507091	0726149714	PMC- W.R	Member
5.	Yattani Galgallo	M	0632866	0710483074	PMC- W.R	Member
6.	Jillo Kunni	M	9558246	0701949235	PMC- W.R	Member
7.	Halakhu Wario	F	8205626	0711819593	PMC- W.R	Member
8.	Elema Jattani	F	20525061	0700593602	PMC- W.R	Member
9.	Dabo Guyo	F	20610986	0112613602	PMC- W.R	Member
10.	Qabale Guyo	F	8735501	0706061108	PMC- W.R	Treasurer
11.	Tadi Huka	M	13729695	0742684954	PMC- W.R	Security
12.	Bernard Roba	M	31586267	0798773005	PMC- W.R	V/Secretary

Appendix 7: Photos



Photo 1: Beacons site showing the proposed site for drilling



Photo 2: A team of community members, hydro-geologists and the county water office team together with the climate smart representatives at the site during the survey



Photo 3: watering point for the livestock, Dololo Dokatu Borehole 10km from proposed site