REPUBLIC OF KENYA

WORLD BANK GROUP

WAJIR WATER AND SEWERAGE COMPANY LIMITED Water for life WAJWASCO

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT SUMMARY PROJECT REPORT

FOR

THE PROPOSED DRILLING OF COMMUNITY PROJECT BOREHOLE FOR WATER SUPPLY AT LAMBIB IN WAJIR COUNTY

COORDINATES FOR THE BOREHOLES AT:

Lambib: **UTM 37 N** **0626232; 0192820, Elevation 262**

FEBRUARY, 2022

CERTIFICATION

This Summary Project Report has been prepared by a team of EIA experts lead by Mr. Paul Nicholas Otieno; NEMA registered EIA/EA Lead Expert No. 2921. This Summary project report has been prepared in accordance with the requirements of the Environmental (Impact Assessment and Audit) (amendment) Regulations, 2019, pursuant to *The Environmental Management and Coordination Act, (CAP 387).*

DISCLAIMER

This Environmental Impact Assessment Summary Project Report is strictly confidential to the proponent and any use of the materials thereof should strictly be in accordance with the agreement between the client/proponent and Mr. Paul Nicholas Otieno (the lead EIA Expert). It is, however, subject to conditions in the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019.

We, the undersigned, certify that the particulars given in this report are correct to the best of our knowledge.

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Proponent

On behalf of

Wajir Water and Sanitation Company (WAJWASCO)

Name.....Ali Bashane.....

Managing Director (MD)

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Date

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EXECUTIVE SUMMARY

Due to scarcity of sustainable water sources within Wajir town to meet the current water demand, proposals were made to identify and develop ground water sources in the outskirts of the town, to supplement the current water supply as part of short-term intervention measures to Wajir town water supply challenges. Lambib was identified as one of the potential suitable sites for the development of a well field to supply water to Wajir town. It is in this regard that the government through World Bank financing is pursuing the intervention under WSDP. To ensure social sustainability of the project, there was need to dedicate one of the boreholes to serve the local community. Lambib community, just like the wider Wajir town population, rely on shallow ground water wells which are prone to faecal matter contamination. There is a proposal to drill a borehole to source water from the lower aquifer to a depth of about 130m deep to supply the community as part of social cooperate responsibility.

The proposed sub-project falls under the World Bank's support to the Government of Kenya through investment lending towards improving water supply and sanitation services focusing on coastal and Northern Kenya regions and priority areas, along with strengthening sector institutional capacity to deliver improved services. The proposed drilling of Lanbib community borehole will thus trigger the Bank's Safeguard Policies *(OP 4.01 Environment Assessment)*. Also, as required by Kenya's EIA assessment process under section 58 of the Environmental Management and Coordination Act CAP 387, it is mandatory that a proponent carry out an ESIA Study before being issued with an EIA license to undertake any project activities that may be considered deleterious to the environment. This includes compliance with the Environment Impact Assessment and Audit Regulations of 2003 and consideration of other national legislations guiding conservation, management, and utilization of natural resources. Therefore, the assessment under this study was to identify significant potential impacts of the project to the project site's physical, biological, social, and economic aspects. The proposed sub-project falls under low risk project according to NEMA categorization and therefore this Summary Project Report (SPR) is prepared in response to requirement. The scope of works covered under this assessment is limited to borehole drilling and equipping with solarised submersible pump. Water distribution works were assessed in a separate ESIA report.

Proposed Project Objective

To improve the socio-economic development and health status of the residents of Lambib community by providing sustainable water supply.

Project Location

The proposed project involves drilling of 1 No. community project borehole for supply of community water at Lambib located in Wajir County, Wajir East Sub-County and within Khorofharar ward. The borehole shall be drilled at Lambib village/settlement in Lambib sub-location within Arbaqeranso location. The land for the development of the borehole is a

community land measuring 50 by 50 meters within Lambib sub- location with a coordinate of UTM 37 N 0626232; 0192820 and Elevation of 262. During Baraza meeting, the community members indicated that the project will serve communities even from outside the project area particularly neighbouring manyattas and the ward in general, especially for domestic water and watering of livestock during droughts. The community elders signed land consent forms allowing the drilling and equiping of the proposed borehole among other facilities whose ESIA report is separate from this and the form is attached in Annex I.

Estimated Cost

The estimated cost of the proposed development is about KShs. 5.757Million[1]. This cost includes construction materials, labour, occupational health and safety for workers and professional support services. The main works considered include: drilling and construction of the boreholes, preliminary and general items, solar system, submersible pump and other electrical mechanical works for the borehole.

Approach and Methodology

The main approach and methods employed during the ESIA study were desktop literature review and field survey. The desktop study involved; reviewing available published and unpublished reports to compile relevant baseline biophysical and socio-economic information about the study area. Field surveys involved environmental and socio-economic data collection. Environmental profiling of the proposed project area was done through assessment of various environmental parameters, including; climatic factors, soils, solid and liquid waste, noise and vibrations receptors and sources, air pollution sources and receptors, landscape, and aesthetic value of the proposed project area as indicated in sections 4.3 of this report. On the other hand, the socio-economic survey approach consisted of collecting data from 83 household individuals and from 5 officers from institutions both at national government offices and county government levels. Data needs were based on predetermined socio-economic parameters, as highlighted in section 4.5 and chapter 5. The units for data collection were households' heads and key informants from relevant sectors. The tools used to collect data were questionnaires administered to households in the area, community baraza meeting discussions guides and from key informant interview guide.

Key Findings

The proposed project shall be implemented as part of corporate social responsibility. Proposed project area was noted to be a natural habitat with *Comiphora myrrh* and *Acacia reficiens* being the most dominant vegetation observed but with hardly any ground cover. Key informant interviews findings indicated that the main threat to vegetation in the area is charcoal burning

[1] *The estimate cost is according to the figures provided in the design report prepared by East African Engineering Consultants Ltd and Systel Engineering Limited*

for fuel in Wajir town. Solid waste management was observed as a key menace within the study area and poses challenge of water pollution. Lambib residents practice small scale irrigation using shallow wells for growing animal fodder, sorghum, beans and vegetables which is limited by water availability. The area social officers noted that out of an approximate population of 300 households, there are only 20 youth groups, 50 women groups, 1 group of PLWD, and 30 registered elderly persons receiving the social welfare fund. The major challenges which these groups face are inadequate resources, illiteracy, and cultural and religious values.

The area is a livestock grazing area and only few free-roaming wildlife with the antelopes and giraffes being observed during field assessment. Consistent with observation made, key informant interview indicated that the common wildlife species in the project area include Somali Giraffe, Dick-Dick, and Gerenuk with the Somali Giraffe being the endangered species. The proposed project's activities trigger several national laws related to environmental management, labor, occupational safety and health, building and construction standards, and conflict management and resolutions among the key project stakeholders, as captured in chapter 3. The proposed project has been allocated land by the local elders through the signing of voluntary land donation consent forms attached in annex I. The locals perceive the project as having overall positive impacts. The proposed borehole shall be drilled to a depth of about 130m. The local community members rely on shallow wells for water resources yet they are affected by recurring droughts which have led to lowering of the shallow water table. The shallow wells are contaminated by feacal coliform from the pit latrines and from open bush defecation. The drilling of the borehole is not anticipated to affect the existing shallow wells due to difference in the aquifers which are separately bounded. The volumes of the works were noted to be low and mitigation measures have been proposed to mitigate against any negative impacts anticipated.

Public Consultation and Stakeholder Engagement

Public consultations and stakeholders' engagement were undertaken through conducting community baraza meeting in an open space in view of the existing Government Covid-19 protocol and limitation in the number of attendees' in public meetings by Government. Table 0-1 is a summary of the discussion as captured in chapter 5 of this report.

Table 0-1: Summary of stakeholders Issues raised and the response

KEY ISSUES RAISED	RESPONSES
Responsibility to operate and maintenance of the proposed project	It was agreed that WAJWASCO shall be responsible of operating and maintaining the proposed project facilities including the borehole and the associated water distribution facilities.
Payment for the water services	It was agreed that WAJWASCO shall give the community a grace period of 90 days (3 month) to use the water for free.

Community fear of the borehole affecting the shallow aquifer if the drilling is not done properly	The shallow aquifer will be protected with a plane casing so as to safeguard the water in the supper aquifer not to sip in to the deep aquifer at the lower level. The borehole shall draw the water from the lower aquifer and the two aquifers do not share the same table.
Pollution associated with the machinery used such as oil spills, noise and emission of smoke.	Constant maintenance of the machines to reduce the impacts. The use of machinery should be reduced where possible and employ man power.
There is likelihood of vegetation being cleared during the process of construction.	Any tree affected to be replanted by the contractor.
Accidents were identified as an issue of great concern during the construction and operation phases. Workers in the site were identified as the most vulnerable to accidents.	Contractor shall be required to have a safety plan Use of PPEs was identified as an important way of protecting the workers against accidents. Locals were asked to keep off the construction site in order to avoid accidents. Labeling of exits and fire assembly points. Annual audits to address loopholes in safety strategies. Hoard the site to keep people off. Site should have signs such as falling objects. Contractor should have group insurance covers
Dust pollution during construction phase	Water to be sprinkled during the construction phase in order to minimize dust.
Waste management issues may arise due to inadequate waste collection facilities and this may lead to outbreak of diseases.	The contractor to provide waste bins and empty to appropriate designated area. Sensitize workers not to throw solid wastes haphazardly
There was fear that once the water and toilets are ready for use, some people may be sidelined owing to several social issues such political inclination, social class, clan or religion hence unfairness during distribution and construction phase.	Locals agreed that the administrators should ensure that fairness is given special attention and ensure all residents have and equal opportunity to work and access water and sanitation services once the process is done.
Moral decadence may result as a result of labor coming from outside and money circulating in the local economy. It may come inform of infidelity in marriages and school drop outs caused by teen pregnancies. This could also result from women and men engaging in extra-marital sexual activities thereby breaking family ties.	Parents, local leaders' e.g. chiefs and religious leaders should take the lead role in teaching and sensitizing the community on the importance of morality and bringing the culprits to book. Use of local labour to avoid influx of workers that can spread immoral issues.
Some locals expressed fears that there is likely to come with increased burden of water charges.	The County government and WAJWASCO should involve the locals before effecting any pricing strategy for the water.
Use of machines by the contractor to avoid local labourers	The contractor to use local work force and only use machine where necessary. Priority to be given to locals in all employment opportunities

	unless the requisite skills are not locally possessed by the local workers.
Spread of disease like COVID- 19, HIV and AIDS and other communicable diseases	Contractor to strictly adhere to the covid-19 protocols and measures. Provision of condoms to the workers. Sensitization of the community against the risk of contacting diseases like HIV AIDS

Impacts of the Project

The proposed drilling and development of Lambib community project is anticipated to have both negative and positive impacts on the residents, users, the environment and the project area in general, as indicated in Chapter 6 of this report. Measures have been put in place to mitigate the negative impacts during both construction and operation stages.

Positive Impacts

The implementation of the proposed project is anticipated to have overall positive impacts particularly on health and sanitation as well as economic status of the residents within the area of interest. Some of the positive impacts are; Creation of temporal employment opportunities, creation of markets for project construction materials, reliable easy and faster access to clean water, livestock production and improved sanitation, increased revenue for WAJWASCO, improved water reliability, improved living, allow the vulnerable groups to access clean water and reduction in child mortality.

The Negative Impacts

The proposed project activities during construction, operation, and decommissioning phases are anticipated to lead to negative impacts including but not limited to: Public safety issues, air quality from exhaust fumes and dust emission, excessive noise and vibrations from the drilling rig, Occupational Health and Safety (OHS) issues on site, increased solid waste generation, infection and spread of invasive species, water loss (leakage and spillage), spread of livestock pest and diseases, conflict among water resource users, and increase in waste water**.**

Mitigation Measures for Negative impacts during drilling and construction phase

NO	ASPECT	POTENTIAL IMPACT	RECEPTOR	MITIGATION MEASURES
1.	**Public Safety**	Injury and accidents	community members and Livestock	• Ensure the safety of residents by providing safety signs at strategic places around the access roads. • Hoarding off working sites to protect the public or unauthorized persons • Reduce unnecessary speeding to prevent accidents from the movement of pedestrians or livestock in the area.

2.	**Air quality**	Air quality degradation	community and workers	• Workers to use masks when working in dusty conditions. • The community members to be discouraged from going to site to watch drilling or construction activities • Consider shielding wind impacts during drilling to reduce mad particulate matter being blow away if it's in the direction of settlement. • Reduced speeding on the dusty roads. • Construction vehicles to have catalytic devices to ensure complete burning of waste gases. • Contractor to ensure proper servicing of vehicles and Construction machines. • Use all means possible to suppress dust if considered to be a menace during excavations.
3.	**Excessive Noise and Vibrations.**	Psychological nuisance and damage to hearing	workers and community members	• The community members to be discouraged from going to site to watch drilling/construction activities • Machines and equipment to be fitted with silencer/muffler devices where possible, • Using equipment and machines with low noise emission. • switching off vehicles and machines when not in use, • avoiding unnecessary hooting, • Workers to be provided with personal protection equipment earplugs. • Reduce working hours for the workers on site during drilling by having working shifts • machines to be serviced to reduce generation of noise and vibrations, • the noisy activities should be restricted during daytime • Ensure that NEMA noise and Vibration standards are observed in all project activities. • Training/sensitization/awareness on use of PPEs and personal safety measures.
4.	**Occupational Health and Safety (OHS).**	Injury and Accidents	workers	• Ensure safety of the construction workers by putting first aid area and injury reporting mechanism • Ensure compliance to Occupational Safety and Health Act Cap. 514 and its Subsidiary Legislations. • Provide appropriate personal protective equipment (PPE) to workers and training on appropriate use. (Reflective jackets, helmets, face masks, ear plugs gloves, safety boots, etc.) • There should be adequate provision of the requisite sanitation facilities for human waste disposal • Recording of all injuries that occur on site in the incident register, corrective actions for their prevention are instigated as appropriate. • The contractor should consider having WIBA insurance policy to cushion self and workers against loss of income in an accident on site. • Provide clean drinking water for the workers to mitigate against dehydration. • Contractor to develop a site safety action plan detailing

				safety equipment to be used, emergency procedures, restriction on site, frequency, and personnel responsible for safety inspections and controls.
5.	**Solid waste generation**	Littering environment and contamination	Water, air, soils, Flora, Fauna and local communities	• Preparation of waste management plan to guide waste management and disposal activities, incorporating segregation of hazardous from non-hazardous wastes. • Reuse of all soil cuttings from the excavation works • Proper disposal of waste from the contractor's camp • Disposing off contaminated soils in cutting pit if volumes are low. • The contractor to develop site specific incident management or response plan in the even of hazardous waste contamination *(used tyres, Oil and Fuel filters*).
6.	**Game meat poaching and injury to wildlife**	Killing and injury	Wildlife	• Sensitization and awareness creation among workers on the illegality of the action and criminal charges. Prohibitions to be incorporated in the code of conduct • The movement of construction vehicles to be restricted to day time • Reporting of any incidents involving injury or game meat poaching to KWS • Engaging local conservation groups to conduct monitoring during project implementation period • Sensitization of the local community members to participate in monitoring and reporting any illegal activities against wildlife
7.	**Spread of invasive species.**	Loss of indigenous species and injury	Indigenous plants, local people and livestock	• Regular monitoring of the project site for the spread of alien plant growth and in the event of such observation, employing relevant management practices e.g uprooting young plants or burning to control the spread of the plant. • Raw materials used for construction such as sand and rocks should be sourced in areas where there are no invasive species. • Equipment required for the drilling and construction works should be clean and free from any alien plants and mud which may contain seeds or tuber of alien species. • Create awareness among the local community on management of the spread of the invasive species.
8.	**Leakage and spillage**	Contamination and pollution	Soil, water, plants and air	• Development of site-specific incident management or response plan. • Taking all measures possible to reduce any spillage and have emergency spill response kit on site, with staff trained on emergency spill response • In the event of hazardous waste leakage or spills, engage authorized waste handlers to dispose contaminated soils. • Disposing off contaminated soils in cutting pit if volumes are low. • Use of NEMA licensed waste handlers to dispose wastes in licensed disposal areas.

9.	**Covid-19** *Spread of COVID-19. During construction at work sites*	infection or loss of life	workers and members of the public	• The Contractors will develop standard operating procedures (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 concentrating more than 15 workers at one location. Where two or more persons are 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; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;
10.	Spread of COVID-19 amongst community members during consultation processes	infection or loss of life	Community members	• Electronic means of consulting stakeholders and holding meetings shall be encouraged, whenever feasible. One-on-one engagements with stakeholders while observing social distance and adhering to PPE wearing shall be enforced; • Avoid concentrating more than 15 community members at a venue. Where two or more participants are gathered, maintain social distancing of at least 1.5 meters (5 feet); • The team carrying out engagements within the communities on one-on-one basis will be provided with appropriate PPE for the number of people and stakeholders they intend to meet. • Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements and mail) when stakeholders do not have access to online channels or do not use them frequently. Ensure to allow participants to provide feedback and suggestions. • Hold meetings in small groups, mainly in form of FGDs if permitted depending on restrictions in place and subject to strict observance of physical distancing and limited duration. • In situations where online interaction is challenging, disseminate information through digital platform (where available) like Facebook and WhatsApp & Chart groups. • Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants.
11.	**GBV/SEA risks /Child**	Injury	Vulnerable persons	• Ensure clear human resources policy at the site against sexual harassment that is aligned with national law • Integrate provisions related to sexual harassment in the

	labour		in the community.	employee COC • Ensure appointed human resources personnel to manage reports of sexual harassment according to policy • The Contractor shall require his employees, sub-contractors, sub-consultants, and any personnel thereof engaged in the drilling works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse
12.	**Grievance Redress**	Conflict between affected parties	All project stakeholders	• Establish community grievance committees at the site • Ensure contractor staff grievance structures exist • Create awareness of the existence of the project grievance redress mechanisms

Mitigation Measures for Negative impacts during Operation phase

NO	ASPECT	POTENTIAL IMPACT	RECEPTOR	MITIGATION MEASURES
1.	Spread of invasive species.	Loss of indigenous species and injury	Indigenous plants, local people and livestock	• Regular monitoring of the project site for the spread of alien plant growth and in the event of such observation, employing relevant management practices e.g. uprooting young plants or burning to control the spread of the plant. • Control of livestock movement into the project area from infested areas • Create awareness among the local community on management of the spread of the invasive species.
2.	Over Exploitation of the water aquifer	Intrusion of salty water, depletion or lowering of the water table.	The water aquifer	• Adhere to the amount of water allocated in the authorization/water abstraction permit by WRA. • Monitor water levels • Ensure efficiency in water use • Conduct regular water quality analysis as per WRA requirements
3.	Occupational health and safety	Accidents or injuries	workers	• Ensure compliance to Occupational Safety and Health Act (OSHA) Cap. 514 and its Subsidiary Legislations standards. • Provide personal protective equipment to operation and maintenance workers. • Recording all injuries that occur on-site to workers while doing their daily duties in the incident register, corrective actions for their prevention should be initiated as appropriate. • Creation of awareness and training of workers on site safety and first aid skills.

				• Hiring employees with proper qualifications for specialized and risky tasks during operation and maintenance of borehole. • Adherence to Covid-19 rules as provided by the ministry of health and the WHO while conducting daily duties. • Training of workers on covid-19 rules and requirements.
4.	**Increase in waste water**	Contamination and pollution	Local people, water course and soils	• Create awareness on reusing waste water for kitchen gardening or tree planting • Do not allow any livestock to drink water during test pumping before the quality is ascertained. • Create awareness and sensitization among the locals on the possibility of risks posed by test pumping water to livestock. • WAJWASCO to consider construction of waste management and treatment system in the long-term.

The total estimated cost for the implementation of the ESMP and ESMoP is about KES 0.73M. However, the actual cost for construction Phase ESMP shall be prepared by the contractor and captured in the C-ESMP. Requirements of the Construction Phase ESMP will be incorporated in the project's bid documents.

ESMP Implementation and Institutional Arrangement

The implementation of the proposed measures shall be overseen by several actors including the Client (WAJWASCO), NWWDA safeguards specialist, the supervision consultant, and the contractor who is expected to have environment, health and safety officer to implement and report on progress of safeguards implementation.

The contractor's environment, health and safety officer will prepare C-ESMP before commencement of works that shall guide the implementation of safeguards requirements. The project supervising consultant shall on a daily basis supervise the implementation of works including the C-ESMP. WAJWASCO Environmental and social safeguards officers together with NWWDA safeguards consultant shall also conduct regular and impromptu monitoring to ensure that all the applicable requirements of the World Bank and National laws are adhered to. Reporting on implementation activities of the Lambib host community project borehole drilling shall be done at several levels. The project supervising consultant shall be in charge of the daily reporting on site on behalf of the client (WAJWASCO). The supervising consultant shall in consultation with the contractor team prepare all the required reports including site meeting minutes and submit to the client. In addition, the supervising consultant and the contractor will be required to promptly report any major incidents on site to the employer and to the Bank as well as relevant authorities as soon as possible, within 24 hrs of the incident occurrence.

Conclusion

Lambib was identified as one of the potential suitable sites for the development of a well field to supply water to Wajir town as part of short-term interventions to water scarcity in Wajir town. And as part of social cooperate responsibility, it was proposed that a community project borehole to be drilled to supply the local community members from Lambib area with improved water supply. The local community members currently access water from shallow wells which are affected by the recurrent droughts. Some of the shallow wells have dried up and the water table is sinking over time forcing the residents to dig deeper and deeper to access water resources. The locals are also faced by the challenge of shallow water table contamination by faecal coliforms necessitating the implementation of the proposed project. Consultations findings showed that the local community are eagerly anticipating the implementation of the project. The proposed project area showed characteristics of natural habitat though near settlements. The environmental and social assessment findings indicated that the project impacts are of low impacts. The drilling activities of the community project borehole, is not anticipated to significantly influence the physical and social environment. It was further noted that the anticipated impacts shall be of low magnitude due to the size of the project and with mitigation measures having been proposed in this report.

Recommendations

Drilling and development of the proposed community project borehole together with the water supply facilities is anticipated to have negative impacts socially and to the physical environment. In spite of the anticipated environmental and social impacts, with proper mitigation measures, the project is environmentally viable. The environmental assessment team proposes the implementation of the project with the following recommendations which need to be considered;

- The project proponent WAJWASCO will ensure full implementation of ESMP and ESMoP proposals during implementation, operation and decommissioning stages of the project as will be required.
- The contractor will not allow any use of the water particularly test pumping water before conducting water quality tests and found fit for consumption, which could not be ascertained at the time of this study.
- WAJWASCO, contractor and the supervising engineer will ensure that ministry of health and World Bank covid-19 guidelines are implemented to the latter at the project site during construction period and that all the workers commit to observing the rules.
- Deliberate (affirmative action) measures will be taken by the proposed project to consider connecting vulnerable and marginalized individual to water within the project area or ensuring provision of water kiosks is near dwelling of such groups and making the commodity affordable.

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LIST OF ACRONYMS AND ABBREVIATIONS

CIDP	County Integrated Development Plan
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ESMoP	Environmental and Social Monitoring Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HHQ	Household Questionnaires
KES	Kenya Shillings
KIID	Key informant Interview Guide
KIIs	Key Informant Interviews
NEMA	National Environment Management Authority
PPE	Personal Protective Equipment
WAJWASCO	Wajir Water and Sanitation Company
WRA	Water Resources Authority
WSDP	Water and Sanitation Development Project

1 INTRODUCTION

1.1 Project Background

Wajir town is growing rapidly yet sufficient sustainable water sources for social and economic development are limited. The residents of the town depend on ground water shallow wells which are often unreliable and due to over pumping experience limited recharge and recovery time, in addition the aquifers are contaminated with feacal matter due to the high-water table that is affected by the pit latrines. The existing Wajir minor water supply system does not meet the demand and only covers public institutions include schools, the hospital and other public institutions. In light of this and the need to alleviate the situation, the Government of Kenya through a World Bank financing loan under Water Sanitation and Development Project (WSDP) is making concerted efforts to ensure that sustainable water sources to Wajir town are identified and developed. Much work has been done already and previous studies identified and categorized Wajir water supply into short and long-term interventions. Among the proposals was to explore the potential of ground water sources outside the town area similar to Wajir minor concept of developing well fields, collect the water and supply to the Wajir town. Lambib was identified as one of the potential suitable sites for drilling of the boreholes. The proposal was to drill 5 No boreholes, link 4 for the purpose of supplying water to Wajir town and 1 No for Lambib host community water supply as part of social corporate responsibility. The proposed borehole is anticipated to serve about 300 households within Lambib area. Therefore, the proposed assignment is focused on drilling the proposed Lambib host community project borehole.

The drilling of the proposed Lambib host community project borehole is expected to have environmental and social impacts that need to be anticipated and mitigated or enhanced. This shall be in line with the World Bank OP 4.01 and section 58 of the Environmental Management and coordination Act CAP 387, which requires a project proponent to carry out an ESIA study before being permitted to undertake activities considered harmful to the environment. This includes observance of other national legislations guiding public participation and consultation, conservation, management and utilization of natural resources. In light of this and in response to the requirements of the law, there was need to conduct an environmental and social impact assessment (ESIA) which is the subject of this report. The ESIA Summary Project Report (SPR) was undertaken in consultation with the community with an aim of allowing for early identification of key environmental and social issues for input into the implementation and operation of the proposed development facilities. This will improve the overall community understanding of possible positive and negative impacts of the proposed sub-project under WSDP, hence increasing its social and environmental sustainability.

1.2 Proposed Project Objective

To improve the socio-economic development and health status of the residents of Lambib community by providing sustainable water supply as part of corporate social responsibility to about 300 households.

1.3 Rationale of the ESIA study

The proposed sub-project falls under the World Bank's support to the government through investment lending towards improving water supply and sanitation services focusing on coastal and north eastern regions and priority areas, along with strengthening sector institutional capacity to deliver improved services. The proposed drilling of Lambib community borehole will thus trigger the Bank's Safeguard Policies *(OP 4.01 Environment Assessment) and occupational health and safety requirements* which requires undertaking environmental and social due diligence.

Also, as required by Kenya's EIA assessment process under Section 58 of the Environmental Management and Coordination Act CAP 387, it is mandatory that a proponent carry out an ESIA Study before being issued with an EIA license to undertake any project activities that may be considered deleterious to the environment. This includes compliance with the Environment Impact Assessment and Audit Regulations of 2003 and consideration of other national legislations guiding conservation, management, and utilization of natural resources. Therefore, the assessment under this study was to identify potential significant potential impacts of the project to the project site's physical, biological, social, and economic aspects. The proposed sub-project falls under medium risk project according to NEMA categorization and therefore this Summary Project Report is prepared in response to the legal requirement.

1.4 Objectives and Scope of the ESIA Study

1.4.1 General Objective of the ESIA Study

The objective of the study was to identify positive impacts of the sub-project and associated enhancement measures, negative impacts and the mitigation measures as well as to comply with section 58 of the Environmental Management Act (EMCA) CAP 387 and the Bank's OP 4.01 which require that a project proponent carries out an EIA study before being issued with a license to undertake a project that is found in schedule II of the Act. This will include observance to the components described below:

- Identification of significant potential impacts of the proposed project to physical, biological, social, Cultural and economic environment.
- Formulate mitigation measures to any adverse impacts on the environment and people's health throughout all phases of the project while enhancing the positive impacts.

This will ensure the proposed project is environmentally friendly, socially acceptable and sustainable.

1.4.2 Scope of the ESIA study

The scope of the ESIA study was confined to the sites where the proposed works shall be implemented and the assessment assignment therefore included:

- Concise description of the national environmental legislative and regulatory framework for implementation and management of the proposed drilling of Lambib host community borehole project.
- Concise description of the project design including technology, procedures and processes to be used during project implementation and operation.
- Conduct a baseline assessment and description of the physical, biological, social, cultural and economic environment of the project area.
- Assess environmental and social impacts due to the proposed development.
- Conduct public consultations and participation
- Identify mitigation measures for negative impacts as well as enhancing measures for the positive impacts of the project.
- Develop an environmental and social management plan (ESMP).
- Develop an environmental monitoring plan (EMoP).
- Submit ESIA report to NEMA for approval and licensing.

1.5 Justification of the Project

Due to scarcity of sustainable water sources within Wajir town to meet the current water demand, proposals were made to identify and develop ground water sources from the outskirts of the town, to supplement the current supply as part of short-term intervention measures to Wajir town water supply challenges. Lambib was identified as one of the potential suitable sites for the development of a well field to supply water to Wajir town. It is in this regard that the government through World Bank financing is pursuing the intervention under WSDP. To ensure social sustainability of the project, there was need to dedicate one of the boreholes to serve the local community targeting about 300 households. Lambib community, just like the wider Wajir town population, rely on shallow ground water wells which are prone to faecal matter contamination. There is a proposal to drill a borehole to source water from the lower aquifer to a depth of about 130m deep to supply the community as part of social cooperate responsibility.

1.6 The Study Approach and Methodology

Various approaches and methodology were applied in the course of collecting environmental and social baseline survey data, data analysis and reporting in order to attain the objectives of the ESIA summary project report. The main approaches were desktop literature review, environmental and social field surveys.

1.6.1 Desktop Review

A desktop study was conducted to review available published and unpublished reports in order to compile relevant baseline biophysical and socio-economic information about the study area.

The biophysical information was compiled on environmental aspect such as flora, fauna, topography, drainage, soils, geology, hydrogeology, climate and vegetation. On the socio-economic aspects, the study compiled information on factors such as population, Social amenities and physical infrastructure, land use and ownership, water and sanitation coverage, livelihood systems income and wellbeing, vulnerable and marginalized groups

1.6.2 Field Survey

The study team conducted field work within the project area on 18th march 2021 and with additional data on 17th November 2021 and 8th and 9th December 2021. The main objective of this activity was to carry out on-site field assessments of the expected effects of the planned developments on the physical, biological and socio-economic environment. The field work exercise involved visiting and paying courtesy calls to the area chief, interview with community representatives and conducting public baraza. The survey team further conducted a site visit to familiarize and appreciate the general setting in respect to the proposed project site accessibility, social amenities, environmental setting and physical features among others. The team took the opportunity to conduct community consultations and social economic baseline survey.

1.6.2.1 Environmental Data Collection

The environmental study team carried out environmental profiling of the proposed project area, by conducting a transect walk through the proposed project site, the transect walk was conducted by a team of representative from the implementing agency (WAJWASCO), the local community representative, some community members and the consultant team. The aim was to assess waste generation and management within the area of interest, sanitation and existing impacts to water resources, identifying potential sources of noise and vibrations as well as likely receptors, potential sources of air quality issues, vegetation type and cover, landscape and aesthetic value of the proposed project area. The main data collection methods were through observations, photo taking, expert judgment and consultations with community elders. The data collected was triangulated with secondary data.

1.6.2.2 Socio-Economic Data Collection

The socio-economic survey data was collected using both quantitative and qualitative techniques depending on the target respondents. For collection of quantitative data, a semi-structured household questionnaire was used to target household heads from about 300 households within the Lambib scheme. The survey targeted 25% of the households for information but data was collected from 83 households. Focused Group Discussion interview guides, professional observations/judgment and limited Key Informant Interviews (KII) were used for collecting of qualitative data from selected community members. Five key informant officers were interviewed from County Environment and Natural Resources Officer, Forest Officer, Land and Physical planning officer, the social welfare officer and Kenya Wildlife Officers. The household

data collection tool was developed and discussed within the survey team for consensus, before training of enumerators, pre-testing and data collection conducted.

1.7 ESIA Project Study Team

Wajir Water and Sanitation Company (WAJWASCO) contracted Renix consultancy firm limited to assist in preparing an Environmental and Social Impact Assessment (ESIA) summary project report for the proposed drilling of Lambib community borehole. Environmental scoping and subsequent preparation of the ESIA summary project report was accomplished through involvement of several experts from WAJWASCO and the consultant with varied inputs. The assignment team composition was as indicated in Table 1-1.

Table 1-1: The ESIA Project Study Team

NO	NAME OF EXPERT	PROPOSED POSITION	SIGNATURE
1.	Mr. Paul Nicholas Otieno	Team Leader/Lead Environmentalist	
2.	Caleb Obonyo	Water and Environmental Engineer	
3.	M. H. Boya	Hydro-geologist	
4.	Ann Kombija	Water Engineer	
5.	Apiyo Christine Awour	Sociologist	
6.	Tony Agutu	Associate environmentalist	
7.	Rebecca Atieno	Administrator	
8.	Mr. Abdirashid Adan	Reviewer Social Safeguards (WAJWASCO)	
9.	Ahmed Malik	Deputy Director; WAJWASCO	
10.	Godfrey Wabomba	Environment and Social Safeguards Reviewer (NWWDA)	

1.8 Content and Structure of the Report

1.8.1 Purpose of the Report

This report is intended to meet the overall assignment objectives of carrying out an ESIA summary project report study for the proposed drilling of Lambib host Community project borehole for the construction of a community water supply system, in accordance with statutory requirements by NEMA on projects under EMCA CAP 387 schedule II. The report will assist NEMA and lead agencies in decision making process as well as ensuring that the project activities complies with sound environmental management practices. The report is also intended to assist the project proponent (WAJWASCO) and other project implementing

partners and the contractor in their obligation of maintaining environmental integrity during the overall management of the project activities.

1.8.2 Structure of the Report

To clearly highlight and determine environmental and social impacts that will occur due to project implementation and operation phases, the ESIA project report has been structured to cover areas required under EMCA, CAP 387 and Environmental Impact Assessment and Audit regulations 2003. The report is also consistent with the international best practices. The ESIA project report contains 8 chapters as outlined below;

- Chapter 1 introduces the project in general giving the background, project justification, study methodology and rational used to achieve the objectives of the project study.
- Chapter 2 describes the project components and the various alternatives considered for implementation.
- Chapter 3 highlights the environmental policy, legal and institutional framework that will inform the overall management of the project and its components at various stages of the project cycle. Local, national and international legal instruments and best practices have been considered.
- Chapter 4 outlines existing environmental baseline information including physical, biological and socio-economic conditions of the project area. The chapter also highlights how the project will influence or be influenced by the baseline conditions.
- Chapter 5 summarizes the public consultative process and the outcomes
- Chapter 6 presents the project impacts both positive and negative that are anticipated due to implementation and operation phases of the proposed development project
- Chapter 7 presents the project Environmental and Social Management Plan (ESMP)
- Chapter 8 presents Environmental and Social Monitoring Plan (ESMoP) outlining impacts that require supervision and monitoring during project implementation and operation stages
- Chapter 9 outline the project grievance redress mechanism
- Chapter 10 presents the EIA project study team's conclusions and recommendations.

2 PROJECT DESIGN AND DESCRIPTION

2.1 Overview

The chapter describes the proposed project components, project alternatives and the estimated financial cost of implementing the proposed works.

2.1.1 Proposed Scope of the host community Project Borehole

The proposed project shall entail drilling of Lambib host community borehole and developing it with an aim of supplying water to about 300 households living in the area.

2.1.1.1 Borehole drilling

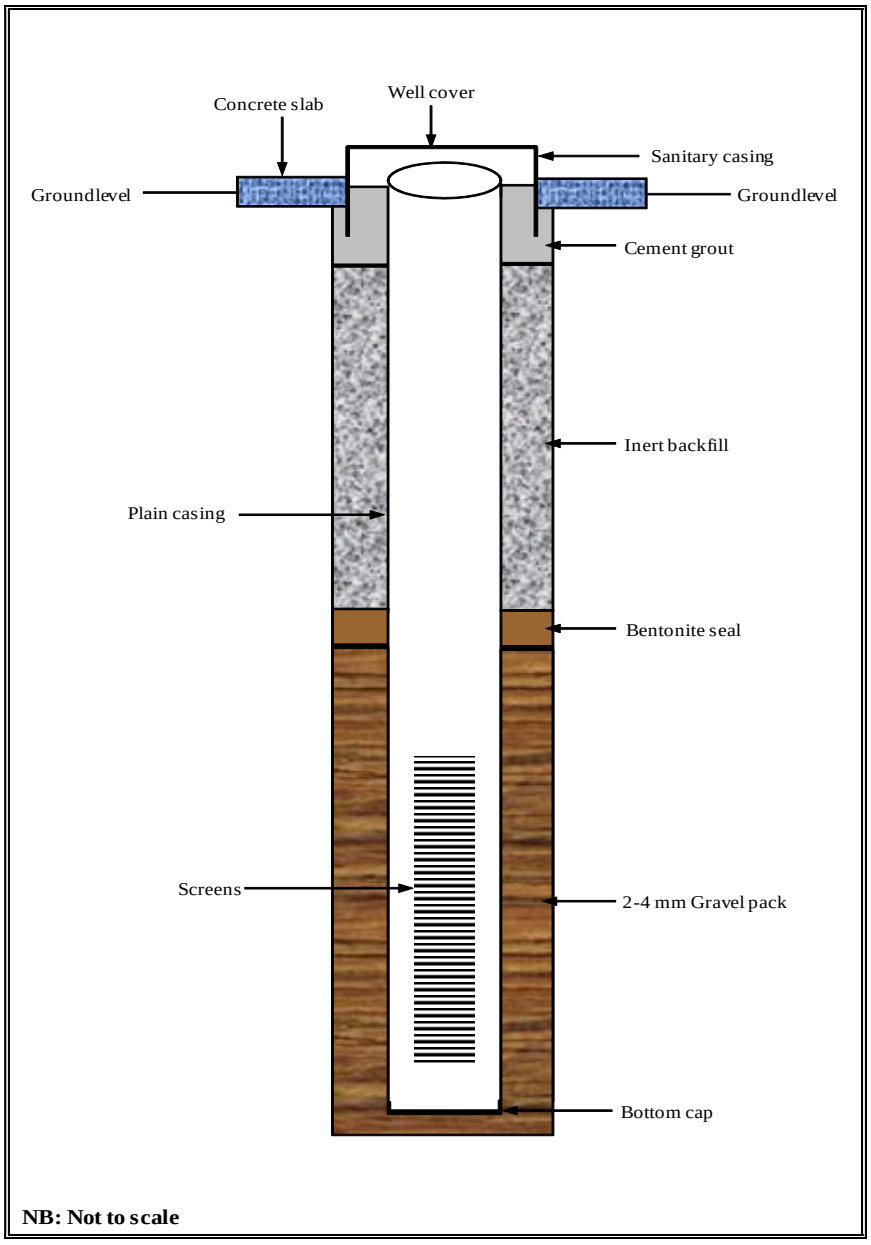
According to the hydro-geological study report, the Lambib community borehole is proposed to be drilled up to a depth of 130m deep to access the lower bounded aquifer. Preliminary design reports indicate that the borehole should be of 300mm diameter. The drilling is proposed to be carried out at a diameter of not less than 10", using a rotary type machine. The drilling rig shall be able to drill to a depth of at least 130m, 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.

2.1.1.2Gravel Pack

The use of a gravel pack has been recommended within the aquifer zone, because the aquifer was suspected to contain sands or silts, which are finer than the screen slot size. A 10" diameter borehole screened at 8" 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 shall 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 shall be washed down with copious volumes of water to avoid bridging. The best method, which is unfortunately rarely used, involves the insertion with a tremie pipe.

2.1.1.3Borehole construction

The borehole will be installed with 200mm diameter plain casing and similar diameter screens at all aquifer occurring formations of the well. The screen casing shall be surrounded with well graded gravel pack to specifications. In installing screen and casing, centralizers at 6 metre intervals shall be used to ensure centrality within the borehole. This is particularly important to insert the artificial gravel pack all around the screen. The gravel packed sections shall be sealed off at the top and bottom with clay or bentonite seals (2 m). In this case, it is also recommended to install a 3 m long, cement grout plug at the surface, to prevent contamination from entering the borehole. The remaining annular space shall be backfilled with inert material (drill cuttings may be used), and the top five metres grouted with cement to ensure that no surface water at the well head can enter the well bore and thus prevent contamination.



Courtesy of Hydrogeological survey report

2.1.1.4Borehole equipping

An appropriate submersible pump will be installed based on the test pumping results of the respective borehole once drilling is completed**.**

2.1.1.5Solar Power

The size of solar shall be the function of the submersible pump size which in turn is a function of borehole yield and dynamic water level as determined during the test pumping exercise. Although borehole yield anticipated in the area was 7.5m3/hr, recent drilling within the same area showed the average test pumping results are at an average yield of 2.6m3/hr.

2.2 Project Activities as Source of Impacts

The implementation of the proposed project is anticipated to consist of various activities such as; drilling of 1No. Borehole, digging of mud pits, install gravelling, casing of borehole, test pumping and solarization of the borehole,

2.3 Materials for use

The materials to be used shall include but not limited to; solid casing, screen, gravel pack, sanitary seal, water, cement, sand, solar panels, building stones, hardcore, submersible pump, concrete fencing posts, chain link and barbed wire among other materials. However, the anticipated works will mainly require use of drilling rig. The materials here mentioned shall be for drilling and equiping of the community borehole.

Water sampling for both chemical and biological analysis will be done by the proponent upon completion of the well development. However, water treatment will be done during the distribution and this is captured in separate ESIA report covering water supply to Wajir town.

2.3.1 Anticipated Waste material and by-products

The anticipated waste materials shall include drilling mud, waste water from test pumping, demolition debris, wood waste, electrical waste, soil cutting, waste metals, plumbing waste, plastics, organic wastes, waste oil and fuel among others.

2.4 Considerations of Project Alternative

The assessment of project alternatives was limited based on hydro-geological survey as far as the location of the proposed project is concerned. The current engineering design facilities only took into consideration the best industry practices and appropriate technology for implementation. Therefore, the ESIA study team just compared the option of either maintaining the status quo or choosing to drill the borehole for community project to supply the community with water.

2.4.1 No Project Option

The **"No project"** alternative represents the potential scenario if the proposed project works are not implemented in the project area. Under the alternative, there shall be no drilling of 1No. Borehole and the associated facilities will not be done in order to influence local physical environment, biological, socio-economic, land use patterns and no investment in the community project borehole shall be made. This option is suitable from an environmental and social

management perspective with no negative impacts but not good for social economic purpose within the project area. The opportunity cost incurred will imply that there will be no drilling of the community project borehole to supply water to the community and about 300 household shall not access improved water supply. The proposed project is therefore anticipated to address the challenge of unreliable water supply to the local community. The option also implies that employment opportunities, health and hygiene of the local, reduction of diseases related to poor sanitation and provision of piped water to the locals shall not be achieved

2.4.2 Project Development Option

The implementation of the proposed drilling of community borehole and the associated facilities by WAJWASCO is therefore anticipated to contribute to;

- Employment opportunities,
- Improved health and hygiene of the local,
- reduction of diseases related to poor sanitation and
- Provision of improved water services to the community members in about 300 households.

Implementation of this option though not the best considering the environmental and social economic costs that shall occur compared to the "No Project Option", mitigation measures have been proposed to ensure that any negative impacts are managed. This alternative would be ideal because of the ability to improve water supply to the project area to improve the living standards of the local people.

2.4.3 Alternative Technology Option

The application of best technology is important in reducing the impacts of the project to the environment. The project design team therefore took cognizance of appropriate technology existing in the market in the proposed project facilities and activities of significance are the integration of renewable energy in the design of the project. The use of electricity and generator energy to pump water other than having a foot print to the environment, is expensive to maintain and electricity is unreliable within Wajir town.

2.5 Cost of the Project

The estimated cost of the proposed development is about KShs. 5.757 Million[2]. This cost includes construction materials, labour, environmental and social management and professional support services. The main works considered include: drilling and construction of the borehole, preliminary and general items, solar system, submersible pump and other electrical mechanical works for the borehole and environmental and social management cost

[2] *The estimate cost is according to the figures provided in the design report prepared by East African Engineering Consultants Ltd and Systel Engineering Limited*

Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
1	Preliminary and General Items	Item	1	1,500,000.00	**1,500,000.00**
2	Borehole drilling, Equipping and Solarization	Item	1	3,081,500.00	**3,081,500.00**
3	Supply of Submersible well Pumps.	nr.	1	43,500.00	**43,500.00**
4	Environmental and social management				**730,000.00**
	Sub Total				**5,756,625**
	Add 7.5% Contingencies				**401,625**
	Total				**5,756,625**

3 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Overview

The chapter highlights significant policy, legal frame work, international best practice and project implementation and operational institutional framework.

3.2 Project Policy Framework

The drilling and operation of the proposed Lambib host community project borehole shall span over several institutions from the National and County Government levels as well as the community. The project activities at different phases will trigger management of various resources including; Borehole water extraction, environmental management, community land resources management and community water resources development. For the comprehensive, coordination and continuous planning, development, operation and management (PDOM) of the proposed project components, review of the existing policy, legal and institutional framework requirements was considered critical. The main policies and institutions that will be triggered at different phases of the proposed project were as highlighted in the subsections below.

3.2.1 Policy Framework

The following Table 3-1 highlights the policies that shall be triggered during project implementation and operation of the proposed project. There will be need to ensure the proposed project activities are in tandem with the policies' requirements.

Table 3-1: Policy Framework

NO.	POLICY INSTRUMENT	OBJECTIVES	APPLICATION TO THE PROJECT
1.	Vision 2030	A policy blue print to guide Kenya's development to a middle-income country by the year 2030. It is based on the 3 pillars of political, social and economic advancement and it aims to transform the economy and achieve sustainable growth. The vision recognizes the significance of water resources in sustaining the proposed economic growth of the Country. Water and sanitation services provision have been identified as significant in sustaining long-term economic growth, poverty	The proposed project shall enable provision of water for the local communities' in order to contribute towards social economic development for human wellbeing in Lambib.

		reduction, health and security.	
2.	Wajir County Integrated Development Plan 2018-2022	To achieve equitable and sustainable use and management of resources for socio-economic development of the county, the plan acknowledges the key roles played by partners in water resources development such as NWWDA. The plan indicates that the development and provision of water resources shall be done in an environmentally conscious manner by undertaking EIAs.	The CIDP recognizes that most parts of the County are water deficient and acknowledges the significance of improving water accessibility to the residents of the county. The proposed borehole shall come in hand to contribute towards water provisions in the county for socio-economic development of the local people.
3.	Water policy, Sessional Paper No. 1 of 1999	To preserve, conserve and protect available water resources and allocate it in a sustainable rational and economic way. The policy enhances a systematic development of water facilities in all sectors for promotion of the country's socio-economic progress. *Note; the policy is under review to align to the requirements of the new constitution*	The proposed borehole under the community project shall be used for provision of water resources to local communities
4.	National Gender and Development Policy (2000)	To mainstream the needs and concerns of men, women, boys and girls in all areas of development process in the country.	Women, girls, boys and men will play different roles in utilization and management of the water project within the project area. Therefore decisions making process in regard to the project will continuously be engendered throughout the project life cycle. The project will come in hand to alleviate the role of girls and women in travelling long distances to fetch for water as well as livestock watering
5.	The National Environment Policy Sessional paper No. 10 of 2014	To provide comprehensive strategies for government action regarding the quality of the environment and development.	The policy will guide the project compliance with integrating of environmental sustainability during implementation, operation and decommission stages of the project cycles which is the key subject of this report

6.	National Land Policy, Sessional Paper No. 3 of 2009.	To provide an overall framework required to address the critical issues of land administration, land access, land use planning, restitution of historical injustices, environmental degradation, conflicts, unplanned proliferation of informal urban settlements, outdated legal framework, institutional framework and information management	The project shall ensure sustainable utilization of land, particularly community land within the project area that shall be utilized by the proposed project facilities.

3.2.2 Legal Framework

Table 3-2 highlights the main legislations that will govern the activities of the proposed project during implementation and operation. The legislations also provide an institutional framework for the proposed project activities at implementation and operation phase. The legal framework provides general framework for coordination of project activities at all phases of the project.

Table 3-2: Legal Framework

No.	LEGAL INSTRUMENT	OBJECTIVES	APPLICATION TO PROJECT
1.	Constitution of Kenya, 2010	To outlines principles of access to safe water, access to public land, sustainable environmental and natural resource utilization with clear responsibilities between the National and county governments. The constitution provides clarity between the 2 levels of governance on water and sanitation services which are a function of the County Government, the National Government has a role to play in managing water resources and construction of national water works as stated in the fourth schedule of the constitution.	The proposed project design and implementation has integrated constitutional principles of environmental management, Natural resource utilization and the right to access water by the citizens of the project area.
2.	Water Act, 2016	The Act generally provides for the development and managing of water resources, managing use of water	The Act is relevant to the proposed project and will provide the institutional management from

		resources, managing of water rights, development of facilities, managing the quality of water service provision, water related dispute resolution and financing of water resources development activities.	water resource development to water services provision to the consumer at household level. The service provider for Lambib (WAJWASCO) shall be required to work closely with the following institutions as stated in the Act The Water Resources Authority (WRA) and the Water Services Regulatory Board (WASREB). Wajir county lies under the jurisdiction of the Northern Water Works Development Agency. WRA will issue permit for drilling and abstraction of water as well as monitor the borehole water quantity and quality.
3.	Public Participation Act 2016	The Act provides a general framework for effective public consultations. It gives effect to the constitutional principles of democracy and the participation of the people. The Act, therefore, gives effect to the principles of public participation as provided for in the constitution.	Participation is anticipated to promote transparency and accountability in decision making, promote community ownership of public decisions and promote public participation and collaboration in project governance processes. The engagement of the stakeholders has been conducted under this project to ensure ownership as well as incorporation of their opinion in the decision-making process.
4.	The water (Services Regulatory) Rules, 2012	To govern water services provision by the service provider. The rules highlight the role of the service provider in provision of the water supply and waste water treatment facilities on the project. The Rules on the other hand provides for quality services delivery to the consumers and also ensuring environmental management.	The rule shall ensure structures for water service provision in the area under the proposed project.
5.	Land Act 2012, Land Registration Act 2012 and the National Land	To ensure proper management and administration of land in accordance with the principles of land policy as set out in the constitution. By	Land will be a major factor in the implementation of the proposed facilities and resolution of any emerging conflicts will require

	Commission Act 2012	ensuring access to land and land utilization rights.	consultation of these Acts. Land within the project area was noted to be community land. And the local leadership together with the county government will ensure necessary measures are taken to allocate land for the project.
6.	The Community Land Act 2016	The proposed borehole shall be drilled on community land, which may trigger the Act. Matters dealing with land at the project site shall be guided by the principles and values set out in this act. The Act in part VIII stipulates the procedure to be adopted in settling disputes and conflicts involving community land in the event of such.	The proposed water project facilities shall be located on unregistered community land, which is held in trust by the county government on behalf of the communities. The community members were consulted who donated the land for the drilling of the borehole through signing of voluntary land donation consent forms.
7.	Water rules, 2007	The rules govern the various stakeholders in provision of water related services. The rules prohibit any activities that may influence negatively the quality of water in a water course. The rules will ensure proper development, delivery of services and conservation of water resources.	The proposed project borehole shall be used for domestic use and watering of livestock within the project area.
8.	County Government, Act 2012	The County Government Act provides local governance principles, guides the planning and development process, and community participation in the development process.	The Act guided the consultation process to reduce conflicts between project implementing agency (WAJWASCO) and other departments offering support services such as livestock, physical planning, wildlife, social welfare and environment, forest and public health among others. The Act spell out the functions and roles of involved agencies at deferent level of governance. Through the Act the operation of the borehole shall be under WAJWASCO which is mandated for water service provision on behalf of the county. The act was also complied with by consulting

			the local community members before any development is implemented.
9.	Environmental Management and Coordination Act, CAP 387	It sets the legal and institutional framework for the management of environmental issues in the country.	The project triggers the Act to assist in managing and coordinating potential environmental issues likely to emanate from proposed project activities during implementation, operation, and decommissioning. The Act shall guide the relationship between WAJWASCO, Drilling Contractor and NEMA on matters regarding the environment management and public concern. It requires ESIA for projects to be undertaken and licensed by NEMA prior to implementation of works. As per the Second schedule, works involving drilling for purposes of utilizing groundwater are considered medium-risk.
10.	EMCA Waste Management Regulations 2006	Provide for management of different forms of waste streams in the country, given that the project activities during implementation, operation, and decommissioning will result in waste generation.	An increase in waste generation is anticipated during borehole drilling, operation, and the regulations will come in hand to guide its proper management and disposal. Some of the regulation requirements has been captured in the ESMP
11.	EMCA Noise and Excessive Vibration Pollution Control Regulations, 2009	The regulations prohibit loud, unreasonable, unnecessary, or unusual noise which annoys, disturbs, injures, or endangers the comfort, repose, health, or safety of others and the environment. Occupational noise and vibration need to be controlled during borehole drilling process. The other sources of noise shall be due to vehicle movement that will be involved in the construction of the distribution pipelines, particularly	The proposed community project borehole drilling is anticipated to have impact on ambient noise levels within the proposed project area during drilling and casing, therefore the regulations shall come in hand to guide noise level management standards. Some of the requirements of the regulations have been incorporated in the project ESMP

		during the transportation of materials to the site.	
12.	EMCA Air quality regulations of 2014	The regulation prohibits emissions of air pollutants exceeding permissible levels from controlled areas, stationery sources, mobile sources, occupational exposure, material handling, demolition areas, and waste incineration, open burning of hazardous waste, or from cross-border. The regulation also requires that all emissions be licensed.	The proposed sub-project is anticipated to compromise air quality within the proposed project area during drilling, construction of main water pipes and therefore the regulation shall come in hand to guide air quality management standards as captured in the ESMP.
13.	EMCA Water Quality Regulations, 2006	Water quality regulations lay down the standards of domestic water and waste water. The regulations are meant for pollution control and prevention, and provide for the protection of water sources.	The proposed project shall ensure the quality of water supplied by the borehole meet domestic water quality standards. Comprehensive water quality analysis including heavy metal tests shall be conducted before the water is allowed to be used by either human or livestock.
14.	The Physical and Land Use Planning Act, 2019	The Act provides for planning and controlling physical development in the country in general. The Act read together with the county government Act 2012 will assist in synchronizing the national, local and project physical planning, controlling for any possible conflicts.	The development of the community borehole and the associated facilities has been synchronized with local development needs where the borehole shall supply water to local school, mosque, for domestic use and livestock watering.
15.	Occupational Safety and Health Act, 2007	The Acts aim to ensure the safety, health, and welfare of persons at work and non-workers as well as cushion workers against loss of income or livelihood due to occupational accidents or diseases.	The Act shall be applied for the safety of workers and the general public to be ensured during project implementation operation, and decommissioning phases. Some of the requirements of the Act has been incorporated in the ESMP
16.	Public Health Act, 1986 (Cap 242 Revised edition 2012)	The Act addresses matters of sanitation, hygiene, pollution and general environmental health and safety which are directly related to water pollution and contamination.	The Act shall be applied to ensure that all sanitation, development of the borehole and management of the water meets public health requirements.

17.	Malaria Prevention Act (Cap 246)	The act provides for prohibition of propagating the breeding of malaria vectors or spreading of malaria due to project related activities.	The proposed project area in general records cases of malaria which may increase with the introduction of the project. The design and operation activities of the project should not encourage breeding of malaria vectors through water stagnation areas due to leakages.
18.	The National Gender and Equality Commission Act 2011	The Act seeks to promote gender equality and prohibit any form of discrimination against any; women, men, persons with disabilities, the youth, children, the elderly, minorities, and marginalized communities.	That Act will guide particularly during the project's construction and Operation phase to ensure equal access to water and opportunities for all persons including men, women, girls and boys.
19.	Sexual Offences Act, 2006	This Act protects people and employees from any unwanted sexual attention or advances by staff members. This act ensures the safety of women, children, and men from any sexual offences, including rape, defilement, and indecent acts.	This legislation will govern the code of conduct of the Contractor's staff and provide repercussions of any wrongdoing. The sexual offense act, 2006 supports the Kenya Employment Act of 2007 that a worker should not be harassed sexually to receive preferential treatment at the workplace or detrimental treatment on present or future employment
20.	The Children Act, 2001	This Act protects the welfare of children within the Country. The Act identifies Children as a person below the age of 18 years old and protects them from exploitation. Of particular importance to this project is section 10, which protects the child from: • Economic exploitation. Any work that interferes with his/ her education or is harmful to the child's health or physical, mental, spiritual, moral, or social development.	The Act shall be applied to regulate any kind of engagement or employment of underage to the project activities on site. No person without national identity card or any other document distinguishing adults and underage shall be allowed to work on site.
21.	Work Injury Benefits	This provides compensation to	Requirements of the Act will be

	Act, (2007)	employees for work-related injuries and diseases contracted in the course of employment.	applied to ensure that income for workers on the project is assured even where they are not able to work for some reasons related to working conditions while still under contract.
22.	Employment Act 2007	The main Objectives of the Act is to improve the working condition of employees and protecting their welfare as well as that of the employer	The Act shall be applied to protect workers against; discriminations, sexual harassment, forced labour, protection of wages, employment relations, settlement of disputes and protection of rights and duties in employment.

3.2.3 World Bank Safeguards Operational Policies (OP)

The proposed drilling of the Lambib host community project borehole falls under the World Bank's support to the government through investment lending towards improving water supply and sanitation facilities with a focus on the coastal and Northern region, along with strengthening sector institutions to deliver improved services under WSDP project. The proposed drilling of the Lambib community water borehole will trigger the World Bank's Safeguards Policies applicable to the project which are mandatory. Table 3-3 captures the Bank's safeguards policies triggered under WSDP and the proposed drilling of the borehole. The instruments herein are a requirement to inform better management of the environment alongside country environmental management laws (EMCA CAP 387).

Table 3-3: Applicable World Bank Safeguards Policies for WSDP and Proposed Lambib host community project Borehole

CODE	NAME OF THE POLICY	OBJECTIVES	APPLICATION TO PROJECT
OP 4.01	Environmental Assessment	To ensure that environmental and social considerations are integrated into WSDP and drilling of Lambib host community project borehole's decision making process. The aim is to enhance positive impacts and mitigate negative impacts of the project.	The policy is triggered under WSDP project and drilling of and development of Lambib host community project sub-project. The policy informed ESIA preparation for the community project borehole to guide on enhancing positive impacts of the project and mitigating negative ones.

OP 4.04	Natural Habitat	To promote environmentally sustainable development through enhancing the conservation, maintenance and protection of natural habitats and their associated ecosystem services and products for human wellbeing and sustainable social development.	The policy may be triggered under WSDP project and but not for the Lambib host community project. The proposed borehole and associated facilities is sited within an environment with highly scattered vegetation without ground cover and with the opportunity of drilling the borehole without cutting down any trees in the area. Neither will the construction activities associated with borehole development directly or indirectly affect natural habitats.
OP 4.11	Physical Cultural Resources	To preserve and conserve artifacts or sites of cultural significance for human well being	Although the policy is triggered under WSDP as a project, for the lambib host community project it is not. The borehole site location is not of any known cultural significance. However, chance find procedure shall be triggered during the drilling of the borehole, in the event that any cultural artifacts are found on site.
OP 4.10	Indigenous Peoples	To foster participatory design and implementation of project activities in a manner that respects the rights of indigenous people, their dignity and way of life. And to preserve cultural uniqueness so that they receive culturally compatible social and economic development to mitigate against any adverse impacts of development process.	OP is triggered as the community inhabited is Somali people of Northern Kenya. The consultation has been carried out in a culturally appropriate manner and FPIC has been adhered to.
OP 4.12	Involuntary Resettlement	To avoid or minimize undue involuntary resettlement and where inevitable, assist displaced persons to improve or restore their livelihoods and standard of living relative to pre-displacement levels or to prevailing levels prior to project implementation.	The drilling of the borehole will be developed in bare community land where the community gave consent to the proposed project as indicated in annex I.

	World Bank Environment, Health and safety guidelines	The proposed sub-project under WSDP triggers: environment, health and safety issues, and considerations of the general as well as water and sanitation guidelines shall come in hand to guide on the best course of action.	Relevant requirements of the guidelines have been incorporated into the ESMP
	World bank policy on access to information, 2010	The World Bank policy on access to information sets out the policy of the World Bank on public access to information in its possession. This Policy supersedes the World Bank Policy on Disclosure of Information, and took effect on July 1, 2010. The Policy is based on five principles which include: Maximizing access to information, Setting out a clear list of exceptions, Safeguarding the deliberative process, Providing clear procedures for making information available and Recognizing requesters' right to an appeals process.	In disclosing information related to member countries/borrower in the case of documents prepared or commissioned by a member country/borrower the bank takes the approach that the country/borrower provides such documents to the Bank with the understanding that the Bank will make them available to the public.

3.3 Project Institutional Framework

Table 3-5 highlights the key regulatory institutions that shall be involved in the management of the project activities during implementation and operation phases. Therefore, coordination and consultations shall be required at different levels depending on the activity at hand.

Table 3-4: Regulatory Institutional Framework

No.	INSTITUTION	RESPONSIBILITY
1.	*Water Resource Authority (WRA)*	The Authority will develop principles, guidelines and procedures for the allocation of water resources, use of water resources, manage the water resources, assess and re-assess water resources potential, receive and determine applications for abstraction permit for water use, monitor and enforce conditions attached to the permit for water use. The authority will

		also regulate and protect water resource quality in the proposed project area.
2.	Wajir County Government	The County government Act 2012 sets the development agenda in the Counties by indicating the functions of the devolved system. Water services provision is a devolved function and the development proponent (WAJWASCO) will be required to work with other departments of the county governments to realize the implementation of the proposed plan. Therefore County Government will support the project proponent to ensure smooth implementation of the project through provision of various permits, wayleave or land for the borehole and any associated water transmission facilities.
3.	*Water Services Regulatory Board*	Shall monitor compliance to standards at design, construction, operation and maintenance of the water facilities of the proposed project. After project implementation, the board will determine and prescribe the standards for provision of water services as well as evaluate and recommend water tariffs for the proposed project where need be.
4.	*Water Service Provider (WAJWASCO)*	The water utility company is the main water service provider in Wajir County. The project shall therefore be operated by WAJWASCO for service provision or as shall be agreed with the community. WAJWASCO will be responsible for contracting the works, and overseeing the appointed contractor, including the overall implementation of the ESMP recommendations during both construction and operation phases.
5.	*National Environmental Management Authority*	The authority through the county office shall be in charge of overall management and co-ordination of all matters relating to the environment impacts of the project in the proposed development area through the County Director of the Environment. NEMA will review the ESIA report and issue license.
6.	*County Commissioner*	The County Commissioner's office shall come in hand to resolve any emerging conflicts between borehole water users in the event of such arising during project operation. The office shall also resolve strive among the locals and any visiting groups accessing water during drought periods. This is anticipated during influx of communities from other areas seeking livestock watering during droughts.
7.	*The National Land Commission*	The institution will resolve land adjudication issues including land registration and management for the proposed project facilities whenever need arises.

Table 3-5 highlights the key project implementing and operation institutional framework that shall be involved in implementation and supervision of safeguards triggered by the project activities during the implementation and operation phases to ensure that they meet safeguards requirement. Therefore, coordination and consultations shall be required at different levels depending on the activity at hand.

Table 3-5: Project Implementation and Operation Institutional Framework

No.	INSTITUTION	RESPONSIBILITY
1.	County Government of Wajir	• The County government through WAJWASCO shall oversee borehole drilling and operation for the sake of community water provision services
2.	WRA	• WRA will manage the aquifer water resources through borehole works permitting, collecting monitoring data on the quality and quantity of the water resources of the borehole.
3.	Project Supervising consultant	• Shall manage the drilling and construction contract on behalf of the client WAJWASCO by supervising the drilling contractor. • Oversee the implementation of safeguards management plans on site and report on implementation progress • Ensure prompt reporting of any serious incidents on site to the relevant authorities and to the Bank and follow up on detailed investigations and remedial actions as applicable.
4.	WSDP-NWWDA Safeguards Specialists	The safeguards specialists shall be part of the project implementation supervision and shall; • Assist to ensure construction activities are carried out in line with national laws, World Bank safeguards operational policies and approved safeguards instrument (ESIA) prepared under the project. • Prepare training materials and carry out technical trainings on environmental and social safeguards requirements to the contractor. • Review Contractor's ESMP and ensure all safeguards issues are accurately addressed as per project design and project ESMP provisions, and provide expert guidance/advice to the project implementing committee site meeting. • Ensure relevant environmental safeguards requirements are included in construction contract. • Conduct independent/impromptu supervision and/or inspections of construction site to verify the compliance levels with the relevant safeguards instruments and Environmental, social, Health and Safety (ESHS). • Collect data on project environmental impact, compliance, Grievance Redress Mechanism functionality and utilization, and keep records of environmental supervision of the project activities on site. • Prepare safeguards monitoring report and input to project progress reports.
5.	*Project Implementing Contractor*	• In liaison with the project supervising consultant to ensure acquisition of all statutory permits or licenses required for any activities at the drilling and construction site • Prepare and implement an incidence response plan, grievance redress mechanism, as well as maintain the accident/incidence records and GRM logs while on drilling site. • Prepare a C-ESMP, ESHS plan and solid/Waste water management plan during drilling in compliance with approved ESIA, National laws and World Bank safeguards operational policies. The contractor shall be

		required to implement and comply with the requirements of the approved documents. • Keep a daily diary of safeguards implementation and complies activities at the drilling site.
6.	*Community members*	• Responsible in ensuring that the projects are implemented as agreed upon. • Reporting negative and positive issues brought about by the project to the relevant agencies. • Acting as watchdogs for the project and future generations.

3.4 Construction Supervision, Monitoring and Reporting

Several safeguards tools have been prepared to assist in implementing environmental management and sustainability requirements on the project. Several institutions as captured in Table 3-5, will play differing roles as captured in the same table. The ESMP in this report and the C-ESMP to be prepared by the selected contractor shall serve to ensure that the contractor observes his obligations of implementing the requirements of the ESMoP and ESMP as per National law and World Bank requirements. Reporting on Lambib host community project implementation activities shall be done at several levels. The supervising consultant shall be in charge of the daily reporting on site, on behalf of the client (WAJWASCO) as captured Table 3-5. The consultant shall in consultation with the contractor team prepare all the required reports including site meeting minutes and submit to the client. In addition, the supervising consultant and the contractor will be required to promptly report any major incidents on site to the Employer and to the Bank as well as to relevant authorities as soon as possible, within 24 hrs of the incident occurrence.

The supervising consultants shall on a daily basis supervise the implementation of the C-ESMP and ESMoP. The NWWDA Environmental safeguards consultant together with WAJWASCO safeguards team shall also conduct regular and impromptu monitoring to ensure that all the requirements of the World Bank and National laws are adhered to. The progress reports prepared shall be on weekly basis. Project implementation team from the ministry of water and sanitation shall also conduct monitoring visits to advice on the progress of the project.

3.5 Contract Management, Administration and Conflict Resolution

The supervising consultant overseeing the works shall be in charge of managing the project contract on behalf of the client (WAJWASCO). Before the commencement of the construction activities, there shall be clarification of supervision and monitoring procedures and responsibilities. The requisite instruments including a monitoring indicator checklist shall be prepared and aligned to site-specific C-ESMP that shall be prepared by the contractor. The contractor shall be required to capture all the cost associated with ESMP in the C-ESMP. The supervising consultant in addition shall be responsible of resolving any emerging contractual conflicts between the client (WAJWASCO) and the contractor. The engineer shall advice the client on the necessary actions that shall be required. Disputes shall be settled amicably through a mutual engagement process that shall be specified in the contract. However, if any dispute

arises related to the contract which cannot be resolved amicably among the aggrieved parties, the matter maybe referred to a competent adjudication/arbitration person or institutions in accordance to national laws related to contract management. The identification of an institution or person or procedure agreed upon by the aggrieved party shall be guided by dispute settlement clauses in the contract.

4 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 Over View

This chapter describes the existing environmental and social baseline conditions within the proposed drilling of Lambib host community project borehole and the associated facilities' Area of Interest (AOI). The conditions described include physical environment, biological environment and socio-economic setting within the AOI.

4.2 Project Location

The proposed drilling of lambib host community project borehole for supply of community water at Lambib is located in Wajir County, Wajir East Sub-County and within Khorofharar ward. The borehole shall be drilled at Lambib in Lambib sub-location within Arbaqeranso location. The land for the development of the borehole is community land measuring 50 by50 meters with a coordinate of UTM 37 N 0626232; 0192820 and Elevation of 262. The location map of the project site is as indicated in Figure 4-1. During Baraza meeting, the community members indicated that the project will serve communities even from outside the project area particularly neighboring manyattas and the ward in general, especially for domestic water and watering of livestock during droughts. Lanbib lies approximately ten kilometers from Wajir on the road from Wajir to Bor as shown below.

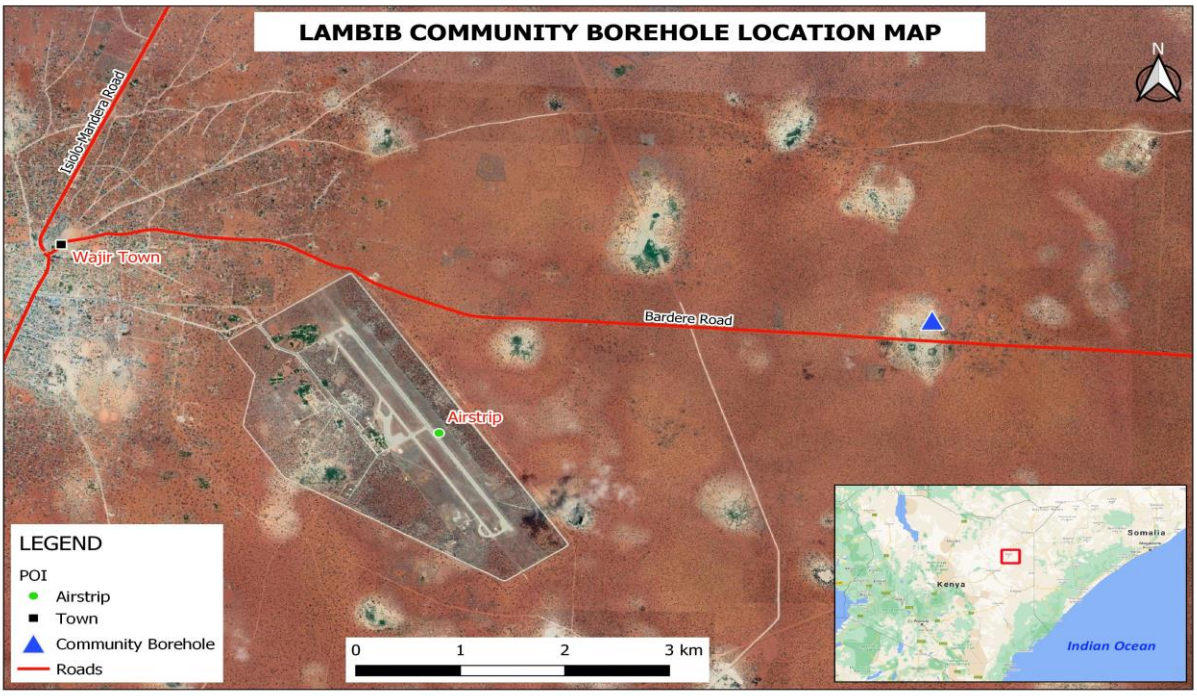


Figure 4-1: Lambib Community borehole location Map

4.3 Physical Environmental Baseline Conditions

4.3.1 Climate and Weather Parameters

Satellite derived data for the proposed project area was used for the description of climate and weather patterns of the project area. Data from Climate Hazards Center Infrared Precipitation with Station data (CHIRPS) was used to estimate rainfalls within Lambib area using the coordinates of the proposed project site. The study team acquired weather and climatic satellite spatial data for temperature, wind speed, relative humidity and radiation from FAO CLIMWAT (November 2021) at Wajir weather station.

4.3.1.1 Rainfall

Wajir County generally experiences semi-arid climatic conditions, satellite derived precipitation *(Climate Hazards Center Infrared Precipitation with Station)* for the past 40 years spanning between the years 1981-2019, the project area coordinate points were used to determine general monthly rainfall distribution and annual rainfall amount in the proposed project area. The project area usually experiences a bi-modal rainfall pattern with relatively high rainfalls under the long rains being experienced between March and May compared to the short rains received between October and December as indicated on Figure 4-2. The figure also shows that July and August are the driest month while April seems to be the wettest month of the year, within the proposed project area. The average annual rainfall within the project area was about 316mm.

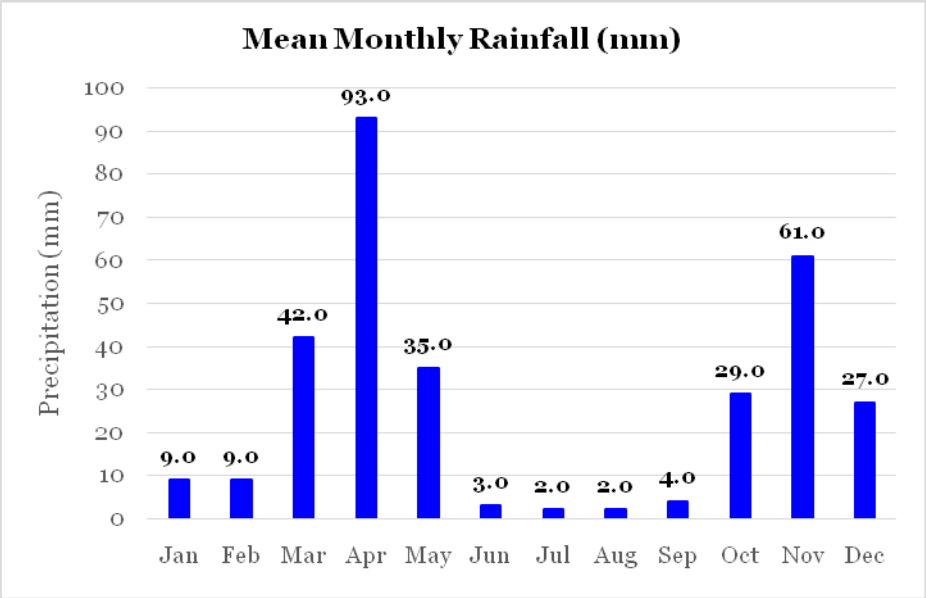


Figure 4-2: Mean Monthly Rainfalls *source (CHIRPS) accessed November 2021*

4.3.1.2 Temperature

Satellite derived temperature data for the same point and over the same period as indicated in the previous section (4.3.1.1) above was used to compute the air temperature within the project site. The temperature data analysis in the area as indicated in Figure 4-3 which shows that February is the warmest months with an average temperature of 30.2˚C while July with an average temperature of 26.3˚C was the coldest. However, the average annual temperature in the project area was noted to be 28.18˚C[3]. The welfare of the workers who will be implementing the project need to be considered by the contractor to reduce the impacts of high temperature by ensuring sufficient provision of drinking water to avoid cases of dehydration.

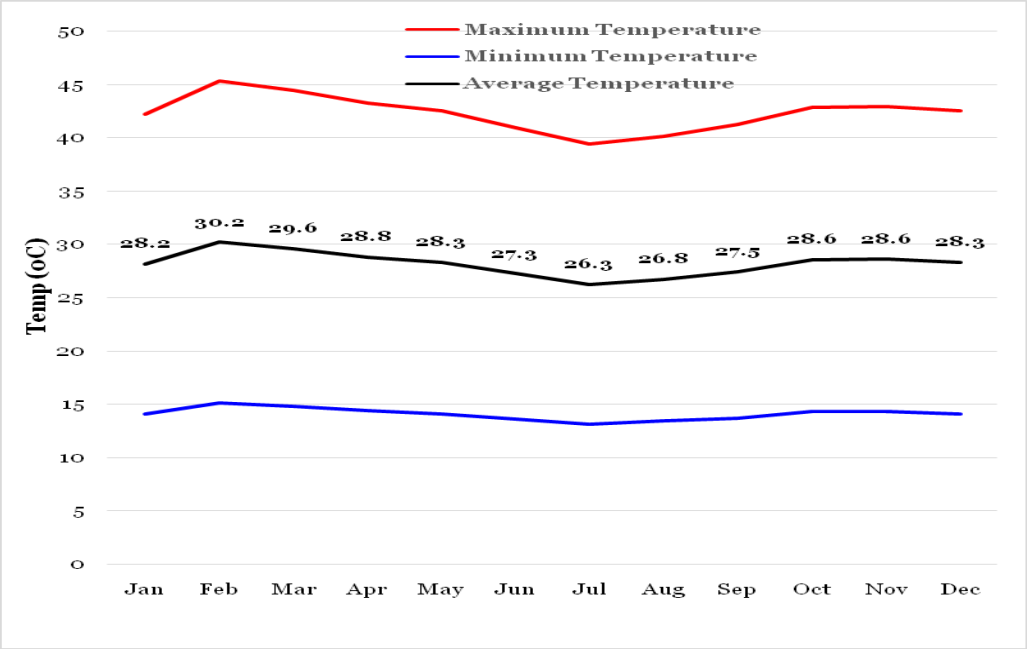


Figure 4-3: Average monthly Temperatures *source FAO CLIMWAT database (November 2021) at Wajir weather station.*

4.3.1.3 Relative Humidity

The average monthly relative humidity within the project Area of Interest (AOI) is about 61.58%. This is comparatively low if compared with most parts in the country. Seasonal mean monthly values fluctuate between 55% in February to 65% in April, October, November and December as shown on Figure 4-4. The highlight on relative humidity within the project area is significant given the high solar radiation within the proposed project area that shall lead to increased sweating among the workers on site. Relative humidity (RH) directly influences the amount of

[3] *The figure was noted to be consistent with UNHBITAT East Africa Climate data and guidelines for bioclimatic Architectural design, 2016*

moisture that is evaporated from the skin of workers to the atmosphere. The proposed project area also experiences relatively high winds that shall increase the rate of moisture being carried from the skin. The low relative humidity will be a nuisance to the contractor's team, hence the need to provide enough water to compensate for the loss through sweat.

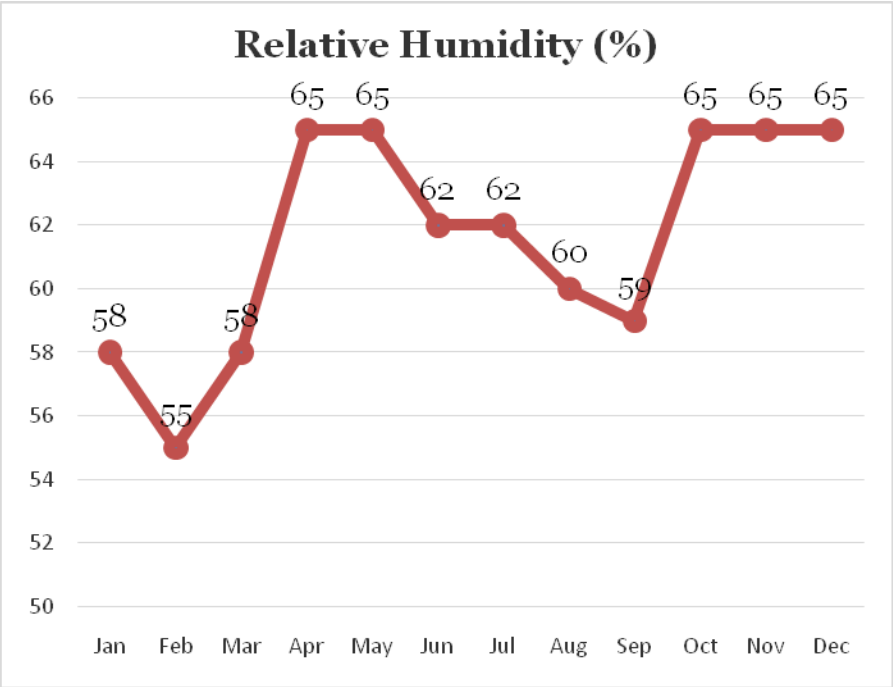


Figure 4-4: Relative Humidity *source FAO CLIMWAT database (November 2021) at Wajir weather station.*

4.3.1.4 Wind Speed

The satellite data for wind speed indicated that average monthly wind velocity experienced in the project area is about 2.55m/s with the lowest wind speed of 1.30m/s being experienced in December while the highest is 3.8m/s occurring in August and September as indicated in Figure 4-5. Wind speeds influence the subsequent changes in the rate of heating, evaporation, transpiration and the microclimate within the working area. The wind speed in addition may cause soil erosion affecting air quality status on site for the workers and the general community health. The high wind speed within the proposed project area shall be carrying the particulate matter from site dispersing to long range areas. The proposed project implementation can capitalize on the months of low wind speeds. The wind speeds generates a force that will influence the elevation steel tank and it positioning.

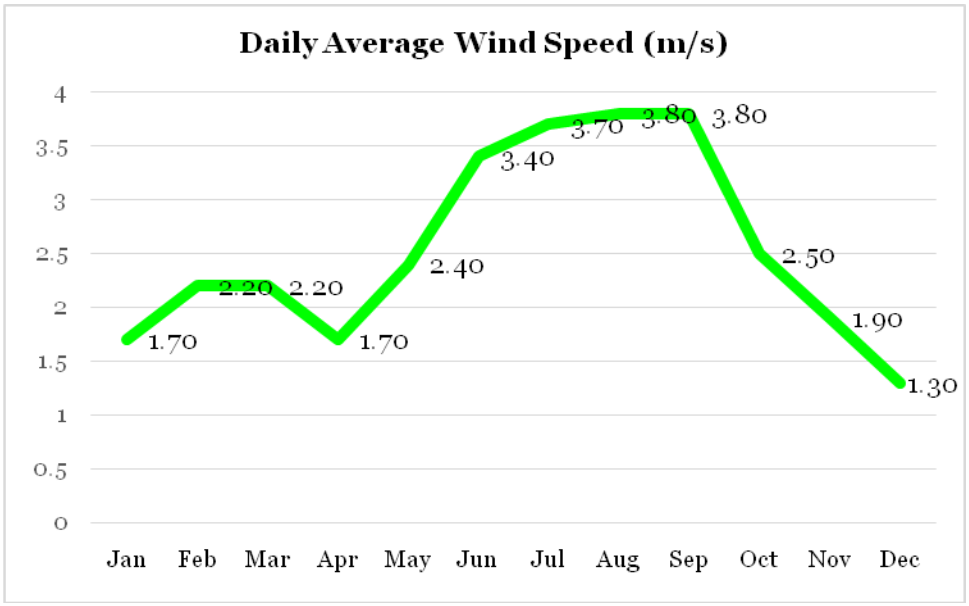


Figure 4-5: Daily wind Speeds *source FAO CLIMWAT database (November 2021) at Wajir weather station.*

4.3.1.5 Radiation

The proposed project area experiences an average monthly radiation of about 19.49 Rad (MJ/m²/day) with the maximum radiation of 22.4 Rad (MJ/m²/day) occurring in the month of February and a minimum of 17.9 Rad (MJ/m²/day) being experienced in the month of November as indicated in Figure 4-6. Solar radiation consists of different light frequencies that can pose a health hazard especially to workers exposed to the sun for long hours with the eyes and the skin bearing the greatest brunt. There will be need therefore for the project implementing agencies to take this into consideration during the construction period. However, the generally high radiation is significant for the solar system that shall power the borehole. The average sunshine hours were noted to be 6.98 in Wajir County. The least number of hours are reported in November of 6 hours and the highest in January of 8.8.

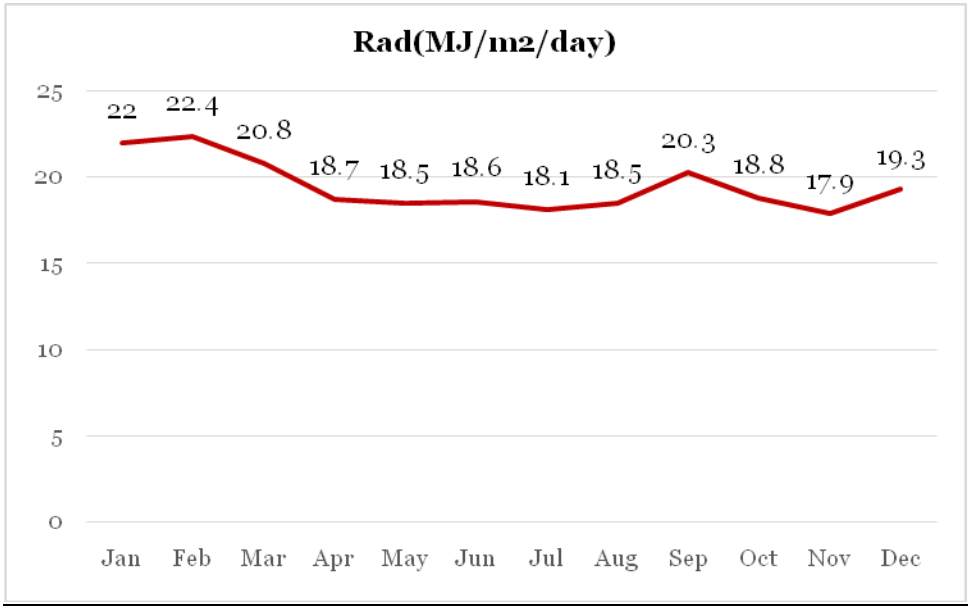


Figure 4-6: Average Daily Radiation *source FAO CLIMWAT database (November 2021) at Wajir weather station.*

4.3.2 Hydro-Geological Survey

The hydro-geological systems within the proposed project area was found to consist of three aquifers: an upper water table aquifer of 4-16 meters, and two lower confined aquifers of 25-40 and 80-100 meters deep, that were expected to be recharged through the infiltration of annual precipitations, and seepage along a major drainage (Lagha Bor) in the area. In the geophysical investigation carried out in the proposed project area, Vertical electrical sounding were employed using ABEM SAS 1000, to study the progressive change of resistivity with depth to locate zones of weathering or fracture that were regarded as good potential borehole development site. These vertical electrical soundings were used to probe to 130 or 160 meter below where no aquifer is expected. Based on the hydro-geological and geophysical investigations, it is recommended that the borehole can be drilled at the proposed site and indicated in the hydro-geological report attached as annex IV. The borehole was to be drilled to 130 meters. The findings of the survey noted that groundwater quality in the area was expected to be slightly mineralized, but suitable for the proposed use.

4.3.3 Waste Generation and Management

The main source of litter observed within the project area during field survey was solid waste from household consumption and commercial activities. Though the County Government ought to provide waste management services, there was evidence of inadequacy. Haphazard littering and wind dispersal of waste in the environment within Wajir town were observed as shown on Plate 4-1 and in lambib in Plate 4-2. The residents of Lambib area just like in Wajir town cope with the inadequate waste collection challenge through burning in compounds or

along the road as was reported during community consultation and as highlighted in Plate 4-3 to 4-4. Haphazard waste disposal was also evident in the area as captured in Plate 4-4. The study findings were consistent with 2019 housing and population census data, showing that 22.2% of the population in Wajir East sub-county reported burning waste, 26.3% buried the waste. In spite of the requirement for the county government to collect waste, only 23% of the population received the services. An implication that over 77% of the population find other means of waste management which could be inadequate leading to environmental degradation. Waste management whether liquid, solid or in gaseous form is critical in maintaining environmental integrity of an area. Waste burning enhances pollutant dispersal to the environment and if not well handled, can be a cause of environmental degradation to the air, biological diversity, ground water sources and the soils. Although generation of waste is anticipated during the borehole drilling, construction of the associated community water supply facilities and operation, most of it is expected to be recycled as back filling with an exception of waste associated with leakage and spillage from the drilling rig and the contractors camp. But despite this and given the size of the proposed community borehole and associated facilities, it is not envisioned to be a menace in the project area

Plate 4-1: Haphazardly disposed of waste near WAJWASCO offices.

Plate 4-2: Inadequate waste management in Wajir town

Plate 4-3: Burning of waste at Lambib

Plate 4-4: Inadequate waste management at Lambib.

4.3.4 Excessive Noise and Vibrations

Noise pollution possesses both auditory and non-auditory effects on the exposed population. Lmbib centre is more of a rural setting than a market area. The area is characterized by low volumes of human activities. The main sources of noise noted were general conversation, public address system in mosques and from livestock. However, as one moves away from the market centre the noise level reduces as the anthropogenic activities also reduces. There were no major noise receptors other than the local residential areas which were about 500m from the proposed borehole drilling points. However, it is anticipated that the borehole drilling rig shall lead to increased noise levels within the proposed project area. However, given the drilling duration, the noise impact is anticipated to be temporal.

4.3.5 Air quality

Air pollution at Lambib centre was noted to be mainly associated with pollutants generated from livestock movement, haphazard burning of waste at residential areas and particulates from moving vehicles or wind action on the unimproved roads (*Plate* 4-6) passing at the centre and its environs. The area has no ground cover vegetation as highlighted in Plate 4-5 and the soils is bare prone to wind actions. The gaseous and particulates pollutants are anticipated to increase with the proposed project activities though insignificantly particularly from mud particulate matter from the drilling rig and movement of construction vehicles. The degradation of air quality has a direct impact on both public health and climate change effect. Monitoring of air quality is a concern to Kenya and NEMA has prepared air quality regulations. Particular concern is about the anticipated increase in exhaust fumes from moving automobile, drilling machines and equipment during implementation period. However, given the low volume of the proposed works, with proper mitigation measures the pollution effect is not anticipated to be a challenge.

Plate 4-5: Poor ground cover

Plate 4-6: Unimproved road from Wajir town to Bor through Lambib

4.4 Biological Environmental Baseline Conditions

4.4.1 Flora and Fauna

According to key informant interview, the proposed project area falls within semi arid region which is under Agro-ecological zone VI. Such areas are typically characterized by low annual rainfall of between 200-400mm as indicated in section 4.3.1.1. The typical predominant natural vegetations in such zones include short grasses with small leaved thorny trees and bushes. The most dominant vegetation observed within the general project area was *Acacia reficiens* as indicated in Plate 4-7 and *Comiphora myrrh* as shown in Plate 4-8. The vegetation within the borehole site remains largely undisturbed. The wildlife officer consulted indicated that the common animal species in the project area include Somali Giraffe, Dick-Dick, and Gerenuk with the Somali Giraffe being an endangered species.

Plate 4-7: ***Acacia reficiens***

Plate 4-8: ***Comiphora myrrh***

4.4.2 Invasive Species Management

There were no invasive species observed in the area of interest. However, the general area is affected by *Prosopis juliflora* present in Wajir town. This could potentially be introduced to the project area if carried in infected machines or any materials sourced outside the project area and the project vehicles working in areas affected. *Prosopis juliflora* if introduced in the project area will spread rapidly inhibiting the growth of local plant species and it's known of inhibiting ground cover type of plants. There is need therefore to ensure that equipment to be used for the drilling and development of the community project are free of any alien plant materials and soils which may contain seeds of alien species. Project vehicles that move into areas infected by *Prosopis juliflora* present in Wajir town should be appropriately cleaned. Also, the sources of raw materials used for development of the borehole should be from areas with no alien/ invasive species. Although the risks are low based on the observations made at the project site, there is need for continued vigilance by the drivers, those in charge of vehicles and equipment, in charge of material sourcing and the environmental advisor through monitoring of any signs.

4.4.3 Natural Habitats

The habitat at the proposed community project borehole site was considered to be a natural habitat and no significant modifications had been made to the physical environment either for human settlement or developments. The main land use was livestock grazing, pastoralism as practiced utilizes the natural resources within their cycle of availability. The main wildlife reported in the area were Somali Giraffe, Dick-Dick, and Gerenuk with the Somali Giraffe being the endangered species.

4.4.4 Visual Impacts

The project area was noted to be natural and without anthropogenic objects. But introduction of the proposed project facilities is particularly the solar panels is anticipated to change the landscape scenery of the area of interest due to artificial objects not being consistent with the background scenery. However, this can be compensated by use of materials with hue consistent with the background area or planting of vegetation consistent with site area, around the perimeter of the borehole site. WAJWASCO through the social safeguards team should also consider keeping consulting the local community to understand their perception and suggestions of what need to be done.

4.5 Socio-Economic Baseline Conditions

4.5.1 Administrative units

The proposed drilling of community project borehole for supply of community water at Lambib is located in Wajir County, Wajir East Sub-County and within Khorofharar ward. The borehole shall be drilled at Lambib in Lambib sub-location within Arbaqeranso location. During Baraza meeting, the community members indicated that the project will serve communities even from outside the project area particularly neighbouring manyattas and the ward in general, especially for domestic water and watering of livestock during droughts.

4.5.2 Demographic Characteristic of the Project site

4.5.2.1 Population Levels

According to housing and population census of 2019, the population for Arbaqeranso location indicated that the male population is slightly higher at 53.63% than female population. The data at Lambib sub-location shows similar results though the percentages were almost same with male being 50.88% and female at 49.12%. The population and housing census further indicated that the location has a total of 865 households with an average household size of 6.2 persons per household which was noted to be consistent in the Lambib sub-location with 323 households and 6 persons per household.

4.5.2.2 Literacy levels

Literacy levels within the general Wajir East Sub-County is relatively higher compared to the rest of the County with Habaswein having the highest literacy level than the sub-county. The national average was 82.8% based on the 2019 census, Wajir County was 21.34% and Wajir East Sub-county had at least 32.91% of the population having attained a form of formal education. It was noted that males in the sub-county had a slightly higher literacy levels than females at 58.12% and 41.88% respectively. About 64.7% of the population does not have any form of formal education in Wajir East Sub-County, with majority observed to be male at 51.12% compared to women at 48.88%. The majority of those with formal education have a form of primary education at 51.92%, secondary levels at 27.37%, 6.89% for tertiary, 3.59% university and 2.1% had other form of literacy either adult basic literacy or madras. There was high gender disparity among those who have attained university level of education with males consisting

78.93% compared to 20.99% who were women. The literacy level figures at national, Wajir County and Wajir East Sub-county were as shown on Table 4-1[4].

Table 4-1: Literacy Level Attained in Wajir East Sub-County

	Level of Literacy	Male	Female
National	82.8%	50.06%	49.96%
Wajir County	21.34%	58.12%	41.87%
Wajir East Sub-County	32.91%	58.12 %	41.88%
Pre-Primary level attained in Wajir East Sub-county	8.16%	51.86%	48.14%
Primary level attained in Wajir East Sub-county	51.92%	54.41%	45.59%
Secondary level attained in Wajir East Sub-county	27.37%	62.21%	37.79%
Tertiary College level attained in Wajir East Sub-county	6.89%	66.89%	33.11%
Universe College level attained in Wajir East Sub-county	3.59%	78.93%	20.99%
Other form of literacy level attained in Wajir East Sub-county	2.1%	53.5%	46.5%

4.5.3 Social Amenities and physical infrastructure

4.5.3.1 Project Area Accessibility

There are limited options in modes of transport to access the proposed project area. Lambib centre is connected to other areas through road network. The main road is Wajir town-Bor road which is unimproved murram road. The road passes through Lambib centre from Wajir to Lambib.

4.5.3.2 Communication Network

Lambib centre and its immediate environs were generally noted to have adequate communication network relative to other areas particularly the rural as one move away from the centre. Development in communication network in an area has an influence on the level of awareness among the local population. Findings from observations, key informant interview and focused group discussion showed that wireless communication is the main mode of communication in the proposed project area. The major mobile network coverage for three communication companies Safaricom, Airtel and telecom were reported to receive signals within the project area, but due to the strong safaricom signal reception, it was reported to be the most

[4] *The data shown on the table was extracted from 2019 Kenya population and housing census Volume IV specifically table 2.4*

popular among the locals. The 2019 population and housing census data indicate that about 33.2% of the population in Wajir East sub-county uses mobile phones, and it appears like women own phones equally like men at 33.2% by each sex. Access to communication services particularly to mobile phones is critical for communication and also money transfer during project operation. The findings further shows that 13.5% of the population within the sub-county use internet men accessing at 15.4% and women 11.3% but interesting is that only 5% of the population own a computer or a laptop. This indicates that of the 13.5% who use internet majority could be accessing the internet using the mobile devices which further shows the significance of communication through mobile phones.

4.5.3.3 Industries and Trade

The type of industrial development in an area suggests the level of consumption, employment and pollution levels particularly from effluents. The proposed project area does not have any industrial activities as was reported during community baraza discussions and key informant interviews as well as observations. The area is more of a rural area and the water to be supplied by the community project borehole shall mainly be for domestic use and watering of livestock. Industry and trade development in an area is among the proxy indicators of the potential demand for water services as well as potential source of waste water. Availability of adequate and reliable water is critical to industrial development in an area. waste water is currently not an issue within the proposed project area.

4.5.4 Land Use and Ownership

4.5.4.1 Land use Pattern

Land in the project area was observed to be generally used for livestock grazing, public land hosting schools and mosques, settlement and for limited subsistence agricultural activities away from Lambib as was reported during community consultation. The manyattas in the area were noted to be clustered around the centre. According to key informant interview and community baraza findings, land in the project area is community land and those who own land at the centre were allocated by the clan elders based on the family and clan settlement patterns. Land use information is significant in providing a view of the main economic activities within the proposed project area and it also provides an indication of whether the proposed project activities are in tandem with the general land use.

4.5.4.2 Land Tenure Status

Land is a factor in the implementation and operation of the proposed project and resolution of any emerging conflicts related to land will require consultations among various stakeholders. Land in Kenya is generally classified as public, private or community land. Key informant interview and the community baraza results revealed that land within the proposed project area is under community land held on behalf of the community by Wajir County. Although individual households seemed to own plots, the land is yet to be subdivided and allotted to individual community members. The apportioning of land to individuals is through the clan elders and the

community members do not have any documentation. The right to access land is therefore managed and adjudicated through elders from different clans. The local people were reported to have the right to access land. The local leadership and elders ratified the drilling of the community project borehole and the associated project facilities through signing of the land consent forms. The agreement documentation authorizing the location of the borehole was part of associated water supply and sanitation facilities. The associated facilities include constructing 1 No. elevated still tank, 2.14km distribution main, 6No. Water kiosks 6 No. cattle troughs, 15 No. ecosan toilets to vulnerable households and fencing around the borehole, was as indicated in Annex II. Although the community discussion meeting was for all the host community project components, it should be noted that the impacts of the associated water supply works and sanitation facilities were assessed in a separate ESIA project report.

4.5.5 The Main Water Sources

Community consultation findings and field survey observations indicated that the main water sources within the project area are ground water shallow wells as indicated in Figure 4-7 and with few reporting rain water harvesting. The observations by the participants were consistent with 2019 housing and population census which indicates that ground water is the main source of water in Wajir East sub-county. The use of unprotected and protected shallow wells was the most dominant sources as reported by 74.7% of the population in the sub-county and rain water harvesting was reported at 0.2%. The area is yet to receive any improved water supply and the project is perceived as a timely opportunity by the local community members.

Figure 4-7: One of community shallow well in Lambib

4.5.6 Water Source Reliability

The existing community water supply sources were reported not reliable at the time of the study. The main concern has been the water table receding overtime due to the recurrent droughts experienced in the area, as a result of climate change effects. It emerged from the

Baraza discussions that initially locals used to access water by digging between 10-15 feet but currently the depth has increased to between 20-28 feet for one to access the water table. Some of the participants in the meeting reported the shallow wells having dried up. For those who reported ran harvesting. This indicates the urgency and need for the proposed project interventions to stabilized water supplies to the residents of the area.

4.5.7 Vulnerable and Marginalized Persons

Vulnerable and marginalize individuals are an important segment of the population and Kenya's constitutions provide deliberate measures to improve the conditions of such groups in the society. The water Act 2016 also recognizes the access to safe and clean water as a human right. The proposed project also needs to take deliberate measures to improve the accessibility of these groups of individuals to services for a decent living standard. The focused group discussions and key informant interviews revealed several vulnerable and marginalized persons/individual among the population in the proposed project area including; the elderly, children, persons with disability, widows, very poor, orphans and youth. According to 2019 housing and population census, 0.4% of the population in Wajir East sub-county was reported to have a form of disability ranging from visual, hearing, communication, self care, cognition and mobility. However it was apparent from the baraza meeting that vulnerable and marginalized formal groups or associations were not present within the proposed project area but rather integrated in other community interest groups. In spite of this, the project provides an opportunity for the living standards of such special groups to be improved. Access to water services being a human right under Kenyan constitution, WAJWASCO will make deliberate efforts to ensure the VMGs access water services.

4.5.8 Cultural Heritage and Properties

The proposed project area is predominantly inhabited by the Somali people who constitute of over 99% of the local population. Lambib sub-location within Arbaqeranso location is mainly occupied by the Degodia and Ogaden clans. The Somali people are culturally governed by council of elders who manages and resolves conflicts among community members as well as adjudicate access to natural resources and land. The local community is religious especially with over 98.97% being Muslims and less than 1.5% being of other faith in the general Wajir County. The local people are usually pastoralists and business people with limited practice of crop farming activities partly contributed by the weather patterns and the soils. Given the low volume of works, the proposed project will not influence the cultural behavior of the local people neither anticipated to make any changes to their present traditions. It is anticipated that with sustained provision of water services, there could be change of land use in some parts of the areas to provide for business premises. Since the project is not anticipated to conflict with the cultural practices of the local people, they shall contribute towards its sustainability.

4.5.9 Community Anticipated Impacts of the Project

Findings from Household survey and Baraza meeting showed that local people were expecting the project to have impacts including; Provision of employment opportunities, improvement of health and hygiene of the local, reduction of diseases related to poor sanitation and provision of piped water. The project in addition shall ensure that local people access reliable water sources free of contamination from the surface infiltrations.

5 PUBLIC PARTICIPATION AND CONSULTATIONS

5.1 Overview

The chapter highlights the need for stakeholder participation and the consultative process adopted during the study and summary results of the process.

5.2 The Consultative Process Adopted

The environmental survey team recognized the significance of the assignment findings to intended users and in this regard, considered active involvement of all the project stakeholders. To attain this objective, the consultant adopted a participatory approach in the identification of environmental and social impacts that are related to the project cycle. Several methods were used to engage stakeholders in the process of capturing their views, issues and concerns on the proposed project during data collection. The levels of project stakeholder engagement during data collection approaches and procedures were through household questionnaire data collection, key informant interview with selected leaders and through community meeting (Baraza).

5.3 Key Informant Interviews

This section highlights the summary of key observation made by purposively selected key informant officers consulted during the study. The number of officers consulted and the discussions were as indicated in Table 5-1

Table 5-1: Summary of Key Informant Interviews

No.	Key Informant Interviewed	Summary of Remarks
1.	Kenya Wildlife Officer	The officer acknowledged that the project will impact wild life in a 5.6 radius. He said wild animals will benefit from community water ponds especially during the night. If water is availed in Lambib, there will be less internal migration of animals from Lambib to Gayune in Wajir west common during the hot season. He also noted that the project will supplement the water ponds constructed near Khumbi wells, Lake Yahud, and Gagab wells where animals converge for water. Common animal species in the project area include Somali Giraffe, Dick-Dick, and Gerenuk with the Somali Giraffe being the endangered species. Asked whether there are wildlife migratory routes in the project area, the official responded that there are no major migratory routes in the area, however, he observed that During the dry season, some wells dry and animals tend to internally migrate from Lambib to Gayune in Wajir west in search of water and pasture. The common breeding and nesting grounds is near Lake Yahud, which is abit far from the project site. He was not sure the project could affect the breeding and nesting grounds

		or the lake. The officer also noted that there are no wildlife grazing or migration areas of significance within the proposed site and also no habitat areas that will be significantly impacted by the project. The vegetation types within the proposed project area/ecosystems that are significant to wildlife include acacia trees, and shrubs, and water points. There is a community conservancy around Lake Yahud, registration process is in the final stages. There is no human-animal conflict, the land is vast and settlement areas are just but a small portion.
2.	The Social Welfare officer	The officer indicated that formation of social welfare groups is not very common but with sensitization, the trend is changing. He noted that people live in tribal and clan groupings with men dominating over women. The Islamic religion he emphasized encourages men to be more aggressive while women are encouraged to be more submissive with most of their activities confined within the home. This makes it difficult to meet certain standards for registration such as gender discrimination. He noted that the most common challenges that groups face is inadequate resources, illiteracy, and cultural and religious values. He noted that out of an approximate population of 300 households with an average 8 people per household, there are only 20 youth groups, 50 women groups, 1 group of PLWD, and 30 registered elderly persons receiving the social welfare fund. In addition, the officer observed that of the 50 women groups, only 6 groups engage in income generating activities dependent on water resources with their main activities being crop production specifically water melon. Their greatest challenge the officer noted was availability of water since shallow wells cannot sustain the expansion of their activities. There is also lack of cooperation from members within groups. Other groups are idle and only renew their registration status during campaigns to receive handouts from politicians.
3.	Land and Physical planning officer	The officer reported that there is no land use zonation of the proposed Lambib project site. Land is communally owned and settlement was mainly determined by availability of water and pasture. Lambib for example had no people until the last 17-20 years when shallow wells were discovered around the area. The officer also observed that the major use of land is Grazing. The land tenure system is communal. For government projects, the Community gives land and the county regularizes what the community has decided by giving some form of written documentation. There is no registration status, what the community endorses is what determines the distribution of land. Land has not been fully devolved to the extent of according the county governments authority to determine land uses. Land issues in the counties are guided by the national laws and policies.

4.	Forest Officer	According to the Officer, Lambib does not fall within the government natural forest designated zone. The common vegetation types include *Acacia, Commiphora* and bush land. The officer also reported that the main uses of the vegetation in the area include construction of traditional houses (the Somali hurt), source of herbal medicine, range for livestock and habitat for wildlife. He affirmed that the main source of cooking energy for most of Wajir and other towns in the region is charcoal, thus the greatest human threats to the vegetation is charcoal burning.
5.	County Environment and Natural Resources Officer	The officer declined to give any comment on waste management practices. He observed that waste management is a component that was given to Wajir town municipality. On the key environmental issues of concern within the area, the officer acknowledged that charcoal burning which threatens the vegetation, land cover and affects grazing land was the main issue. This is not a problem for Lambib alone but a problem in the entire Wajir county. The officer reported that 95% of the charcoal used in Wajir town comes from the neighborhoods, Lambib being one of them. The officer also acknowledged that water pollution in Lambib is a major challenge. Water contamination source is mainly human solid waste including spittle, defecates, and plastics which find their way in shallow wells either by wind or rain water. He reported that when it rains, such contaminants change water color and taste. Other than these challenges, the officer reported that there are no major environmental issues of concern for the project. Asked if the county government had passed any environmental bill, the officer responded that the Water bill is in its final stages, but other bills such as the waste management bill, Charcoal burning control bill, have also been drafted but he was not sure whether they have been passed.

5.4 Lambib Community Baraza

The community baraza was held in addition to Key informant interviews and household survey as a means of seeking the opinion of community members regarding the proposed project. The baraza was organized by the area chief in consultation with the village elder in Lambib and was held on 18th March 2021 at the project site as indicated in Plate 5-1 and Plate 5-2. Community members were invited to participate in the meeting as indicated in the attendance list in Annex III. The meeting consisted of men and women, all in the presence of the area chief and the elders. The EIA assessment team presented the objective and the scope of the project. The participants were taken through the environmental and social impact assessment process. The aim was to get input and concerns that need to be considered in the ESIA project report, during implementation and operation of the project facilities. From the findings of the discussions in the meeting, it was apparent that the project was welcome and considered timely by the community members. The meeting discussions were guided by the social safeguards expert from

WAJWASCO and some of the observations made by the participants were as captured and detailed in Annex II *(it is critical to note that though this SPR report focuses on drilling and development of the community borehole, the meeting discussions in the minutes also captured the water works and the ecosan facilities in the same meeting. However, these other works were assessed in a separate ESIA report).*

A summary of the feedback includes;

- During the meeting, it was observed that land had already been allocated to the project and the community had signed community land resolution and consent forms for land use.
- The community members who were to benefit from the other component of the project were to sign consent forms as it were to be guided by WAJWASCO social safeguards expert.
- It had been agreed that the community project borehole was to be managed by WAJWASCO
- The community members made a request of being given 90days grace period after operationalization of Lambib host community project.
- The community in general felt the project shall improve employment opportunities, health and hygiene of the local, reduction of diseases related to poor sanitation and provision of piped water to the locals

Plate 5-1: Local youth Following the Community baraza discussions

Plate 5-2: Community members following proceedings during community baraza.

Local Women following Proceedings

5.5 Summary of Issues Raised during baraza and the response

There were several issues that were raised by the community and the team gracing the community baraza discussions gave responses to the concerns of the community as captured in Table 5-2.

Table 5-2: Summary of stakeholders Issues raised and the response

KEY ISSUES RAISED	RESPONSES
Responsibility to operate and maintenance of the proposed project	It was agreed that WAJWASCO shall be responsible of operating and maintaining the proposed project facilities including the borehole and the associated water distribution facilities.
Payment for the water services	It was agreed that WAJWASCO shall give the community a grace period of 90 days (3 month) to use the water for free.
Community fear of the borehole affecting the shallow aquifer if the drilling is not done properly	The shallow aquifer will be protected with a plane casing so as to safeguard the water in the supper aquifer not to sip in to the ground aquifer at the lower level. The borehole shall draw the water from the lower aquifer and the two aquifers to not share the same table.
Pollution associated with the machinery used such as oil spills, noise and emission of smoke.	Constant maintenance of the machines to reduce the impacts. The use of machinery should be reduced where possible and employ man power.
There is likelihood of vegetation being cleared during the process of construction.	Ant tree affected to be replanted by the contractor.
Accidents were identified as an issue of great concern during the construction and operation	Contractor shall be required to have a safety plan Use of PPEs was identified as an important way of protecting the workers against accidents.

	phases. Workers in the site were identified as the most vulnerable to accidents.	Locals were asked to keep off the construction site in order to avoid accidents. Labeling of exits and fire assembly points. Annual audits to address loopholes in safety strategies. Hoard the site to keep people off. Site should have signs such as falling objects. Contractor shall have group insurance cover.
	Dust pollution during construction phase	Water to be sprinkled during the construction phase in order to minimize dust.
	Waste management issues may arise due to inadequate waste collection facilities and this may lead to outbreak of diseases.	The contractor to provide waste pins and empty to appropriate designated area. Sensitize workers not to throw solid wastes haphazardly
	There was fear that once the water and toilets are ready for use, some people may be sidelined owing to several social issues such political inclination, social class, clan or religion hence unfairness during distribution and construction phase.	Locals agreed that the administrators should ensure that fairness is given special attention and ensure all residents have and equal opportunity to work and access water and sanitation services once the process is done.
	Moral decadence may result as a result of labor coming from outside and money circulating in the local economy. It may come inform of infidelity in marriages and school drop outs caused by teen pregnancies. This could also result from women and men engaging in extra-marital sexual activities thereby breaking family ties.	Parents, local leaders eg chiefs and religious leaders should take the lead role in teaching and sensitizing the community on the importance of morality and bringing the culprits to book. Use of local labour to avoid influx of workers that can spread immoral issues.
	Some locals expressed fears that there is likely to come with increased burden of water charges.	The County government and WAJWASCO should involve the locals before effecting any pricing strategy for the water.
	Use of machines by the contractor to avoid local labourers	The contractor to use local work force and only use machine where necessary. Priority to be given to locals in all employment opportunities unless the requisite skills are not locally possessed by the local workers.
	Spread of disease like COVID 19, HIV/AIDS and other communicable diseases	Contractor to strictly adhere to the covid-19 protocol measure. Provision of condoms to the workers. Sensitization of the community against the risk of contacting diseases like HIV AIDS

6 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

6.1 Overview

This chapter highlights impacts of the proposed development; positive and negative impacts of the project as well as mitigation measures against deleterious effects of the project as captured in Table 6-1 and Table 6-2.

6.2 Positive Impacts of the Proposed Project

The implementation of the proposed project is anticipated to have overall positive impacts particularly on health and sanitation as well as economic status of the residents within the area of interest. Some of the positive impacts are;

- Creation of temporal employment opportunities at the construction site. The local people during community consultations reported anticipating for creation of employment at the construction site from the opportunities presented by the project activities.
- Creation of markets for project construction materials: It was evident from the discussions with the community that there shall be creation of markets for project construction materials which should be sourced locally from those who can supply.
- Easy and faster Access to water: It was apparent during the study that local people sometimes face challenges of access water especially during droughts when the water table recedes. Portable water sources are limited in most parts of the study area. Implementation of the project will provide an opportunity to improved access to water hence reducing time and distance travelled to fetch the commodity particularly by women and the girl child.
- Increased access to clean water and improved sanitation to the local population that shall impact on personal and food hygiene and decline in cases of water-borne diseases.
- Improved Water Reliability: The proposed additional water sources will improve the reliability of the existing supply where locals reported drying of the shallow wells in the area.
- The vulnerable groups in the community make tremendous physical and financial efforts to access portable water. They often resort to unsafe sources to obtain this valuable commodity therefore the project will come in hand to improve access to safe source. Hence access to adequate drinking water in terms of quality and quantity will improve resorting to the often unsafe sources.
- Reduce child mortality: Access to clean water is also anticipated to reduce the mortality rate, particularly among children, and helping to increase life expectancy within the environs of the proposed project area.

6.3 Negative Impacts of the proposed Project

The proposed project focuses on the drilling of community borehole. The implementation and operation of the proposed project activities is anticipated to results to negative impacts highlighted below;

- **Public Safety:** Public safety issue is anticipated to arise during borehole drilling, at construction site, movement of machines and equipment to and from site may lead to injuries or accidents to livestock, wildlife or the public.
- **Air quality:** It is anticipated that exhaust fumes and dust emission will be generated during drilling and construction works of the proposed borehole facilities.
- **Excessive Noise and Vibrations.** Drilling rig is anticipated to generate high level of noise impacting mainly workers working on the rig as the nearest homestead form the site is about 500m. Noise shall also be from movement of contraction vehicles on site.
- **Occupational Health and Safety (OHS):** Accidents may occur on site causing injuries during implementation of the project works affecting the workers
- **Solid waste generation:** The proposed project activities are anticipated to lead to increased generation of solid waste. The main source of waste shall be the contractor's camp, construction waste and drilling mud. It is anticipated that increase of economic activities within the project area due to availability of water shall also come with increased waste generation during project operation phase.
- **Spread of invasive species:** The proposed project area was noted to be without Prosopis *julflora* (mathenge). However, there is a risk if the construction machines and equipment shall be contaminated. This can occur during sourcing of materials especially from areas that are infected as Wajir town was noted to be infected with Mathenge plant. Therefore, there is likelihood to spread during project implementation by borehole drilling and construction equipment. Spread of invasive species is often associated with loss of indigenous species, injury to animal and local people
- **Game meat poaching and injury and accidents to wildlife:** Free range wildlife was noted on site and the site workers may be tempted to engage into game meat poaching. There could be knocking of wildlife in the area by moving vehicles.
- **Leakage and spillage:** Leakage and spillage from the contractor's drilling rig (machines and equipment) is anticipated at the site during borehole drilling and construction of the associated facilities.
- **Increase in waste water:** Test pumping of the borehole shall lead to high waste water depending on the quality of water struck. However, this shall be temporal and restricted at project implementation phase.

The proposed mitigation measures for the above impacts are discussed in Table 6-1.

Table 6-1; Mitigation Impacts and measures during project Implementation phase

No	ANTICIPATED NEGATIVE IMPACTS	IMPACT RATING	MITIGATION MEASURES
1.	**Public Safety** Public safety issues are anticipated to arise during borehole drilling, at construction site, movement of machines and equipment to and from site, movement of construction vehicles.	**Impact is minor** The impact is temporal and will be of local scale given the volume of works, anticipated contractor machines and vehicles on site.	• Ensure the safety of residents by providing safety signs at strategic places around the access roads. • hording off working sites to protect the public or unauthorized persons • Reduce unnecessary speeding to prevent accidents from the movement of pedestrians or livestock in the area.
2.	**Air quality** It is anticipated that exhaust fumes and dust emission will be generated during drilling and construction works of the proposed borehole facilities.	**Impact is low** The impact is temporal and will be of local scale given the volume of works, anticipated contractor machines and vehicles on site	• Workers to use masks when working in dusty conditions. • The community members to be discouraged from going to site to watch drilling or construction activities • Consider shielding wind impacts during drilling to reduce mad particulate matter being blow away if it's in the direction of settlement. • Reduced speeding on the dusty roads • Construction vehicles to have catalytic devices to ensure complete burning of waste gases, • proper servicing of vehicles and Construction machines • Use all means possible to suppress dust if considered to be a menace during excavations
3.	**Excessive Noise and Vibrations.** Drilling rig is anticipated to generate high level of noise impacting mainly workers working on rig. Noise shall also be from movement of	**Impact is Moderate** The impact is temporal and will be of local scale given the volume of works, anticipated number of contractor machines and vehicles on site.	• The community members to be discouraged from going to site to watch drilling/construction activities • Machines and equipment to be fitted with silencer/muffler devices where possible, • Using equipment and machines with low noise

	construction vehicles on site	However, water drilling rig generates high amount of noise and given the number of hours the workers spent on site could have substantial impacts.	emission. • switching off vehicles and machines when not in use, • avoiding unnecessary hooting, • Workers to be provided with personal protection equipment earplugs. • Reduce working hours for the workers on site during drilling by having working shifts • machines to be serviced to reduce generation of noise and vibrations, • the noisy activities should be restricted during daytime • Ensure that NEMA noise and Vibration standards are observed in all project activities. • Training/sensitization/awareness on use of PPEs and personal safety measures.
4.	**Occupational Health and Safety (OHS).** Occupational Health and Safety (OHS). Accidents may occur on site causing injuries during implementation of the project works affecting the workers.	**<u>Impact is low</u>** The impact is temporal and will be of local scale given the volume of works, anticipated volume of contractor machines and vehicles on site	▪ Contractor to develop a site safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency, and personnel responsible for safety inspections and controls. This should be ready and approved by the supervising engineer before commencing works ▪ Train workers on safety before commencing works ▪ Ensure safety of the construction workers by putting first aid area and injury reporting mechanism ▪ Ensure compliance to Occupational Safety and Health Act (OSHA) 2007 and its Subsidiary Legislations. ▪ Provide appropriate personal protective equipment (PPE) to workers and training on appropriate use. *(Reflective jackets, helmets, face*

			masks, ear plugs gloves, safety boots, etc.) ▪ There should be adequate provision of the requisite sanitation facilities for human waste disposal ▪ Recording of all injuries that occur on site in the incident register, corrective actions for their prevention are instigated as appropriate. ▪ The contractor shall be required to have WIBA insurance policy to cushion self and workers against loss of income in an accident on site. ▪ Provide clean drinking water for the workers to mitigate against dehydration.
5.	**Solid waste generation** The main source of waste shall be the contractors camp, construction waste, drilling mud and cuttings	**<u>Impact is low</u>** The volume of works are low and the team onsite is also anticipated to be small	• Preparation of waste management plan to guide waste management and disposal activities, incorporating segregation of hazardous from non-hazardous wastes. • Reuse of all soil cuttings from the excavation works • Proper disposal of waste from the contractor's camp • Disposing off contaminated soils in cutting pit if volumes are low. • The contractor to develop site specific incident management or response plan in the event of hazardous waste contamination *(used tyres, Oil and Fuel filters*). •
6.	**Spread of invasive species.** Spread of invasive species, loss of indigenous species, injury to animal and local people	**<u>Impact is low</u>** <u>*Prosopis juliflora*</u> was noted in Wajir town and can easily be spread due to project related activities. Particularly when the rig and drilling equipment are contaminated	• Regular monitoring of the project site for the spread of alien plant growth and in the event of such observation, employing relevant management practices e.g uprooting young plants or burning to control the spread of the plant. • Raw materials used for construction such as sand and rocks should be sourced in areas where there are no invasive species. • Equipment required for the drilling and

			construction works should be clean and free from any alien plants and mud which may contain seeds or tuber of alien species. • Create awareness among the local community on management of the spread of the invasive species. •
7.	**Leakage and spillage** Leakage and spillage from the contractor's drilling rig, machines and equipment is anticipated at the site during borehole drilling and construction of the associated facilities.	**Impact is low** The low volume of works anticipated to attract a low number of machines	• Development of site-specific incident management or response plan. • Taking all measures possible to reduce any spillage and have emergency spill response kit on site, with staff trained on emergency spill response • In the event of hazardous waste leakage or spills, engage authorized waste handlers to dispose contaminated soils. • Disposing off contaminated soils in cutting pit if volumes are low. • Use of NEMA licensed waste handlers to dispose hazardous wastes in licensed disposal areas.
8.	**Game meat poaching and injury to wildlife**	**Impact is low** The impact is temporal at implementation and the drilling and development of the borehole is anticipated to take short time of less than a month	• Sensitization and awareness creation among workers on the illegality of the action and criminal charges. Prohibitions to be incorporated in the code of conduct • The movement of construction vehicles to be restricted to day time • Reporting of any incidents involving injury or game meat poaching to KWS • Engaging local conservation groups to conduct monitoring during project implementation period • Sensitization of the local community members to participate in monitoring and reporting any illegal activities against wildlife
9.	**Increase in waste water** Test pumping of the borehole shall lead to high waste water depending	**Impact is minor** The impact is temporal at implementation but could be fatal if the livestock is watered on test pumping waste water yet	• Create awareness on reusing waste water for kitchen gardening or tree planting • Do not allow any livestock to drink water during test pumping before the quality is ascertained.

	on the quality of water struck.	the quality is not right.	• Create awareness and sensitization among the locals on the possibility of risks posed by test pumping water to livestock. • WAJWASCO to consider construction of waste management and treatment system in the long-term.
10.	**Covid-19** In the event that one of the contractor's workers has covid-19 virus then it can spread so fast between workers and any other persons who come in contact with infected persons. There is also a possibility of the community members infect workers	**Minor** The drilling and equiping of the borehole are anticipated to take less than 5 days. However, in the event of infection, the virus has a potential of spreading quickly Therefore the impacts are anticipated to be low.	• The Contractors will develop standard operating procedures (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 concentrating more than 15 workers at one location. Where two or more persons are 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; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;
11.	Spread of COVID-19 amongst community members during consultation processes	**Minor** The drilling and equiping of the borehole are anticipated to take less than 5 days. However, in the event of infection, the virus has a potential of spreading quickly.	• Electronic means of consulting stakeholders and holding meetings shall be encouraged, whenever feasible. One-on-one engagements with stakeholders while observing social distance and adhering to PPE wearing shall be enforced; • Avoid concentrating more than 15 community

		Therefore, the impacts are anticipated to be low.	members at a venue. Where two or more participants are gathered, maintain social distancing of at least 1.5 meters (5 feet); • The team carrying out engagements within the communities on one-on-one basis will be provided with appropriate PPE for the number of people and stakeholders they intend to meet. • Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements and mail) when stakeholders do not have access to online channels or do not use them frequently. Ensure to allow participants to provide feedback and suggestions. • Hold meetings in small groups, mainly in form of FGDs if permitted depending on restrictions in place and subject to strict observance of physical distancing and limited duration. • In situations where online interaction is challenging, disseminate information through digital platform (where available) like Facebook and WhatsApp & Chart groups. • Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants.
12.	**HIV/AIDS** If any local person engages with a worker sexually there could be a possibility of infection in the event of an infected party. There it will be advisable to take precautions because the impacts take long that it's hard to link the HIV/AIDs infection to the source.	**Low** The drilling and equiping of the borehole are anticipated to take less than 5 days. Therefore, the impacts are anticipated to be low	• Promote HIV/AIDS prevention messaging • Install HIV testing services at the construction site • Support infected workers with ARVs • Peer counseling services at the site

13.	**GBV/SEA** Due to opportunities presented by the project, the vulnerable may be taken advantage off	**Low** The drilling and equiping of the borehole are anticipated to take less than 5 days. Therefore, the impact is anticipated to be low	• Ensure clear human resources policy at the site against sexual harassment that is aligned with national law • Integrate provisions related to sexual harassment in the employee COC • Ensure appointed human resources personnel to manage reports of sexual harassment according to policy • The Contractor shall require his employees, sub-contractors, sub-consultants, and any personnel thereof engaged in the drilling works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse
14.	**Grievance Redress** The local community, contractor, client (WAJWASCO) or any other aggrieved party due to project activities need to be aware of the structures of expressing their grievances	**Low** The drilling and equiping of the borehole are anticipated to take less than 5 days. Therefore, the impacts are anticipated to be low	• Establish community grievance committees at the site • Ensure contractor staff grievance structures exist

Table 6-2: Impacts and Mitigation Measures during project Operation phase

No	ANTICIPATED NEGATIVE IMPACTS	IMPACT RATING	MITIGATION MEASURES
1.	Spread of COVID-19 amongst community	**Minor** There shall be little activities at the	• WAJWASCO to develop standard operating procedures (SOPs) for managing the spread of Covid-19 during project operation on COVID-19,

	members during operation phase	borehole site during operation. The use of the borehole is anticipated to be by the local people which will reduce the risk of spreading virus	in line to 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 at the borehole site; • Maintaining social distance during operation and maintenance activities • Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work and ensure they are used; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;
2.	Spread of invasive species**.**	**<u>Impact is low</u>** *<u>Prosopis Julflora</u>* was noted in Wajir town and can easily be spread due to project related activities. The project site if infected will spread in the area	• Regular monitoring of the project site for the spread of alien plant growth and in the event of such observation. • Create awareness among the local community on management of the spread of the invasive species. • Employing relevant management practices e.g. uprooting young plants.
3.	Over Exploitation of the water aquifer	**<u>Impact is moderate</u>** Borehole within the project area have low yields at an average of 2.6m3/hr as was noted from the recent test pumping.	• Adhere to the amount of water allocated in the authorization/water abstraction permit by WRA. • Sensitization and awareness creation among WAJWASCO workers and the community at large on water conservation principles. • Monitor water levels regularly • Promote efficiency in water use • Conduct regular water quality analysis. • Install a master meter
4.	Occupational health and safety	**<u>Impact is low</u>** There shall be low operation and maintenance activities at the borehole site. The activities at the borehole site shall be of low risk	• Ensure compliance to Occupational Safety and Health Act (OSHA) and its Subsidiary Legislations standards. • Provide personal protective equipment to operation and maintenance workers. • Ensure all electrical wires are properly insulated. • Recording all injuries that occur on-site to workers while doing their daily

			duties in the incident register, corrective actions for their prevention should be initiated as appropriate. • Creation of awareness and training of workers on site safety and first aid skills. • Hiring employees with proper qualifications for specialized and risky tasks during operation and maintenance of borehole. • Adherence to Covid-19 rules as provided by the ministry of health and the WHO while conducting daily duties. • Training of workers on covid-19 rules and requirements.
5.	Increase in waste water	**<u>Impact is low</u>** The water use is mainly for domestic usage purposes which are not anticipated to produce a lot of waste water.	• Create awareness on reusing waste water for kitchen gardening or tree planting • Do not allow any livestock to drink water during test pumping before the quality is ascertained. • Create awareness and sensitization among the locals on the possibility of risks posed by test pumping water to livestock. • WAJWASCO to consider construction of waste management and treatment system in the long-term.

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

7.1 Over view

This chapter captures the environmental and social mitigation measures for the anticipated negative impacts. The ESMP capture the impacts, receptor, proposed mitigation measures, institution responsible for the mitigation, frequency and the budget. Table 7-1 and Table 7-2 below show the anticipated impacts, proposed mitigation measures, the institutions responsible, the period within the project life cycle when the action is to be undertaken and estimated possible cost of the action.

Table 7-1: Environmental and Social Management Plan (EMSP) at Constrution Phase

NO	ASPECT	POTENTIAL IMPACT	RECEPTOR	MITIGATION MEASURES	RESPONSIBILITY	BUDGET (KES)
1.	**Public Safety**	Injury and accidents	community members and Livestock	• Ensure the safety of residents by providing safety signs at strategic places around the access roads. • Hoarding off working sites to protect the public or unauthorized persons • Reduce unnecessary speeding to prevent accidents from the movement of pedestrians or livestock in the area.	Supervising engineer and the contractor	Part of drilling cost
2.	**Air quality**	Air quality degradation	community and workers	• Workers to use masks when working in dusty conditions. • The community members to be discouraged from going to site to watch drilling or construction activities • Consider shielding wind impacts during drilling to reduce mad particulate matter being blow away if it's in the direction of settlement. • Reduced speeding on the dusty roads • Construction vehicles to have catalytic devices to ensure complete burning of waste gases, • Proper servicing of vehicles and Construction machines • Use all means possible to suppress dust if considered to be a menace during excavations	the contractor and supervising engineer	40,000
3.	**Excessive Noise and Vibrations.**	Psychological nuisance and damage to hearing	Workers and community	• The community members to be discouraged from going to site to watch drilling/construction activities • Machines and equipment to be fitted with silencer/muffler devices where possible, • Using equipment and machines with low noise	Project supervising engineer	50,000

			members	emission. • switching off vehicles and machines when not in use, • avoiding unnecessary hooting, • Workers to be provided with personal protection equipment earplugs. • Reduce working hours for the workers on site during drilling by having working shifts • machines to be serviced to reduce generation of noise and vibrations, • the noisy activities should be restricted during daytime • Ensure that NEMA noise and Vibration standards are observed in all project activities. • Training/sensitization/awareness on use of PPEs and personal safety measures.		
4.	**Occupational Health and Safety (OHS).**	Injury and Accidents	Workers	▪ Ensure safety of the construction workers by putting first aid area and injury reporting mechanism ▪ Ensure compliance to Occupational Safety and Health Act Cap. 514 and its Subsidiary Legislations. ▪ Provide appropriate personal protective equipment (PPE) to workers and training on appropriate use. *(Reflective jackets, helmets, face masks, ear plugs gloves, safety boots, etc.)* ▪ There should be adequate provision of the requisite sanitation facilities for human waste disposal ▪ Recording of all injuries that occur on site in the incident register, corrective actions for their prevention are instigated as appropriate. ▪ The contractor should consider having WIBA insurance policy to cushion self and workers against loss of income in an accident on site.	Contractor and supervising consultant	200,000

				▪ Provide clean drinking water for the workers to mitigate against dehydration. ▪ Contractor to develop a site safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency, and personnel responsible for safety inspections and controls.		
5.	**Solid waste generation**	Littering environment and contamination	Water, air, soils, Flora, Fauna and local communities	• Reuse of all soil cuttings from the excavation works • Proper disposal of waste from the contractor's camp • Disposing off contaminated soils in cutting pit if volumes are low. • The contractor to develop site specific incident management or response plan in the evident of hazardous waste contamination *(used tyres, Oil and Fuel filters*). • Preparation of waste management plan to guide waste management and disposal activities.	Contractor and supervising engineer	Part of construction cost
6.	**Game meat poaching and injury to wildlife**	killing and injury	Wildlife	• Sensitization and awareness creation among workers on the illegality of the action and criminal charges. Prohibitions to be incorporated in the code of conduct • The movement of construction vehicles to be restricted to day time • Reporting of any incidents involving injury or game meat poaching to KWS • Engaging local conservation groups to conduct monitoring during project implementation period • Sensitization of the local community members to participate in monitoring and reporting any illegal activities against wildlife	Local community members, conservation groups, contractor and project supervising consultant	100,000
7.	**Spread of invasive species.**	Loss of indigenous	Indigenous plants, local	• Regular monitoring of the project site for the spread of alien plant growth and in the event of such observation, employing relevant	Contractor and	100,000

		species and injury	people and livestock	management practices e.g uprooting young plants or burning to control the spread of the plant. • Raw materials used for construction such as sand and rocks should be sourced in areas where there are no invasive species. • Equipment required for the drilling and construction works should be clean and free from any alien plants and mud which may contain seeds or tuber of alien species. • Create awareness among the local community on management of the spread of the invasive species.	supervising engineer	
8.	**Leakage and spillage**	Contamination and pollution	Soil, water, plants and air	• Development of site-specific incident management or response plan. • Taking all measures possible to reduce any spillage and have emergency spill response kit on site, with staff trained on emergency spill response • In the event of hazardous waste leakage or spills, engage authorized waste handlers to dispose contaminated soils. • Disposing off contaminated soils in cutting pit if volumes are low. • Use of NEMA licensed waste handlers to dispose hazardous wastes in licensed disposal areas.	contractor and supervising engineer	Part of construction cost
9.	**Covid-19** *Spread of COVID-19. During construction at work sites*	infection or loss of life	workers and members of the public	• The Contractors will develop standard operating procedures (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;	Supervising Engineer and Contractor	20,000

				• Avoid concentrating more than 15 workers at one location. Where two or more persons are 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; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;		
10.	Spread of COVID-19 amongst community members during consultation processes	infection or loss of life	Community members	• Electronic means of consulting stakeholders and holding meetings shall be encouraged, whenever feasible. One-on-one engagements with stakeholders while observing social distance and adhering to PPE wearing shall be enforced; • Avoid concentrating more than 15 community members at a venue. Where two or more participants are gathered, maintain social distancing of at least 1.5 meters (5 feet); • The team carrying out engagements within the communities on one-on-one basis will be provided with appropriate PPE for the number of people and stakeholders they intend to meet. • Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements and mail) when stakeholders do not have access to online channels or do not use them frequently. Ensure to allow participants to provide feedback and suggestions. • Hold meetings in small groups, mainly in form of FGDs if permitted depending on restrictions in place and subject to strict observance of physical distancing and limited duration. • In situations where online interaction is	Supervising Engineer and Contractor Stakeholder Engagement Expert/ Communication specialist.	20,000

				challenging, disseminate information through digital platform (where available) like Facebook and WhatsApp & Chart groups. • Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants.		
11.	**GBV/SEA risks /Child labour**	Injury	Vulnerable persons in the community.	• Ensure clear human resources policy at the site against sexual harassment that is aligned with national law • Integrate provisions related to sexual harassment in the employee COC • Ensure appointed human resources personnel to manage reports of sexual harassment according to policy • The Contractor shall require his employees, sub-contractors, sub-consultants, and any personnel thereof engaged in the drilling works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse	local leaders, contractor, supervising engineer and WAJWASCO local CBO/ NGO	100,000
12.	**Grievance Redress**	Conflict between affected parties	All project stakeholders	• Establish community grievance committees at the site • Ensure contractor staff grievance structures exist • Create awareness of the existence of the site	Local leaders, contractor, supervising engineer and WAJWASCO	100,000

Table 7-2: Environmental and Social Management Plan (ESMP) at Operation Phase

NO	ASPECT	POTENTIAL IMPACT	RECEPTOR	MITIGATION MEASURES	RESPONSIBILITY	BUDGET (KES)
1.	Spread of invasive species.	loss of indigenous species and injury	indigenous plants, local people and livestock	• Regular monitoring of the project site for the spread of alien plant growth and in the event of such observation. • Control of livestock movement into the project area from infested areas • Create awareness among the local community on management of the spread of the invasive species. • Employing relevant management practices e.g uprooting young plants or burning to control the spread of the plant.	WAJWASCO and local communities	Part of operation cost
2.	Over Exploitation of the water aquifer	intrusion of salty water, depletion or lowering of the water table, ,	the water aquifer	• Adhere to the amount of water allocated in the authorization/water abstraction permit by WRA. • Monitor water levels • Ensure efficiency in water use • Conduct regular water quality analysis	WAJWASCO	Part of operation phase
3.	Occupational health and safety	accidents or injuries	workers	• Ensure compliance to Occupational Safety and Health Act Cap. 514 and its Subsidiary Legislations standards. • Provide personal protective equipment to operation and maintenance workers. • Recording all injuries that occur on-site to workers while doing their daily duties in the incident register, corrective actions for their prevention should be initiated as appropriate. • Creation of awareness and training of workers	WAJWASCO	Part of construction cost

				on site safety and first aid skills. • Hiring employees with proper qualifications for specialized and risky tasks during operation and maintenance of borehole. • Adherence to Covid-19 rules as provided by the ministry of health and the WHO while conducting daily duties. • Training of workers on covid-19 rules and requirements.		
4.	**Increase in waste water**	contamination and pollution	local people, water course and soils	• Create awareness on reusing waste water for kitchen gardening or tree planting • Do not allow any livestock to drink water during test pumping before the quality is ascertained. • Create awareness and sensitization among the locals on the possibility of risks posed by test pumping water to livestock. • WAJWASCO to consider construction of waste management and treatment system in the long-term.	WAJWASCO and Local Communities	Part of operation cost

Based on as build, the contractor and the project supervision engineer shall prepared indicative cost of the operation and maintenance and the proponent should budget for the implementation as proposed.

7.2 Decommissioning

After the borehole drilling works are complete, the borehole will be handed over to WAJWASCO. If the borehole for some reason becomes obsolete due to dry borehole, inadequate water, poor water quality, inadequate borehole development/collapsing or legal issues. Before the project decommissioning is considered, WRA will carry out a review of the project after five to seven years from when the project operations started. In between this period, mini reviews will be done on annual basis. In case a decision is made to abandon the borehole, then a decision should be made on whether to cap it or backfill the entire borehole and remove the submersible pump and other installations. The decommissioning cost will be prepared during the preparation of the decommissioning ESMP plan.

8 ENVIRONMENTAL AND SOCIAL MONITORING PLAN (ESMoP)

8.1 Over View

This chapter captures the environmental and social monitoring indicators for the anticipated negative impacts as highlighted in Table 8-1 .

Table 8-1: Environmental And Social Monitoring Plan (EMoP)

PARAMETER/ ACTIVITY	LOCATION	MEANS OF MONITORING	FREQUENCY	RESPONSIBLE AGENCY	
				IMPLEMENTED BY	SUPERVISED BY
Occupational Health and Safety	Drilling site	Visual inspection of first aid area, injury reporting mechanism, WIBA insurance cover, appropriate use and wearing of PPE, training programs for workers, health and safety plan prepared for site, clean drinking watering points, housekeeping on site and at the contractor's camp. safety training certificates, gloves, earplugs, safety boots, reflector jackets, drinking water, nose mask, helmet, overall, sanitation facilities, anti-vibrating gloves	Daily	Contractor	Project supervising consultant
Covid-19 management	Drilling and at operation phase	Appointing covid-19 champion or marshal, regular fumigation of common area and shared tools, sanitizing and hand washing area and equipment, isolation area, covid-19 PPE, visual inspection of social distance	Weekly	Contractor	Project supervising consultant
Public health and safety	Areas surrounding the construction site.	visual inspection of site for; safety signs at strategic places, cordoned off working sites to protect the public or unauthorized persons, usage of signs and warnings on sites with high risks, enforcement of low speeds of construction vehicle and	Weekly	Contractor	Project supervising consultant

		consideration of wind action. No of reported injuries and accidents and No. of grievances reported.			
Leakages and spills	Contractor yard, drilling site and construction site	Visual inspection of hazardous waste leakage or spills to soils on site, records of cutting pits for disposed of contaminated soils, Developed site-specific incident management or response plan.	Weekly	Contractor	Project supervising consultant
Noise and vibrations	Drilling and construction site	Use equipment with low noise levels or fitted with mufflers. Visual inspection of site for use of PPE, use of sound proof materials, notices to public on noisy drilling activities, restricting noisy activities day time (drilling schedule) and regular measurement of noise levels through mobile phone gadgets.	Weekly	Contractor	Project supervising consultant
Air quality	Drilling/construction site and along construction vehicle movement routes	Physical inspection of vehicles records to ensure meets emission requirements, Use of masks while working in dusty conditions, members of the public on site watching, shielding wind impacts during drilling, low speed of construction vehicle, catalytic devices on vehicle and dust suppression on site	Daily	Contractor	Project supervising consultant
Waste generation	drilling/construction site	Visual inspection of; sanitation facilities for human waste management, amount of waste correctly disposed, Visual inspection of haphazard littering, practicing of waste avoidance, reduction, reuse and recycle,	Monthly	contractor	Project supervising consultant

		designated waste transfer stations onsite, documented approved waste dumping site, presence and compliance to implementations of site-specific waste management plan.			
Conflict among water resource users	Operation site and livestock watering points	Guidelines regulating access to water resources by the various interest groups. meeting held by GRCs to resolve conflicts over water access	Annually	provincial administration services	Deputy County Commissioner
HIV/AIDS prevalence	Drilling site	HIV/AIDS prevention and awareness campaign; as well as HIV/AIDS testing facilities and clinic at the site	Weekly	Contractor	Project supervising consultant
GBV/SEA risks /Child labour	Drilling site	Training of all workers at the construction site and signing of code of conduct prohibiting GBV/SEA/Child labour prevention	Weekly	Contractor	Project supervising consultant
Labour and employment-related issues	Drilling site and contractor's office	Physical counts and inspection of records on; No. of locals employed on the project from the employment records. No. of Grievance recorded from employees and how they were addressed	Weekly	Contractor	Project supervising consultant/ WAJWASCO

The total estimated cost for the implementation of the ESMP and ESMoP is about KES 0.73M. However, the actual costs shall be prepared by the contractor and captured in the C-ESMP, as requirement for the Construction Phase, the ESMP will be incorporated in the bid documents.

9 GRIEVANCE REDRESS MECHANISM

9.1 Over view

Construction activities are bound to elicit grievances from the PAPs or from other interested parties. It is therefore imperative to have a workable grievance redress mechanism to take care of any such disputes arising from the construction works so that they do not have an adverse effect on the project.

A grievance mechanism (GM) is presented below to ensure the project's social and environmental safeguards are adhered to. The purpose of the GRM is to record and address any complaints that may arise during the implementation phase of the project. The GRM is designed to address concerns and complaints promptly and transparently with no impacts (cost, discrimination) on project affected persons. The GRM works within existing legal and cultural frameworks, providing an additional opportunity to resolve grievances at the local, project level.

The key objectives of the grievance redress mechanism are:

- Record, categorize and prioritize the grievances;
- Settle the grievances via consultation with all stakeholders (and inform those stakeholders of the solutions)
- Forward any unresolved cases to the relevant authority.

This procedure will not replace the existing legal system for dealing with grievances, however the PAPs and interested parties will be persuaded to use the proposed mechanism, and make use of the legal redress as a last resort at their own cost. For ease of handling the Grievances Redress Mechanism, the RAP has been combined with the ESIA mechanisms.

9.2 Grievance log

Documentation of complaints and grievances is important, including those that are communicated informally and orally. These should be logged, assessed, assigned to an individual for management, tracked and closed out when resolved. Records provide a way of understanding patterns and trends in complaints, disputes and grievances over time.

The log will contain a record of the person responsible for an individual complaint, and record dates for the following events:

i. Date the complaint was reported;
ii. Date the grievance log was uploaded onto the project database;
iii. Date information on proposed corrective action sent to complainant (if appropriate);
iv. The date the complaint was resolved

A sample grievance redress form is shown in **Error! Reference source not found.** of this report.

Once parties agree on a path forward – such as an apology, compensation or an adjustment to operations – an action plan should be formalized and implemented. Depending on the issue,

responses may vary from a single task to a program of work that involves different parts of the operation. Effective responses will also include engagement with parties involved to ensure that the response continues to be appropriate and understood.

9.3 Organization structure for grievance management.

It is recommended that the proposed GRM include members of the local administration, representatives of project affected persons from all locations affected by project activities as well as local and external professionals.

The GRM for the project has been divided into three levels. Level one involves local committee while level 2 involves county committee. Level three of grievance redress mechanism involves project committee as discussed below.

9.3.1 Level one: local committee

A committee consisting of the following members or their representatives will be formed to address grievances at the local level:

i. Chairman: Area Chief
ii. Secretary: Assistant Chief
iii. Member of the county assembly representative
iv. Representative from the county government of Wajir
v. Members: Six PAP representatives consisting of two men (elders), two women(elders) and two youth (18-30 years)

This committee will sit at the office of the Area Chief. The following procedure for registering grievances at this level is as follows:

i. A PAP registers a grievance and within one working day, the committee members are alerted of the case
ii. The affected person is immediately informed on the next date of the scheduled hearing. Depending on the case load, a maximum of seven working days will be given between the date that a case is recorded and the date when the hearing is held
iii. The committee will meet once every seven calendar days to deal with emerging cases. At these meetings, hearings with the affected persons and related witnesses will be held
iv. The committee will communicate its judgement to the affected person within three working days after conclusion of hearings
v. If no resolution is met or the PAP is not satisfied with the judgement, the case is moved to the next level by the committee. This will be done within five days of the hearing
vi. If the PAP is not satisfied with the judgement, he/ she will be allowed to move the case to the next level

9.3.2 Level two: county committee

Some grievances may require calls for witnesses, unbiased parties or technical evaluations prior to proposing solutions. Local mechanisms may not have the capacity to meet all these

requirements and would therefore require some form of support. A county level committee constituted of the following members has therefore been proposed

i. Respected opinion leader in the community such as a religious leader or community elder
ii. Deputy County Commissioner
iii. Members: Three PAP representatives consisting of a man, a woman and a youth

This committee will be chaired by the opinion leader but the proposed secretary is the representative from the PAPs. The committee will sit once a month at the County government office. The following procedure for committee deliberations has been proposed

i. A grievance is forwarded from the local level committee and lodged at the County Government office. This includes cases forwarded from the local committee level;
ii. Within five working days, a notice is sent out to all interested parties informing them of the date of the hearing;
iii. Prior to the hearing, the chairman and the secretary will determine the need for an arbiter and invite them to the hearing;
iv. A hearing will then be held within twenty days of the grievance being raised;
v. In cases where an arbiter is required, the committee ruling is final. The complainant shall however be made aware of the fact early prior to commitment to the arbiter;
vi. The ruling of the hearing shall be communicated within three working days.
vii. Disputes that cannot be resolved at this level will be forwarded by the committee to the next level within five working days.

9.3.3 Level three: Project committee

Some grievances may also occur that are outside of the direct control of the county committee and would require intervention at national or county level. These include disputes that require policy interpretation or investigations prior to conclusive resolution. In such cases, the committee may require legal interpretation on certain aspects. A project level committee constituted of the following members has therefore been proposed.

i. Chairman: Chief Executive, Lands Housing and Urban Development
ii. Secretary: Deputy County Commissioner
iii. A specially delegated representative from WAJWASCO
iv. Members: Three PAP representatives consisting of a man, a woman and a youth.

This committee will sit once in three months at the County Government office. The following procedure is proposed for committee deliberations:

i. A grievance is lodged at the County Government office and within five working days, a notice is sent out to all the interested parties informing them of the date of the hearing. This includes cases forwarded from the county committee level
ii. A hearing will then be held within thirty days of the grievance being raised

iii. In the event that the investigations and technical witnesses are required, a maximum of three calendar days will be taken prior to a hearing being held
iv. The committee decision will be communicated in writing within five days of the date of hearing
v. If the committee does not resolve an issue, the affected persons are free to go to the Environment and Land Court

Considering the various levels of decision making required at this stage, it is proposed that the final decision from this committee be communicated within three months. A Samples of the grievance form and a sample of a Grievance Resolution Form are attached in appendix D AND E respectively.

The GRM process considers a special attention to GBV cases due to it sensitivity and urgency of support that are required.

The GRM will have a focal person at the site who will be working and document on cases of gender-based incidents in close relation with the established local committee. The committee will resolve any arising minor disputes on gender related issues that do not meet the threshold for criminal liability. However, where cases of GBV that amount to capital offences such as sexual violence against women and girls or serious assault with grievous body harm, the GBV focal person in support of local committee will link and refer the victim/survivor to Wajir gender and technical working group (WGTWG) to ensure offenders are apprehended and prosecuted in the local formal justice system and justice is delivered to the survivor.

The Gender technical working group is a proactive multi-sectoral county stakeholder group which support cases of sexual and gender base violence reported county wide. It comprises of police, county department of gender, department of children services, and county department of health, civil society (ALDEF KENYA, Wajir women for peace and Kenya Red Cross) Wajir court users committee and local FMs.

The technical working group has established gender recovery centre within Wajir county referral hospital and has a hotline number and gender-based violence desk. Progress reports are shared during every bi-monthly GTWG meetings supported by wajir women for peace in partnership with UNDP Amkeni program and Wajir legal aid program run by ALDEF KENYA and its implementing partners. WAJWASCO legal officer is also a member of GTWG and the Wajir court users committee who support Wajir legal aid program on matters of GBV.

10 CONCLUSION AND RECOMMENDATIONS

10.1 Conclusion

Lambib was identified as one of the potential suitable sites for the development of a well field to supply water to Wajir town as part of short term interventions to water scarcity in Wajir town. And as part of corporate social responsibility, it was proposed that a community project borehole to be drilled to supply the local people from Lambib area with improved water supply. The local people currently access water from shallow wells which are affected by the recurrent droughts. Some of the shallow wells have dried up and the water table is sinking over time forcing the residents to dig dipper and dipper to access water resources. The locals are also faced by the challenge of shallow water table contamination by faecal coliforms necessitating the implementation of the proposed project. Consultations findings showed that the local community are eagerly anticipating the implementation of the project. The proposed project area showed characteristics of natural habitat though near settlements. The environmental and social assessment findings indicated that the project impacts are of low impacts. The drilling activities of the community project borehole, is not anticipated to significantly influence the physical and social environment. It was further noted that the anticipated impacts shall be of low magnitude due to the size of the project and with mitigation measures having been proposed in this report.

The project will not trigger resettlement. The borehole will be situated within community land which the locals have been engaged and a community resolution and consent for land usage obtained. There are no structures in the proposed project areas and the land is not in use.

Any local community issues that may arise will be address through the implementation of a Grievance Redress Mechanism (GRM). This will have three levels, each populated with local administrative officials from the project area and professionals involved with the project. Level one involves local committee while level 2 involves county committee. Level three of grievance redress mechanism involves a project committee.

10.2 Recommendations

Drilling and development of the proposed community project borehole together with the water supply facilities is anticipated to have negative impacts socially and to the physical environment. In spite of the anticipated environmental and social impacts, with proper mitigation measures, the project is environmentally viable. The environmental assessment team proposes the implementation of the project with the following recommendations which need to be considered;

- The project proponent WAJWASCO to ensure full implementation of ESMP and EMoP proposals during implementation, operation and decommissioning stages of the project as will be required.
- The contractor should not allow any use of the water particularly test pumping water before conducting water quality tests and found fit for consumption, which could not be ascertained at the time of this study.

- The project implementing agency, contractor and the supervising engineer to ensures that ministry of health and world bank covid-19 guidelines are implemented to the later at the project site during construction period and that all the workers commit to observing the rules.
- Deliberate (affirmative action) measures to be taken by the proposed project to consider connecting vulnerable and marginalized individual to water within the project area or ensuring provision of water kiosks is near dwelling of such groups and making the commodity affordable.
- Grievance should be addressed through the follow up of the above existing stipulated structure.

11 REFERENCES

1. Kenyan New Constitution, 2010.
2. The water Act 2016, Kenya gazette supplement No. 164 (Acts No. 43).
3. The Public participation Act 2016, Kenya gazette supplement No. 175 (senate bills No. 15) *Government printer, Nairobi.*
4. Kenya Population and Housing Census 2019: Volume 1: Population by County and Sub-County.
5. GoK (2017): Environmental and Social Management Framework for Water and Sanitation Development Program (WSDP). Ministry of Water and Irrigation State Department of Water, February 2017.
6. Wajir County Integrated Development Plan 2018-2022
7. The Physical and Land Use Planning Act, 2019, Kenya gazette supplement No. 129 (Acts No. 13).
8. Water Resources Management rules 2007
9. Kenya gazette supplement Acts 2000, Environmental Management and Coordination Act CAP 387. *Government printer, Nairobi*
10. Kenya gazette supplement Environmental Management and Coordination (Water Quality) Regulations, 2006.
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12. Kenya gazette Legal Notice No. 101 Environmental Impact Assessment and Audit Regulations 2003. Government printers, Nairobi
13. Kenya gazette supplement Acts Occupation Health and Safety (2007) government printer, Nairobi.
14. UNISDR Guidance note on Recovery: Livelihood. https://www.unisdr.org/files/16771_16771guidancenoteonrecoveryliveliho.pdf

12 ANNEXES

I. COMMUNITY LAND RESOLUTION AND CONSENT FORM FOR LAND USAGE PERMIT.

- ***Both English and somali format of the community land resolution and consent form for land use permit.***

COMMUNITY LAND RESOLUTION AND CONSENT FORM FOR LAND USAGE PERMIT No. _____

ITEM	DESCRIPTION
Project name	
Name of Investment	
Detailed specifications of investment	
Project Location:	
GPS coordinates and measurement of affected area (m2)	
Total area belonging to the community (km^2). Please specify under the "Description" column whether it is equivalent to the "catchment area".	
Description of impacts	
Specifically, impacts on assets: • **Trees that will be destroyed** • **Fruit Trees** • **Trees used for other economic or household purposes** • **Mature forest trees** • **Others**	
Any other assets that must be moved or will be lost in order to implement the project. If any, please indicate the cost and source of valuation.	
Eventual owner of the land after licence granted for temporary use	

No. of Months of free water to be received	

BACKGROUND

Wajir Water and Sewerage Company (WAJWASCO) will be granted permission in form of a licence by the Community to use the project area defined in this Community Land resolution and Consent form for Land Usage Permit.

For this reason, we agree to the following terms of agreement.

TERMS OF LICENCE AGREEMENT

This agreement is between _____Community (the "Community "), represented by the undersigned, and the Wajir Water and Sewerage Company (WAJWASCO) of P.O Box _____.

WHERE AS

i. Community Consultations were held on …….. to which all residents of the investment area (specify) …….. were involved (Annex of list of members consulted)

ii. Community representatives were duly nominated, who shall represent the interests of the Community under this agreement and subsequent engagements in this regard. That the following issues under this agreement were discussed and the residents and regular users of this land are in unanimous agreement to grant to _____ a licence over (measurement of land) _____ .

iii. Location of the investment detailed in the map (Annex 3) for purpose of that the land be utilised as the site of the proposed -----development of borehole and auxualary equiped----------

iv. The Community understands that they will pay a fee to ----------wajwasco---------- to access water from the borehole investment, save for the three months' grace period of free water granted by Wajir Water and sewerage Company (WAJWASCO) as consideration for the licence under this agreement.

v. The community Land Resolution and Consent form for Land Usage Licence No. ---------- and all annexes hereto form part of this agreement.

The Community Represents:

1. We all are aware that the land set aside for the investment is community land and no one is claiming individual ownership, because it belongs to the Community, and no alternative claims will be made at a later date on the land.

2. We have all agreed unanimously that the project implementation should continue.

3. We all shall strive to peacefully resolve any conflicts with other communities concerning the investment.

4. We shall all strive to peacefully resolve any conflict arising out of the investment facility following due process provided by the laws of Kenya.

5. The land to be granted for temporary use was identified in consultation with all residents and users (if any) of the land.

6. We all understand the likely impacts of proposed investment on the licenced land. That include: ----------
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---.

7. We all agreed to this investment and land usage permit / licence without coercion, manipulation, or any form of pressure on the part of public or traditional authorities.

8. We have been informed that we are entitled to request monetary or non-monetary benefits as consideration for the licence, as per World Bank Operational Policy, but have agreed that granting this licence is not conditional upon receiving monetary considerations.

9. We understand that we will have to pay a fee to use water from the borehole, which fee can be adjusted from time to time.

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10. We confirm that granting a licence over the project-affected land will not adversely affect the livelihoods of occupiers and regular users of the land.

11. If any structure will be moved or any access to land be limited as a result of the sub-project, support will be promptly provided by WAJWASCO to the affected individual or family so their livelihoods are not adversely affected.

12. That the project affected land is free of any encumbrances or encroachment and its ownership is not contested.

13. We understand that any other costs associated to the licence (such as taxes, registration fees, measurement costs, documentation and notarial fees as relevant), will be covered by WAJWASCO.

14. We understand that granting this licence means that it will be a legally binding arrangement in which WAJWASCO will have full control of the licenced land for the period of the investment.

Representation by WAJWASCO:

a) We understand that the project-affected land is unregistered community land under the laws of Kenya.

b) We understand that this is a licence for use of the project-affected parcel of land, and this licence does not confer proprietary interest over the land.

.

c) We understand that as a consideration for this licence, WAJWASCO shall give us water free of charge for ninety days (90 days) from the date of the completion of the borehole.

d) We confirm we will use the granted parcel of land only for the purpose of investment described in on the form and attached to this agreement.

e) Confirm the above information to be true and that we have resolved to abide by ALL terms of this agreement. (Please attach minutes of the community meeting including the signed attendance sheet and photos of the meeting).

In witness therefore,

WAJWASCO

DIRECTOR

(Name and Signature)

DIRECTOR / COMPANY SECRETARY

(Name and Signature)

WITNESS:

(Lawyers Stamp and Signature)

THE COMMUNITY

Those signing below have been recognized as community representatives by all community members and verified by the County Commissioner in a letter dated _____.

S/No.	Name	Village/Location	ID/No.	Signature
1.				

2.				
3.				
4.				
5.				

Witnessed on this ……. Day of …….. in the Year……..: by:

1. **Deputy County Commissioner**

Name	ID/No.	Signature & R/Stamp

2. **Area Chief**

Name	ID/No.	Signature & R/Stamp

3. **Ward Administrator**

Name	ID/No.	Signature & R/Stamp

4. **Land Registrar/adjudication officer**

Name	ID/No.	Signature & R/Stamp

5. **County Government (Physical Planning Department)**

Name	ID/No.	Signature & R/Stamp

6. County Ministry Relevant to the project e.g. Water/Livestock Production etc.

Name	ID/No.	Designation	Signature & R/Stamp

7. County Project Team Leader

Name	ID/No.	Signature & R/Stamp

Qaraarka bulshada ee dhulka iyo foomka ogolaanshaha isticmaalka dhulka. Lambarka 01

Qodob	Faahfaahinta
Magaca mashruuca	Mashruuca hormarinta biyaha iyo fayadhowrka
Magaca maalgelinta	Mashruuca biya galinta Wajeer
Faahfaahin dheeri ah oo ku saabsan maalgelinta	Shaan ceel biyood oo laga qodayo tulada Lambib
Goobta mashruuca:	Lambib
GPS Xiriirinra iyo cabirka deegaanada waxyeeladu gaartay (m2)	ceel 1: 37N 06226232 0192890 ceel 2: 37N 0626489 0192601 ceel 3: 37N 0627583 0191761 ceel 4: 37N 0627766 0172466
Baaxadda deegaanka bulshadu leedahay (km²). Fadlan ku cadee faahfaahinta hoosteeda haddii ey la mid tahay "aaga biya qabadka".	Baaxada dulka deganka waa in kabadan 20KM² aga biyaqabatka waa in aad u yar marki lobadbar diga dulka deganku leyahay
Faahfaahinta saameynta	- Sigenta hawada
Si gaara, saameynta hantida: Geedaha laga yaabo in la burburiyo • Geedaha qudaarta • Geedaha loo isticmaalo dhaqaala ahaan ama ujeedooyin guriga ah • Geedaha waaweyn ee keymaha • Kuwa kale	- dulka oo wasaqda salida kudadto - Biya marenado oo lawasaqeyo - Ismaqalka oo halabo waqtiyada shaqalte - Geedaha waweyn oo hagoya - Hos udacya oo ceelqacmedyada kuyimado
Hanti kasta oo kale oo la qaaday ama luntay si mashruuca loo fuliyo.Haddii ey jirto, fadlan cadee qiimaha iyo cidda wax qiimeysay.	
Milkiilaha rasmiga ah ee dhulka kadib ruqsada isticmaal ku meel gaar ah.	Shirkada biyaha iyo Bulacda Wajeer (WAJWASCO)
Tirada bilaha biya lacag la'aan ah la siinaya.	Sadex Bilood

1

REPUBLIC OF KENYA

WORLD BANK GROUP

WAJIR WATER AND SEWERAGE COMPANY LIMITED
Water for life
WAJWASCO

Gundhig

Shirkada Wajir biyaha iyo bulaacadaha (WAJWASCO) waxaa la siin doonaa ruqsad bulsho si ey u isticmaalaan deegaanka mashruuca sida ku qeexan qaraarka dhulka bulshada iyo foomka ogolaanshaha isticmaalka dhulka.

Si daa awgeed, waxaan ogolnahay eray bixinta heshiiska soo soeda.

Eray bixinta heshiiska ruqsada

Heshiis kan waxa uu u dhexeeyaa Bolshado Lambib Bulsho (Bulshada "). oo metalayaan dadka hoos ku saxiixan iyo shirkada wajeer ee biyaha iyo bulaacadaha (WAJWASCO) P.O Box 708-2001 WAJIR.

Halka

i. Wada tashiyo bulsho ayaa laga q..btay 5/12/2020 taa soo dhamaan dadka deegaanka mashruuca (magacaaw) Lambib ey ka qeyb galeen (lifaaqa liiska xubnaha la tala geliyay)

ii. Xubno metalaya bulshada ayaa la magacaabay, ku waas oo heshiis kan iyo shaqooyin kalaba ku metheli doona danaha bulshada. Sidaa darted, arimaha soo socda ee heshiiskan uu dhigayo waa laga dooday. Dadka deegaanka iyo dadka sida joogtada ah u isticmaali doona dhulka waxa ey gelayaar: heshiis wada ogol in la siyo ruqsad dhuleed Shirkada biyaha iyo Bulaccla Wajeer dulka oo cabirkisu yahay (cabirka dhulka) 12,500M².

iii. Goobta maalgelinta waxey ku faahfaahsantahay khariidadan (lifaaqa 3) si loogu isticmaalo dhulka sida goobta loo hindisay. In laga gaalha afar ceel biyood iyo laga dusa gobolka Ceelasha oo ey. Kamiid yihin barkadoyin, guriga Matorka iyo derka ceelasha

iv. Bulshadu waxa ey fahansantahay in ey ku bixin doonto lacag Shirkada biyaha iyo Bulaccla Wajeer si ey biyo uga hesho ceelka la maalgeliyay. iyo in ey keydsadaan waqtiga sedaxda bilood ee biyaha lacag la'aanta ah ey siineyso shirkada wajeer ee biyaha bulaacadaha (WAJWASCO) iyada oo la tix gelianayo ruqsada ku dhigan heshiiskan.

v. Qaraarka dhulka bulsha iyo foomka ogolaashaha isticmaalka dhulka lambar 1 - iyo dhamaan lifaaqyada qeybta ka ah heshiiskan.

Bulshadu waxa ey meteleysaa:

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1. Waxaan dhamaan qireynaa in dhulka loo qoondeeyay maalgelinta uu yahay dhul bulsho, mana jiro cid gaar u sheegan karta milkiyadiisa sabab too ah waxaa iskale bulshada, mana jirto sheega shooyin kale oo mustaqbalka la sameyn karo.

2. Waxaan dhamaan si wadar ogol ah ku ogolaanay in mashruuucan fulintiisu ey socoto.

3. Waxaan dhamaanteen ku dadaali doonaa in si nabad ah aan ku xalino qilaaf kasta oo ka yimaada bulshooyinka kale ee maalgelintan ey quseyso.

4. Waxaan dhamaanteen ku dadaali doonaa in aan si nabad ah ku xalino qilaaf kasta oo ka soo baxa goobta maalgelinta iyada oo la raacayo nidaamka qawaaniinta Kiinya.

5. Dhulka la bixinayo si ku meel gaar loogu isticmaalo waxaa lagu xadidayaa iyada oo lala tashanayo dhamaan dadka dhulka degan iyo isticmaalayaasha (haddii ey jiraan).

6. Waxaan dhamaanteen fahamsanahay saameynta suurta galka ah ee maalgelinta la soo jeediyay u uku yeelan karo dhulka la bixiyay. Waxaana ka mid ah: 1. Sharabka ama Coska oo lagora 2. hoos udacitanka biya dulka hoosa Kujira 3. Dirta oo lagoya Melaha ceelasha lagaqodayo

7. Waxaan dhamaanteen waafaqnay maalgelintan iyo ruqsada isticmaalka dhulka iadoo eysan jirin qasab, awood, ama wax cadaadis ah oo la saaray oo kaga yimid masuuliyiinta dowlada ama dhaqanka.

8. Waxaa dhamaanteen nagula wargeliyay in aan xaq u leenahay in aan dalbano faaiido lacageed ama faaiido aan lacag aheyn taa soo u dhiganta ruqsada si waa faqsan siyaasada shaqa gelinta ee bangiga aduunka, laakiin waxaan waafaqnay in bixinta ruqsadu eysan ku xirneyn helitaan lacag.

9. Waxaan fahamsanahay in aan bixin doono lacag si aan u isticmaalno biyaha ceelka, lacagta waa la bedeli kaaraawaqti kasta.

10. Waxaan xaqeejineynaa in bixinta ruqsada ee dhulka mashruucu saameynta ku leeyahay eysan six un u saameyn doonin nolasha dadka guurta ah iyo kuwa sida joogtada ah u isticmaala dhulka.

11. Haddii qaab dhismeed dhulka la baa b'iyo ama la xiro marinadiisa mashruuc hoosaadka awgiis, kaalmo deg deg ah ayaa waxaa la gaarsiinayashaqsiga ama qoyska wax yeeladu soo gaartay si nolashooda sixun ey saameyn ugu yeelan.

12. Dhulka mashruucu saameeyay waxaa uu ka caagan yahay wax culeys ah, milkiyadeedana looma tartami karo.

13. Waxaan fahamsanahay in qiima kasta oo la soeda ruqsada (sida canshuuraha, lacagta is diiwaan gelinta, lacagta cabirka dukumiinti u sameynta iyo lacagaha nootaayada) waxaa bixin doona WAJWASCO.

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WAJIR WATER AND SEWERAGE COMPANY LIMITED
Water for life
WAJWASCO

14. Waxaan fahamsanahay in bixinta ruqsadan ey ka dhigan tahay heshiis sharci oo ku qabanaya kaa soo WAJWASCO ey yeelan doonto maamulka dhulka ruqsada la siiyay mudada maalgashiga.

Metalaada WAJWASCO:

a) Waxaan fahamsanahay in dhulka mashruucu saameeyay uu yahay dhul bulsho oo aan ka diiwaan gashaneyn sharciga Kiinya.

b) Waxaan fahamsanahay in ruqsadan loogu tala galay isticmaalka dhulka mashruucu saameeyay oo uusan bixineyn milkiyada dhulka.

c) Waxaan fahamsanahay in helitaanka ruqsada awgeed, WAJWASCO ey bixin doonto biyo lacag la'aan ah muddo 90 maalmood ah (90 maalmood) laga bilaabo marka la dhameystiro ceelka.

d) Waxaan cadeyneynaa in aan u isticmaali doono qeybta dhulka nala siiyay keliya ujeedo maalgashi sida ku qeexan foomka ku lifaaqan heshiiskan.

e) Waxaan caddeyneynaa in xogta kor ku qoran ey sax tahay iyo in ey naga go'antahay in u hogaan sano **dhamaan** eray bixinta iyo shuruudaha heshiiskan. (fadlan ku lifaaq warqada shirka bulshada ka soo baxday oo ey ku jirto warqada xaadirinta oo saxiixan iyo sawirada kulanka).

Oo marqaati ka yiilin.

WAJWASCO

Agaasimaha

(magaca iyo saxiixa)

Agaasimaha/ hoghayaha shirkada

(magaca iyo saxiixa)

Mahamed Oman Issack

Marqaati:

(qareenada shaabdda iyo saxiixa)

Bulshada

Saxiixayasha hoos kuqoran waa wakiilo la aqonsanyahay oo mathalaya dhaman xubnaha bulshada oo uu ku cadeeyay Gudoomiyaha Degmada wargad ku taariikheysan 4/12/2020

S/lambar.	Magaca	Xaafadda/deegaanka	Aqoonsiga/lambar.	saxiixa
1.	Aloss Hussein Issak	Lambib	0055910	[signature]
2.	Adan Farah Ibrahim	Lambib	0041559	[thumbprint]
3.	Kasim Abdi Bashir	Lambib	26943109	[signature]
4.	Ahmed Mohamed Ali	Lambib	23106017	AH
5.	Musa Sumbul Mohamed	Lambib	21325204	[signature]

Waxaa marqaati ah ...5... maalinta Labitobnad (12) sanadka...2020... : 5/12/2020

1. **Gudoomiyaha ismaamulka gobolka bariga wajeer.**

Magaca	Aqoonsiga/lambar.	Saxiixa iyo shaabadda
M'MBEISA OMAR BEJA	10226223	[signature] [stamp: DEPUTY COUNTY COMMISSIONER WAJIR EAST SUB-COUNTY]

2. **Gudoomiyaha waxda /deganka**

Magaca	aqoonsiga/lambar.	Saxiixa iyo shaabadda
Mohamud -M- Harun	27470654	[signature] [stamp: MAMUD M. HARUN ASST. CHIEF LAMBIB SUB-LOCATION KHOROF HARAR SUB-COUNTY]

3. **Maamulaha laanta/wodka**

Magaca	Aqoonsiga/lambar.	Saxiixa iyo shaabadda
Mohamed Hussein Issack	27234954	[signature] [stamp: OFFICE OF THE ... ADMINISTRATOR KHOROF HARAR WARD P.O. BOX ... WAJIR Date]

4. **Diiwaan hayaha dhulka/ sarkaalka xukunka**

Magaca	aqoonsiga/lambar.	Saxiixa iyo shaabadda
AHMED MOHAMED ADAN	9565123	COUNTY CHIEF OFFICER LANDS, HOUSING & PHYSICAL PLANNING WAJIR COUNTY

5. **Ismaamulka gobolka (waaxda qorsheynta)**

Magaca	aqoonsiga/lambar.	Saxiixa iyo shaabadda
Abdullahi Hassan Adan	27280625	COUNTY PHYSICAL PLANNER WAJIR COUNTY P.O. BOX 385-70200 WAJIR

6. **Wasaaradda ismaamulka ee quseyso mashruuca tusaale biyaha iyo xoolaha IWM**

Magaca	P/No.	Designation	Saxiixa iyo shaabadda
Abdihakim B. Noor	27110850	CECM - Water services	

7. **Horjoogaha mashruuca ismaamulka**

Magaca	aqoonsiga/lambar.	Saxiixa iyo shaabadda
MOHAMED OSMAN OMAR	22400186	CEO WAJIR WATER AND SEWERAGE COMPANY LIMITED Water for life WAJWASCO P.O. Box 708 - 70200, WAJIR

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REPUBLIC OF KENYA

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WAJIR WATER AND SEWERAGE COMPANY LIMITED
Water for life
WAJWASCO

OFFICE OF THE PRESIDENT
MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT
WAJIR COUNTY

Telegrams: "DISTRICTER" ....
Telephone: ...0729-966-135.....
When replying please quote
REF: Wa/&01/2020
and date

OFFICE OF THE ASS. CHIEF
...Lambib............ SUB-LOCATION
P.O. BOX ....
WAJIR COUNTY
Date: ..23rd November 2020

DHULKA MASHRUCA EE KUYELA LAMBIB

Aniga oo Magaceydu yahay Mohamed. M. Harun, ee le nambarka aqonsiKa: 27410854, Madhaxa tuLadha Lambib ayaa cadeeyay in wax dagma ah hadumin doonin fass oo ay sabab utahay ruqsad siinta dhulka Mashruuca ee lagu qeexay fomka Xalinta dhulka bulshadha iyo ogalanshaha Istiemalka dhulka.

Dhulka loogaladhay oo na lobixiyay istiemalka mashruuca aya laga hergalindonaa oo na loisticmalidonaa:

1. Qodista shan ceel biyood
2. Dhismaha barkadaha biyaha (hamo bir ah iyo
3. Dusida
4. Dhigida dhumaha waweyn ee biyaha iyo qadadka qeybinta
5. Dhismaha guriga matorka
6. Dhisida deyrka ceelasha

Mashruucu wuxuu ubahandoona dhul ~~1.25~~ 1.25 (Ha) ah oo si Joogta ah. Waxaa la xaqiijiyey in dhamaan dhinacyada; ogaden iyo dagodia oo daneynaya dhulka ayaa sidoo kale kafaaiideysanaya faaiidoyinka ugu waweyn ee Mashruucyada biyaha oo ah ceel riig ah oo loo qoondeyay.

Xubnaha dadweynaha waxa si rasmi ah loogu wargaliyay inay xaq u leeyihin inay udiidikaran WajWasco isticmalka dhulka. Ruqsadsinta dhulka waxaa kamid ah biyo bilash mudda saddex bilood ah.

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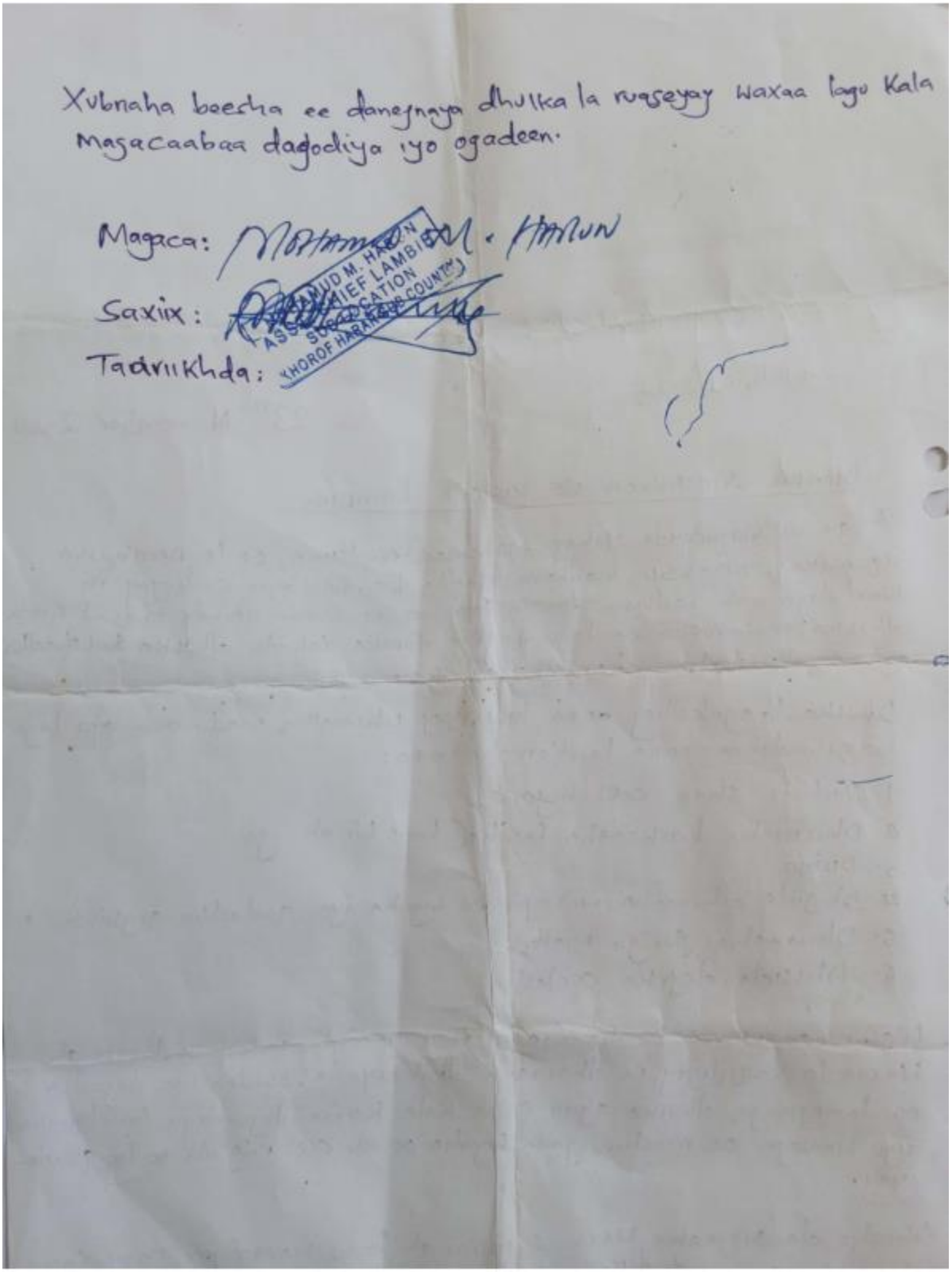
Water for life
WAJWASCO



Xubnaha boodha ee daneynaya dhulka la rugeyay waxaa lagu Kala Magacaabaa dagodiya iyo ogadeen.

Magaca: Mohamed M. Hamun

Saxiix:

Taariikhda:

REPUBLIC OF KENYA

WORLD BANK GROUP

WAJIR WATER AND SEWERAGE COMPANY LIMITED Water for life WAJWASCO

ENGLISH FORMAT OF THE ABOVE TRANSLATED LETTER.

THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telegrams:" DISTICTER": ..... **OFFICE OF THE ASS. CHIEF**

Telephone: ..... **.....SUB-LOCATION**

When replying please quote **PO BOX.....**

Ref. No: ..... **WAJIR COUNTY**

And date **Date: .....**

RE: PROJECT LAND IN LAMBIB

I Mohamed M. harun, ID No. 27470854 Assistant chief Lambib sub-location has verified that no settlement will be lost from Lambib sub-location as a result of licensing the project area defined in the community land resolution and consent form for land use permit . The land permitted and granted for right to use will be used for;

1. Drilling of five boreholes
2. Construction of water reservoirs (steel tanks)
3. Construction of kiosks and troughs
4. Laying of main rising pipelines and distribution lines
5. Construction of pump house.
6. Construction of borehole fence. Each borehole will be fence separately.

Further, the project will require 1.25(Ha) on permanent basis. It has been verified that all parties; Ogaden and Degodia with interest in the land are also benefiting from the projects` main water benefits in form of a dedicated borehole.

The members of the Community have been duly informed that they have the right of refusal to grant land use rights to WAJWASCO and the term of licensing include free water for three month, toilets and implementation of pro-poor tariffs after the three month elapses.

The members of the Community that have interest in the land being licensed are identified as (Clan ogaden and Degodia).

Name:

_____

Signed: _____ Date: _____

II. MINUTES FOR COMMUNITY BARAZA

Minute of a meeting held in Lambib chief office on 18th march 2021 at 3:00pm.

Present members

- Present community members in the attendance list attached below.

MIN1: INTRODUCTION

The meeting kicked off 3:00pm with a word of prayer from the area chief and thereafter requested for self- introduction of the present members. He briefly explained the project component and handed over to the social expert for further explanation on objective of the meeting.

Min2: Project Description.

The social safeguard specialist gave a brief explanation of the WSDP project and informed the meeting that the borehole that was drilled by the county which was serving as both test drill borehole and a dedicated community borehole was not drilled to the specification required hence WAJWASCO intend to drill a new borehole within the same parcel of land that was consented and the community gave right to use to WAJWASCO on 5th December 2020. Further he informed that the funding is a loan from World Bank to national treasury and a grant to county government.

He informed that test drill borehole will be connected to a tank of $50M^3$ that will be constructed within Lambib and subsequently distribute water to a 6Nr kiosk with a total reticulation network of 2.5km as it was identified by the WAJWASCO engineer by the name **Moulid Abdullahi Jehow** and the representative of the community including the area chief.

Further he informed that the objective of the meeting was to conduct public consultations for the environmental and social impact assessment for the borehole in order to come up with appropriate mitigation measure.

At this juncture the social expert welcomed the consultant to explain objective of the Environment social impact assessment report.

Importance of the ESIA

The ESIA (Environmental & Social Impact Assessment) expert explained the scope of the project, introducing the proposed water works and sanitary measures and how they would be implemented. He

then went on to explain the importance of conducting an ESIA on the said sub-projects. He further informed the participants that the ESIA team would identify impacts that are likely to occur during project implementation phase and come up with appropriate ways of mitigating the impacts. He then informed that the views of the community meant to modify and improve design, ensure efficient resource use and inform decision making so as to avoid serious and irreversible damage to the environment. Further the study will be used to develop an appropriate Environmental and Social Management Plan (ESMP) for the project's sustainable development.

Project Components
The project will include the following activities:

i. **Borehole drilling**

According to the hydro-geological study report, the Lambib community borehole is proposed to be drilled up to a depth of 130m deep to access the lower bounded aquifer. The drilling is proposed to be carried out at a diameter of not less than 10", using a rotary type machine.

ii. **Borehole construction**

The borehole will be installed with 200mm diameter plain casing and similar diameter screens at all aquifer occurring formations of the well. The screen casing shall be surrounded with well graded gravel pack to specifications. In installing screen and casing, centralizers at 6 metre intervals shall be used to ensure centrality within the borehole.

iii. **Borehole equipping**

An appropriate submersible pump will be installed based on the test pumping results of the respective borehole once drilling is completed.

DISCUSSION, question and feedback.

In the discussion abdi mohamed in formed meeting that the land required for the borehole was already signed by the community on 5th December 2020 through the signed **community land resolution and consent form for land usage permit 01 provided and attached above.**

Alas the community chairman and the chief attested and confirmed the truth of the matter.

For other infrastructure like the kiosk, storage tank and the pipeline the social safeguard was tasked to fast track signing the consent forms.

The consultant enquired where the community and the proponent have already discussed the management of the borehole.

Yunis Hussein informed the meeting that the community and the proponent have already discussed the management of the borehole and agreed that WAJWASCO will manage the borehole and meet the cost of maintenance.

Also, Hussein the community chairman also informed the meeting that they agreed with WAJWASCO to provide free water to the community for a grace period of 90 days upon completion of the borehole.

The area chief thanked the consultant and the social safeguard expert for the effort. He highlighted the importance and the benefit of the project which include Provision of employment opportunities, improvement of health and hygiene of the local, reduction of diseases related to poor sanitation and provision of piped water. However, the chief informed the meeting that the fear of the community is draining of the shallow aquifer if the drilling is not done properly.

Abdi the social expert informed the meeting that the shallow aquifer will be protected with a plane casing so as to safeguard the water in the supper aquifer not to sip in to the ground.

Musa Sumbul inquired when the construction will begin.

The consultant replied that the previous ESIA report was approved by the bank while the host community project is under preparation. He informed that the plan is to hasten the ESIA of the community project before we start drilling of any borehole. The expectation is before end of August the drilling of the boreholes will commence.

In the deliberation the consultant requested the community to highlight any adverse negative impact that they foresee in the implementation of the project. Upon deliberation the following were highlighted and mitigation measures were agreed with the community.

Environmental impacts

IMPACTS	MITIGATION MEASURES
Pollution associated with the machinery used such as oil spills, noise and emission of smoke.	Constant maintenance of the machines to reduce the impacts. The use of machinery should be reduced where possible and employ man power.
There is likelihood of vegetation being cleared during the process of construction.	Ant tree affected to be replanted by the contractor.
Accidents were identified as an issue of great concern during the construction and operation phases. Workers in the site were identified as the most vulnerable to accidents.	Use of PPEs was identified as an important way of protecting the workers against accidents. Locals were asked to keep off the construction site in order to avoid accidents. Labeling of exits and fire assembly points. Annual audits to address loopholes in safety strategies. Hoard the site to keep people off. Site should have signs such as falling objects. Contractor should have group covers for insurance.
Dust pollution during construction phase	Water to be sprinkled during the construction phase in order to minimize dust.
Waste management issues may arise due to inadequate waste collection facilities and this may lead to outbreak of diseases.	The contractor to provide waste pins and empty to appropriate designated area. Sensitise workers not to throw solid wastes haphazardly

Socio-economic Impacts

IMPACTS	MITIGATION MEASURES
There was fear that once the water and toilets are ready for use, some people may be sidelined owing to several social issues such political inclination, social class, clan or religion hence unfairness during distribution and construction phase.	Locals agreed that the administrators should ensure that fairness is given special attention and ensure all residents have and equal opportunity to work and access water and sanitation services once the process is done.
Moral decadence may result as a result of labor coming from outside and money circulating in	Parents, local leaders eg chiefs and religious leaders should take the lead role in teaching

the local economy. It may come inform of infidelity in marriages and school drop outs caused by teen pregnancies. This could also result from women and men engaging in extra-marital sexual activities thereby breaking family ties.	and sensitizing the community on the importance of morality and bringing the culprits to book. Use of local labour to avoid influx of workers that can spread immoral issues.
Drying of shallow wells	Use of plan casing to protect shallow aquifer Proper supervision of the contractor by the supervision team.
Some locals expressed fears that there is likely to come with increased burden of water charges.	The County government and WAJWASCO should involve the locals before effecting any pricing strategy for the water.
Use of machines by the contractor to avoid local labourers	The contractor to use local work force and only use machine where necessary. Priority to be given to locals in all employment opportunities unless the requisite skills are not locally possessed by the local workers.
Spread of disease like COVID 19, HIV and AIDS and other communicable diseases	Contractor to strictly adhere to the covid-19 protocol measure. Provision of condoms to the workers. Sensitization of the community against the risk of contacting diseases like HIV AIDS

MIN3: AOB

There being no any other business to discuss the meeting was adjourned at 4:45pm

III. ATTENDANCE LIST FOR COMMUNITY BARAZA MEETING

PAUL NICHOLAS – NEMA Reg. No 2921

Mobile: 0724 242 338/ 0737 046 895

Consultant: *Environmental Impact Assessments (EIA), Environmental Audits (EA), Water, Sanitation & Hygiene (WASH) Baseline Surveys*

Project: *Environmental & Social Impact Assessment for Proposed construction of the water reticulation pipe network, 15No. toilets, and 6No. Water Kiosks in Lambib Town.*

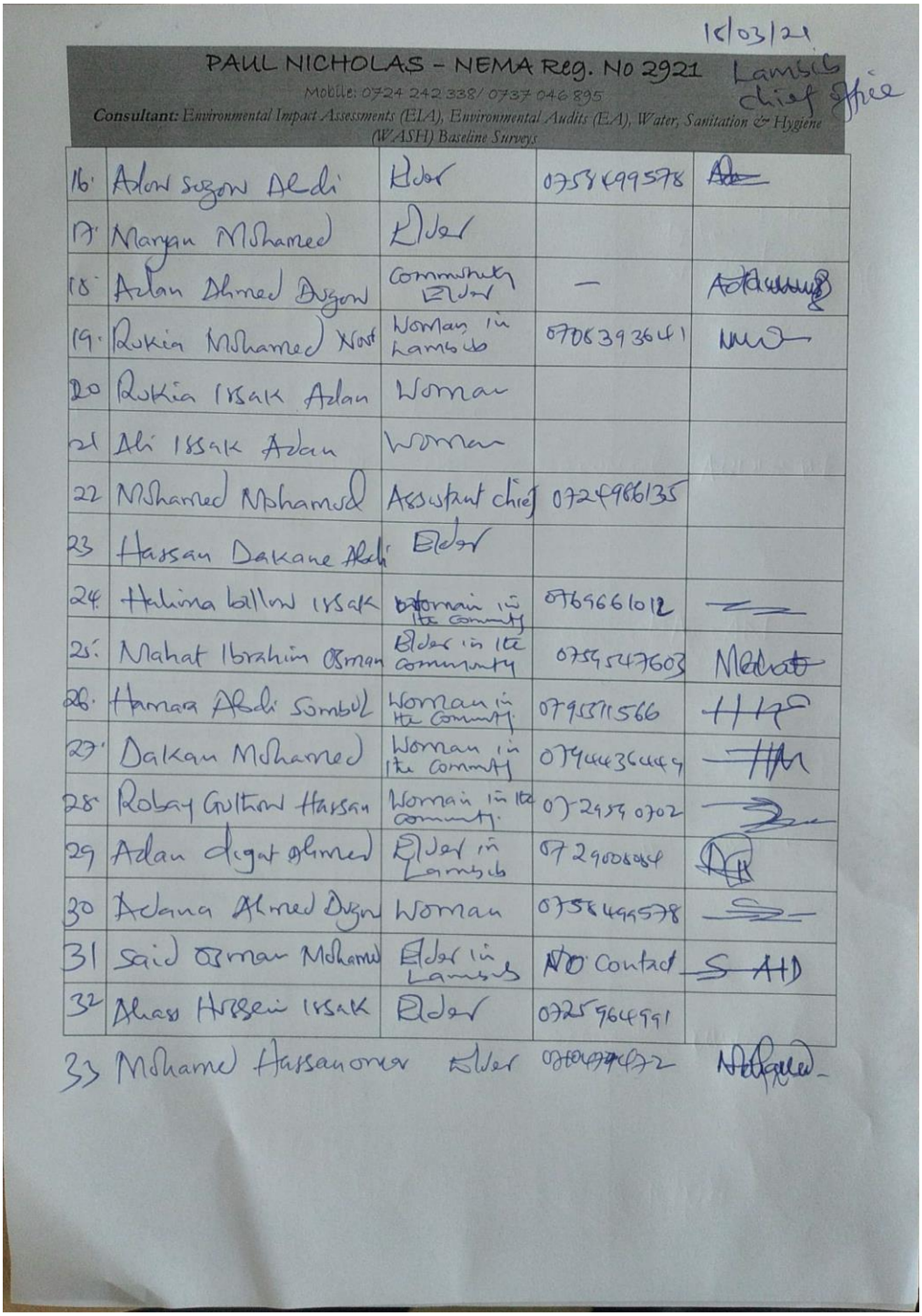
Date: 18/03/21

Client: WAJIR COUNTY WATER AND SEWERAGE COMAPANY

Venue: Lambib chief's office

PUBLIC PARTICIPATION - ATTENDANTS LIST

NO	NAME	DESIGNATION	CONTACT	SIGNATURE
1.	Ahmed Abdullahi	Elder		
2.	Abdi sijat Abdullahi	Lambib Elder	No contact	ABDISSAI
3.	Mohamed Mohamud	Elder		
4.	Hassan file barrow	Elder	0706274857	HASSAN
5.	Ali issak Adan	Lambib elder		
6.	Ahmed Mohamed Ali	Lambib elder	No contact	A-AU
7.	Mohamed Hassan	Lambib elder		
8.	Bishara Alasow	Community Elder	0759710453	BISHI
9.	Musa somow	Youth in Lambib		
10.	Dubow Mohamed Abdille	Elder	0715602311	DUBOW
11.	Mohamed Hassan Issak	Elder		
12.	Musa Ebey Issak	Elder		
13.	Halima Abdile omar	Woman	0769660071	UMAR
14.	Adan Farah Ibrahim	Elder		
15.	Mohamed Nude Hassan	Elder	0723980516	Afrole



15/03/21

PAUL NICHOLAS – NEMA Reg. No 2921 Lamu CG chief office

Mobile: 0724 242 338/ 0737 046 895

Consultant: *Environmental Impact Assessments (EIA), Environmental Audits (EA), Water, Sanitation & Hygiene (WASH) Baseline Surveys*

16.	Adow Sugow Abdi	Elder	0758499578	
17.	Maryan MShamed	Elder		
18.	Adan Ahmed Sugow	Community Elder	—	
19.	Rukia MShamed Nor	Woman in Lamu cb	0706393641	
20	Rukia Isak Adan	Woman		
21	Ali Issak Adan	Woman		
22	MShamed Mohamed	Assistant chief	0724986135	
23	Hassan Dakane Abdi	Elder		
24.	Halima Ballow Isak	Woman in the community	0769661012	
25.	Mahat Ibrahim Osman	Elder in the community	0754547603	
26.	Hamara Abdi Sombul	Woman in the community	0795711566	
27.	Dakan MShamed	Woman in the community	0794436444	
28.	Robay Gultow Hassan	Woman in the community.	07-2454702	
29	Adan digut Ahmed	Elder in Lamu cb	0729008484	
30	Adana Ahmed Dugu	Woman	0758499578	
31	Said Osman MShamed	Elder in Lamu	No Contact	
32	Ahas Hussein Isak	Elder	0725964991	
33	MShamed Hassan Omar	Elder	0704994472	

IV. HYDRO-GEOLOGICAL SURVEY REPORT

REPUBLIC OF KENYA

WORLD BANK GROUP

WAJIR WATER AND SEWERAGE COMPANY LIMITED Water for life WAJWASCO

BG SURVEYS

.....LTD

Report no. 2021/05

HYDROGEOLOGICAL SURVEY REPORT

FOR LANBIIB AND RAHFED

M.H.Boya

HYDROGEOLOGIST

License no. WD/WRP/248

BOWYER GROUNDWATER SURVEY LTD
P.O. BOX 258-70200
WAJIR **February, 2021**

HYDROGEOLOGICAL SURVEY REPORT

CLIENT: The Managing Director
Waj'wasco
P.O.BOX 9-70200
WAJIR

PROJECT: Rural water supply

SUB-COUNTY: Khorof Harar/Wajir south

WARD: Khorof Harar/Leheley

LOCATION: Lan'biib/Qumbi

INVESTIGATING HYDROGEOLOGIST: M.H. BOYA

SELECTED BOREHOLE SITES: Sheet No. NA – 37 – 11
Lambiib 1: UTM 37 N 0626232; 0192820, Elevation 262m
Lambiib 2: UTM 37N 0626489; 0192001, Elevation 265m
Lambiib 3: UTM 37 N 0627583; 0191767, Elevation 263m
Lambiib 4: UTM 37 N 0627766; 0192466, Elevation 261m
Lambiib 5: UTM 37 N 0627362; 0193144, Elevation 265m
Rahfed (or Qumbi) 1: UTM 37 N 0616705; 0188533, Elevation 258m
Qumbi 2: UTM 37 N 0616703; 0185326, Elevation 242m
Qumbi 3: UTM 37 N 0615100; 0184582, Elevation 245m
Qumbi 4: UTM 37 N 0617829; 0185921, Elevation 246m
Leheley: UTM 37 N 0611492; 0178826, Elevation 234
ii

EXECUTIVE SUMMARY

This County has no permanent river(s). Wajir town, its Headquarter, subsequently; lacks a central water supply system despite having a fast growing population due to immigration of rural population to this relatively urban center. To meet the needs of this growing population, various

development plans are envisaged by the County Government for this town. One such plan entails provision of a central water supply system; as this town constitutes the base for administrative and accompanying services in the County. This study aims at identifying a reliable source for this Wajir central water supply system. It also hopes to drill one borehole in Lanbiib, and one in Rahfet (Qumbi) as corporate responsibility.

The County Government, through Wajir Water and sewerage Company (Wajwasco), proposes to drill ten boreholes beyond the 6.4 kilometer radius of Wajir town, and link eight of these boreholes as source for this central water supply system. This report presents the results of a hydrogeological and geophysical investigation undertaken in Lanbiib, and Rahfet area that were identified as potentially suitable sites for these boreholes following an earlier remote sensing satellite investigation conducted by Wajwasco.

The project area lies in a hot semi-arid climate, where rainfalls are menial and temperatures are generally high; in view of which potentials for surface water development is low. The sedimentary and metamorphosed rocks in the project area, however; evince moderate potentials for groundwater development in view of the high number of successful shallow wells and boreholes here. Locally the hydrogeological systems here consist of three aquifers: an upper water table aquifer of 4-16 meters, and two lower confined aquifers of 25-40 and 80-100 meters deep; that are expected to be recharged through the infiltration of annual precipitations, and seepage along a major drainage (Lagha Bor) in the area.

In the geophysical investigation carried out in the project area of Lanbiib and Rahfeit, Vertical electrical sounding is employed using ABEM SAS 1000, to study the progressive change of resistivity with depth to locate zones of weathering or fracture that are regarded as good potential borehole development site. These vertical electrical soundings are used to probe to 130 or 160 meter below where no aquifer is expected.

Based on these hydrogeological and geophysical investigations,**it is recommended that these boreholes aredrilled in Lanbiib at the location of vertical Electrical soundings: R00594, R00595, R00596, R00597, and R00598;in Rahfeit (Qumbi) at the location ofvertical Electrical sounding: R00599, R00600, R00601, R00602,and in Leheley at the location ofvertical Electrical sounding R00603**. These sites are marked on the ground and their coordinates provided in the report.

These boreholes are to be drilled to 130 meters. The groundwater quality in these areas is expected to be slightly mineralized, but suitable for the proposed use. The output of these boreholes, however, will be determined after drilling and test pumping of these wells

TABLE OF CONTENTS

GLOSSARY OF TERMS

Aquifer: A geological formation or structure which transmits water and which may supply water to wells, boreholes or springs.

Confined: Confined aquifers are those in which the piezometric level, or the water rest level, is higher (ie, at a greater elevation relative to sea level) than the elevation at which the aquifer was encountered.

Old Land Surface: Old Land Surface (OLS's) is the term given to ancient erosion surfaces now covered by younger surface material. In hydrogeology, OLS's frequently

make good aquifers, especially where the erosion debris left behind is coarse in nature.

Phenocrysts: The larger crystals in porphyritic rocks. In phonolites, these are usually crystals of the minerals orthoclase and nepheline.

Porphyritic: A rock containing large crystals or phenocrysts, in a finer groundmass.

Pycroclastic : Rocks that consist of fragmental volcanic material which has been blown intothe atmosphere by explosive activity.

Recharge: The general term applied to the passage of water from surface sources (ie. From rivers or rainfall) into the groundwater store.

Tuff/tuffaceous: Rocks formed by the consolidation of ash ejected from a volcano.

Unconformable: The representation in physical geology (ie, in the rock record) of a break in the ordered succession of rocks.

Vesicular : Small spherical or ellipsoidal cavities found in volcanic lavas which are produced by bubbles of gas trapped during the solidification of the rock.

Volcanic: Here used as a general describing geological material of volcanic origin.

VI

INTRODUCTION

BACKGROUND INFORMATION

Wajir town has a radius of 6.4 kilometers. Outside this periphery are found small rural centers that rely on Wajir town for trade and other services namely: Wagalla, Lafaley, Lanbiib, Ganyure, Qulaaley, and Leheley to mention just a few. While the main objective of this project is to seek for groundwater sources for Wajir town's central water supply system, the point source areas of Lanbiib, and Leheley are designed to benefit from this project. Of the proposed ten boreholes in

this project, therefore; eight are to be connected to Wajir central water supply system, while two are to be installed to serve Lanbiib, and Leheley trading centers.

Overall goal

This project is aimed at improving the socio economic and health status of these beneficiary communities through sustainable supply of potable water by serving approximately 20,000 people from Wajir Town, Lanbiib and Leheley. In view of which approximately 500 m^3/day water demands is to be meet.

Location

Wajir town lies on the Longitudes 40.04970^0 East, and the Latitude 1.74322^0 North, and has a radius of approximately 6.4 kilometers. Lanbiib and Leheley, the other project centers, lie approximately ten kilometers from Wajir on the roads to Wajir Bor and Nairobi respectfully as shown below (Fig. 1.0).

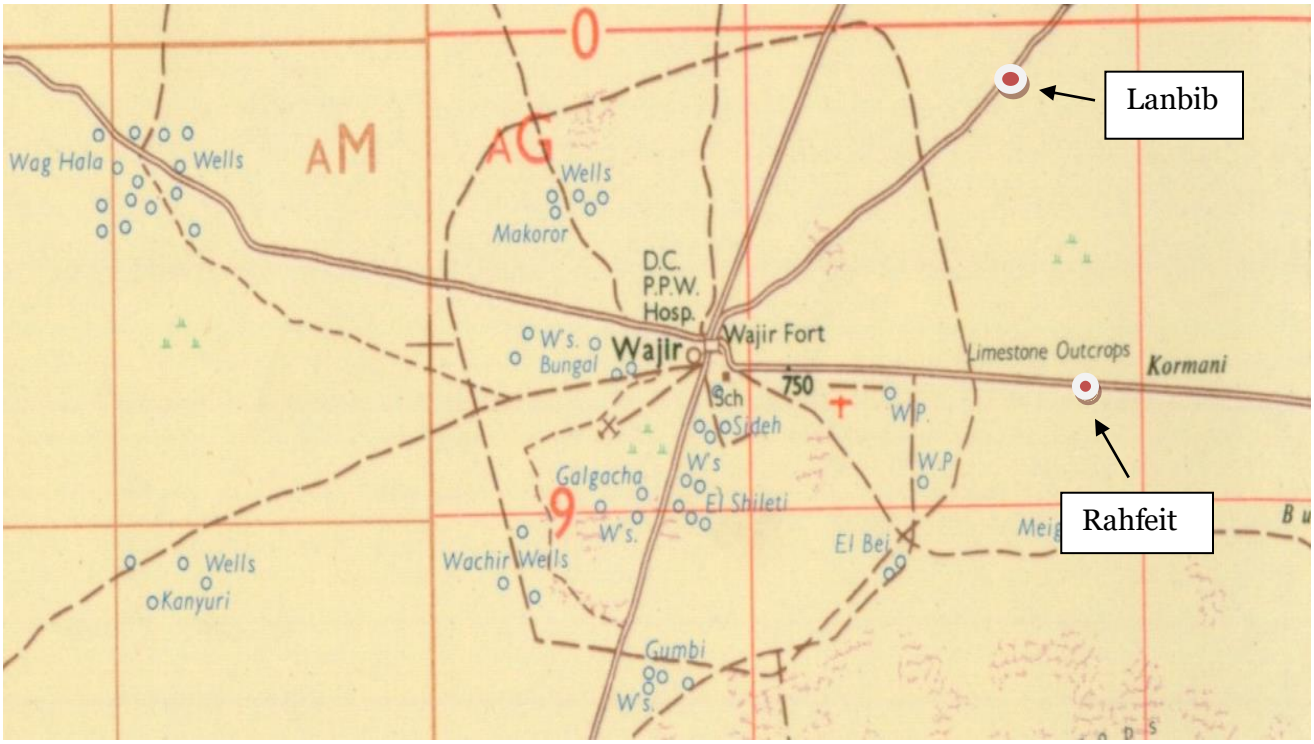


Figure 1.0: Location map; Project area

CLIMATE

The climate here is typically hot semi arid type that is generally characterized by wet and dry phases. The rainfalls recorded in Wajir town have an annual average of 288 mm;with the average monthly rainfalls recorded as shown below(Table 1.0).

The long rains begin in the middle of March and external into May, while the short rains begin in October and extend into December; and accounting for more than 70% of the total precipitation in the area.5% of these annual precipitations are assumed to go to recharge the groundwater in the area through direct infiltration and seepage along water course ways.

The dry seasons are marked by the months of January, February, June, July, August, and September. The prevailing daily temperatures throughout the year are, however; high with the average minimum and maximum temperatures of 21^0 C and 34^o C; with very little variations in the year.

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Table 1.0 Average monthly rainfall

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Rainfall(mm)	8	6	37	69	15	6	2	6	7	23	79	59

Source: Meterological Dept. Wajir

3.0 PHYSIOGRAPHY

The main physiographic units distinguished in the project area are an extensive red sandy plain, and the Wajir continental basin. Wajir town lies in a shallow lacustrine basin, but outlying this basin is an extensive plain that range from 150 to the south and to 460 meters above sea level to the north.

This plain has no hills, and gently slopes to the southeast towards the Indian Ocean with a slight warping; drained by lagha Bor (to the west) and several minor, broad, shallow, ephemeral water

courses trending NE-SW that flow once or twice a year. These water-ways are associated thick bushy vegetation that predominantly consists of sparse shrubs, studded by woody Acacia elatior.

3.0 GEOLOGY

The rocks in the project area are all of sedimentary origin. The oldest rocks consist of the metamorphosed sedimentary rocks of the Precambrian age. These rocks include gneiss, schist, and quartzite that form a basement system beneath a veneer of deposits of younger rocks (figure 2.0).

The Jurassic beds which immediately lie above this basement system consist of limestone, gypsum, and sandstones that were deposited during the transgression of the sea during the Jurassic age. During the latter regression of the sea, a variety of sediments of the late Pliocene that consist of inter-bedded sands, silts, and clay covered this limestone formation. Above the later then finally lay the superficial deposits of the quaternary age that are represented by thick red sands, silt and the alluviums. 3

These rocks exhibit considerable variation in thickness, extent and lithologic characteristics that suggest rapid deposition of detritus materials derived from the erosion of adjacent areas of older crystallized rocks to the north.

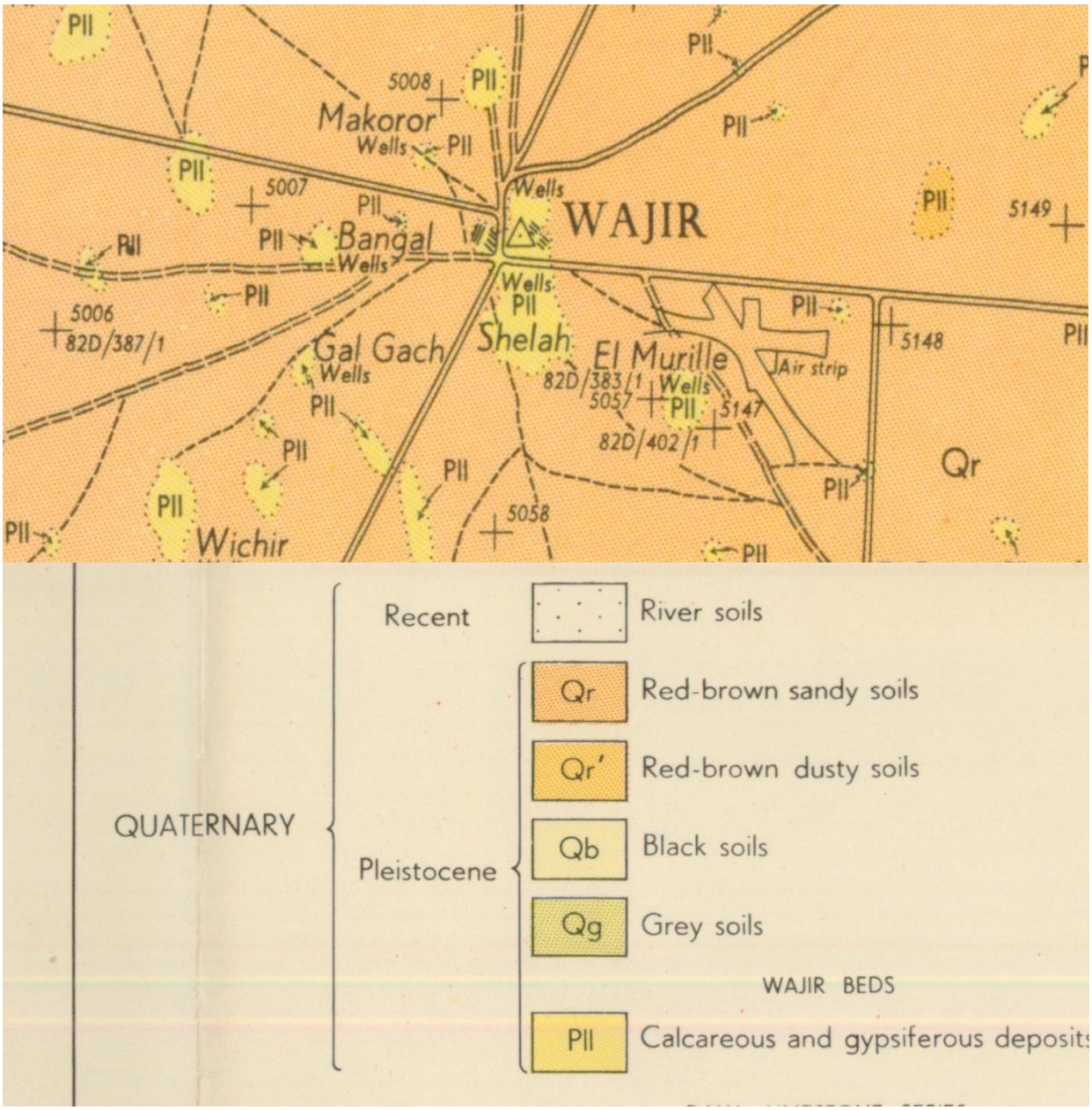

Figure 2.0: Geological map

4.0 HYDROGEOLOGY

The groundwater recharge in the project area is expected to be local, mainly involving infiltration from direct precipitation in the wet seasons of March-May and October-December.

But mean annual rain fall of 288mm in a year, is meage to adequately recharge the groundwater. Yet groundwater constitutes the main source of water in the area, which is taped through digging shallow wells or the drilling of boreholes. The project area is assumed lack external recharging media, but evinces fair groundwater availability in and around the shallow Wajir continental basin.

Lagha Bor, a major water course in the area that traverses the area to the west of Leheley and Turatura trending NW-SE, is expected to enhance the groundwater in the project area through seepage along its course ways.Assuming that 5% of the annual precipitation actually goes to recharge the groundwater through direct infiltration; this plus seepage along Lagha Bor is considered to enhance the groundwater resources in the area.

5.2 GROUNDWATER POTENTIALS

5.2.1 SHALLOW WELLS

The groundwater potential in the general area is considered moderate, as there exists shallow wells over the 6.4 kilometers of Wajir town and beyond. Some of these wells occur in well fields like those in Ganyure, Orahey, Wagalla, Guguf, Modokare, Shalete, and Elnur to mention just a few. Over 700 individual plots and institutions in these areas have their own water supply based on shallow wells. These well fields and individually owned wells serve to point at the groundwater potentials in these areas.

5.2.2 BOREHOLES

Beside these wells, a number of boreholes were previously drilled in Wajir town, some of which have fairly good yield. The drilled depths in these boreholes range 50-148 meters, evincing three aquifers at the depth of 7-13m, 30-50m, and 80-146m. Technical details of some of these boreholes in Wajir town are shown below (Table2.0). These closely correlate the aquifer zones expected in Lanbiib and Rehfat (Qumbi).

Table 2.0 Boreholes drilled in Wajir

B/hole No.	Location	Depth (m)	WSL (m)	WRL (m)	Yield M^3/H	Remarks

	Air port	74	13, 50	6	5.1	Operational
C3964	Air port	128.9	7.6, 53, 97	14	2.5	,,
	Wajir girls	140	7, 32, 104	4.9	7.68	Operational
C9740	KP&L	148	146	25	4.8	,,
	Wajir Hospital	100	11,30, 80	6	4	,,
	Wajir Resort	58	10, 30, 50	8	7	,,
	Wajir Wakhaf	80	10, 25, 80	7	8	,,
	Al-shimali mosque	125	-	12.92	3	

Legend: Wsl – water struck level
Wrl – water rest level

4.3 WATER QUALITY

No records on the groundwater quality is immediately available on Lanbiib, Rahfed (or Qumbim),and Leheley area. But based on past borehole drilling in Wajir and its environs, the groundwater in Lanbiib, Rahfed, and Leheley are expected to be fairly mineralized; with TDS and hardness of 1300-3000mg/lit and 280-340 mg/lit respectively, therefore; saline and hard to some degree. Due to organic pollution, the nitrates in the water here are also considered above 330mg/lt.

6

But resistivity values of the vertical Electrical sounding carried out in the project area occur in the range of 11-24 Ohm meter at inflection points, which is indicative of brackish groundwater quality. In view of these, the groundwater here is expected to be just slightly saline by Wajir standards.

5.0 GEOPHYSICAL INVESTIGATION

In the geophysical investigation carried out in Lanbiib and Rahfed, electrical resistivity method was employed to study the progressive changes of resistivity with depth employing ABEM SAS 1000. A method that had successful been used in locating proper sites for drilling, and in determining depths to bedrocks in sedimentary areas. Ten vertical electrical soundings: R00594-R00604 were carried out in the project area probing to 130 or 160 meters using Schlumberger array. The values of the apparent resistivities obtained are then plotted (see annex); and qualitatively analyzed.

Based on these results, the true depths and expected geological formations in these areas are interpreted as below (Table 3.0). The selected sites were chosen on assumption that zones of weathering or fractured rocks represent potential borehole development site. In the project area, these weathered/ or fractured zones are found to occur at the depth of 4-16m in phreatic aquifers, and 25-40m and 80-100m in the confined aquifers.

Table 3.0 Resistivity interpretation

Traverse no.	Depth interval m	Resistivity Ohm/m	Expected geological formations
R00594	0-4	190	Top white sandy soil
Lanbiib no 1	4—6.3	30	limestone
	6.3—10	17	Weathered Sandstone
	10- 20	46	Sandstone
	20-25	11	Weathered Sandstone
	32-80	60	Sandstone
	80-100	20	Weathered quartzite
	100 and beyond	60	Quartzite

Traverse no.	Depth interval m	Resistivity Ohm/m	Expected geological formations

R00595 Lanbiib no 2	0-3.2 3.2-16 16—20 20- 32 32-40 40-80 80-130 130 and beyond	100 110 11 15 10 48 22 30	Top red sandy soil limestone Weathered Sandstone Sandstone Weathered Sandstone Sandstone Weathered quartzite Quartzite
R00596 Lanbiib no 3	0-4 4-6.3 6.3-25 25-50 50-100 100 and beyond	450 120 36 82 16 60	Top red sandy soil limestone Weathered Sandstone Sandstone Weathered Sandstone Quartzite
R00597 Lanbiib no 4	0-02 02-3.2 3.2-5 5-16 16-25 25-63 63-100 100 and beyond	500 340 120 72 10 34 13 27	Top red sandy soil limestone Weathered Sandstone Sandstone Weathered Sandstone Sandstone Weathered quartzite Quartzite
R00598 Lanbiib no 5	0-5 5-16 16-25 25-50 50-100 100 and beyond	1000 100 14 36 12 15	Top red sandy soil limestone Weathered Sandstone Sandstone Weathered Sandstone Quartzite
R00599 Qumbi no.1	0-4 4-13 13-20 20-40 40-50 50-80 80-130 130 and beyond	180 30 15 19 12 47 37 72	Top white sandy soil limestone Weathered Sandstone Sandstone Weathered sandstone Sandstone Weathered sandstone Quartzite

Traverse no.	Depth interval(m)	Resistivity (ohm-m)	Expected geological formations
R00600 Qumbi no.2	0-5 5-10 10-16 16-25 25-40 40-63 63-80 80 and beyond	500 55 27 25 16 80 19 40	Top white sandy soil limestone Weathered Sandstone Sandstone Weathered sandstone Sandstone Weathered sandstone Quartzite
R00601 Qumbi no.3	0-4 4-8 8-10 10-13 13-63 63-100 100-130 130 and beyond	320 120 100 110 30 90 30 40	Top white sandy soil limestone Weathered Sandstone Sandstone Weathered sandstone Sandstone Weathered sandstone Quartzite
R00602 Qumbi no.4	0-4 4-10 10-20 20-25 25-32 32-63 63-80 80-100 100-130	1600 180 23 56 11 100 50 100 60	Top white sandy soil limestone Weathered Sandstone Sandstone Weathered sandstone Sandstone Weathered quartzite Quartzite Weathered gneiss
R00603Leheley	0-2,5 2.5-10 10-32 32-40 40-100 100 and beyond	360 880 187 107 9 10	Top red sandy soil limestone Weathered Sandstone Sandstone Weathered sandstone Gneiss

7.0 Conclusion and Recommendation

Given the project area has a mean annual rainfall of 288mm and that there is no external recharging media, the infiltration due to these annual precipitations, and seepage along Lagha Bor are expected to recharge the groundwater. Past success in shallow wells, and borehole drilling in the general area attests to the fact that indeed there exist in these areas fair groundwater potentials to drill boreholes for the propose project.

The aquifers in the area of Lanbiib and Rahfet/Qumbi are expected to occur at the depth of 4-16meters, 25-40meters, and 80-100 meters below the ground level. These water bearing formations phreatic or confined consist of weathered sedimentary rocks underlying the area. **In view of the foregoing it is here recommended that all these boreholes, location at vertical electrical sounding: R00594 - R00603 in Lanbiib, Qumbi, and Leheley be drilled to a maximum depth of 130 meters**; these sites are marked on the ground and their coordinates provided in this report. The groundwater in these areas is expected to be slightly mineralized.

To fulfill a legal requirement, the client is advised to apply for a groundwater permit from **WaterApportionment Board, Ministry of Environment and Natural Resources** for authorization to drill these boreholes. A technical specification in the drilling of these boreholes is enclosed.

M.H.Boya
HYDROGEOLOGIST

References

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DISTRICT DEVELOPMENT PLAN: 2002-2008

DIXEY, F.1948. Geology of Northern Kenya . Report No. 15, Geol. Surv. Kenya.

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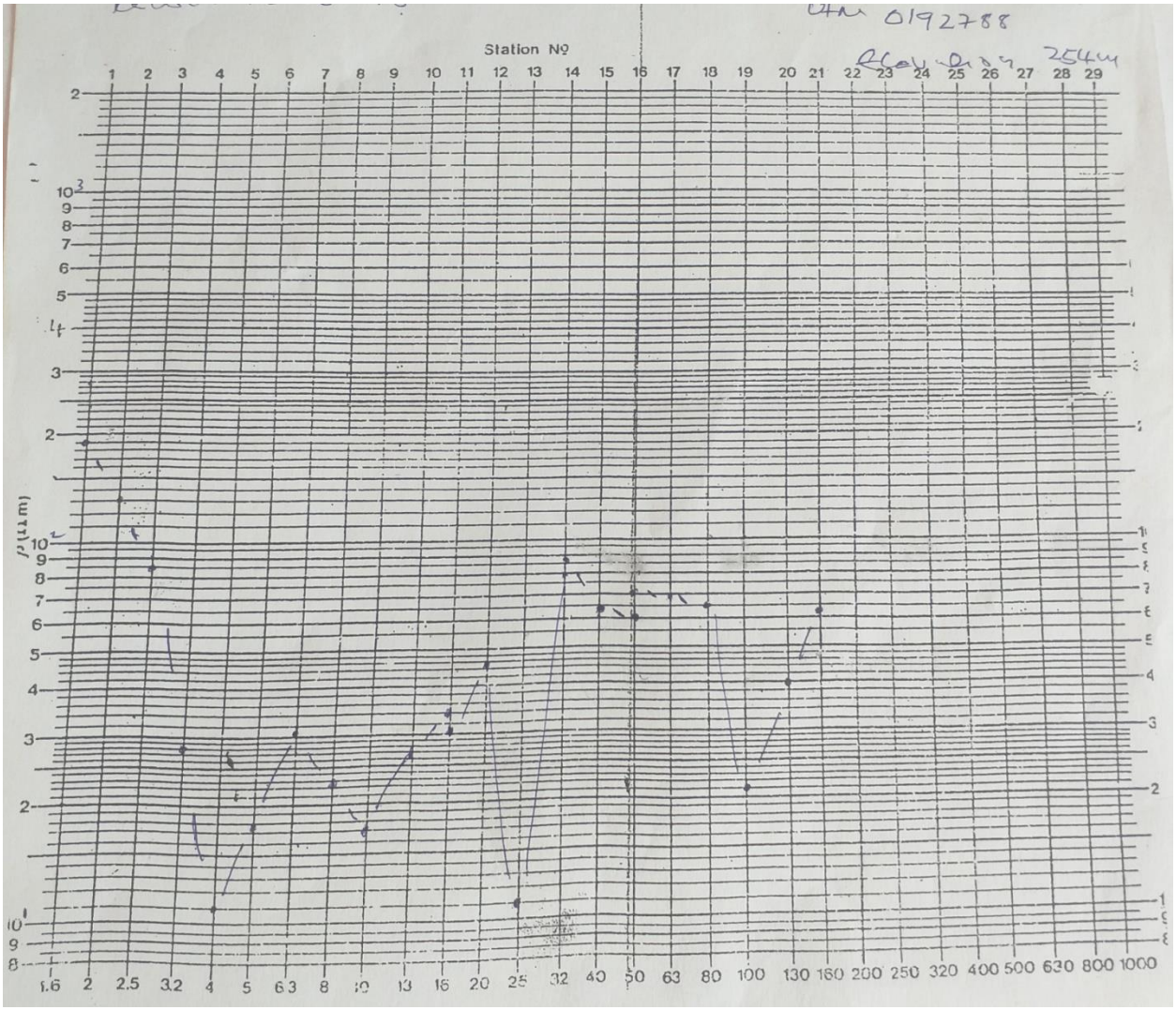
WHO, 1973. Groundwater resources of Kenya. Sectoral study and National Programming for community and rural water supply, sewerage and pollution control. Report No. 7.

Annex

RESISTIVITY CURVES



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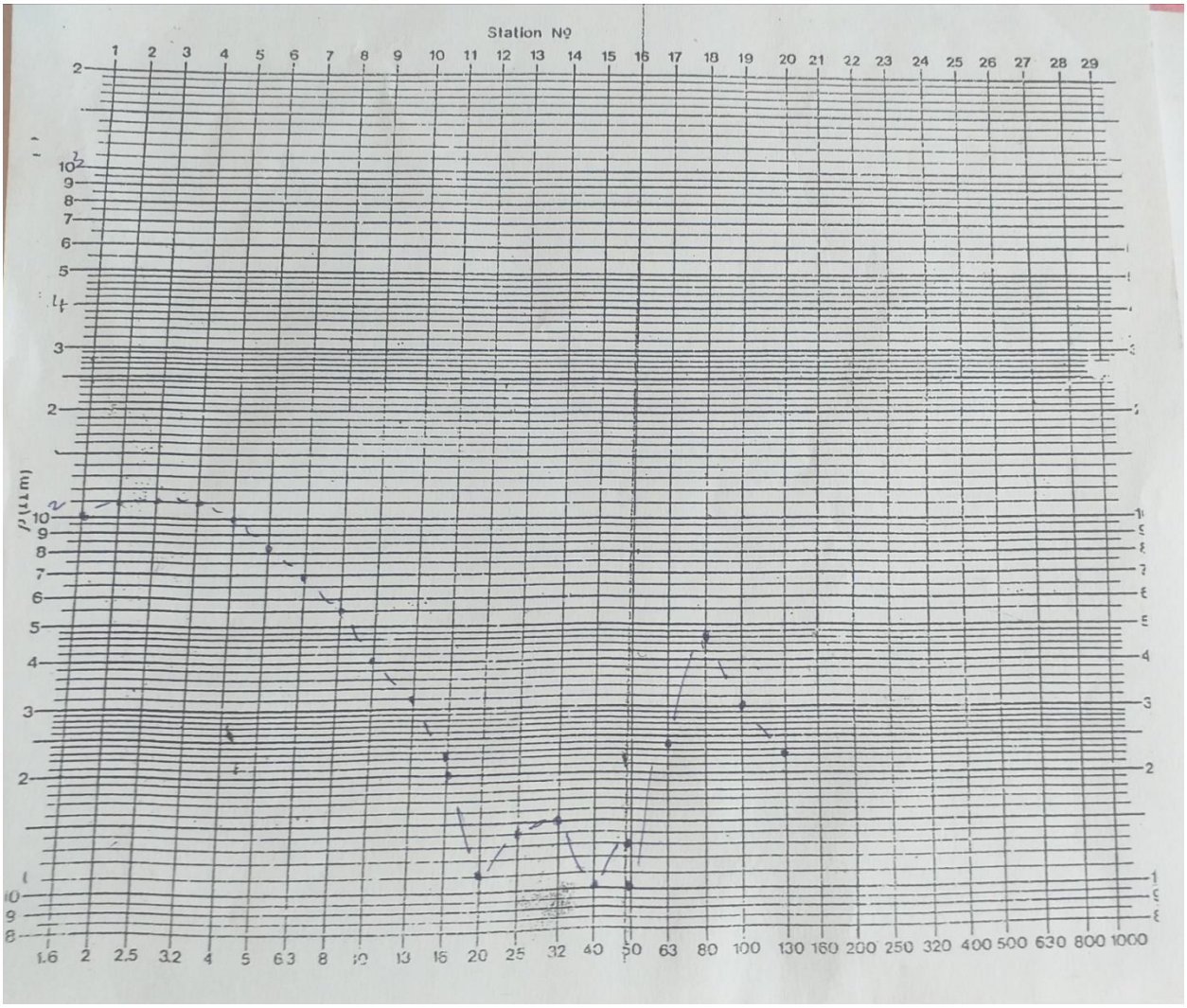

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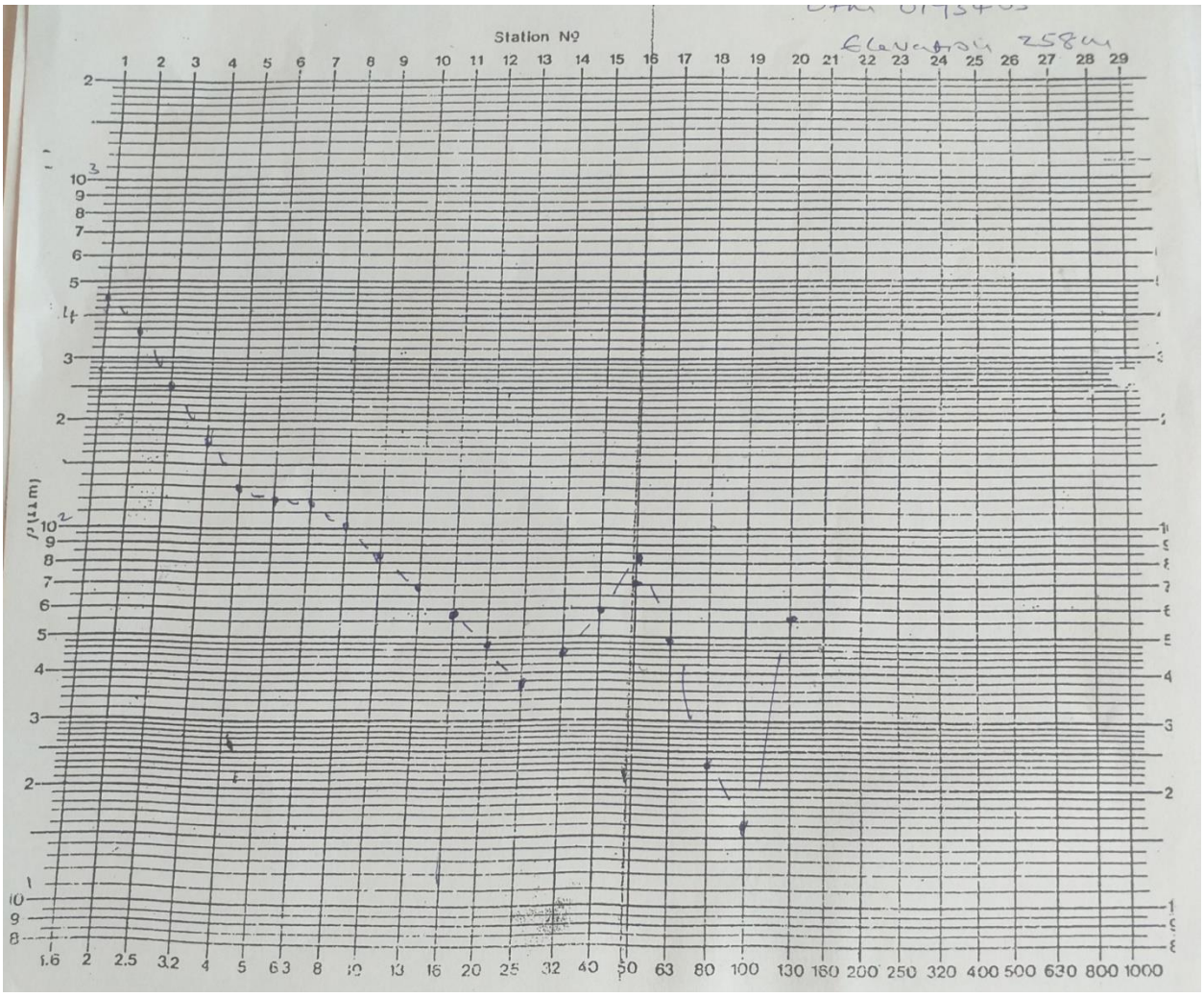

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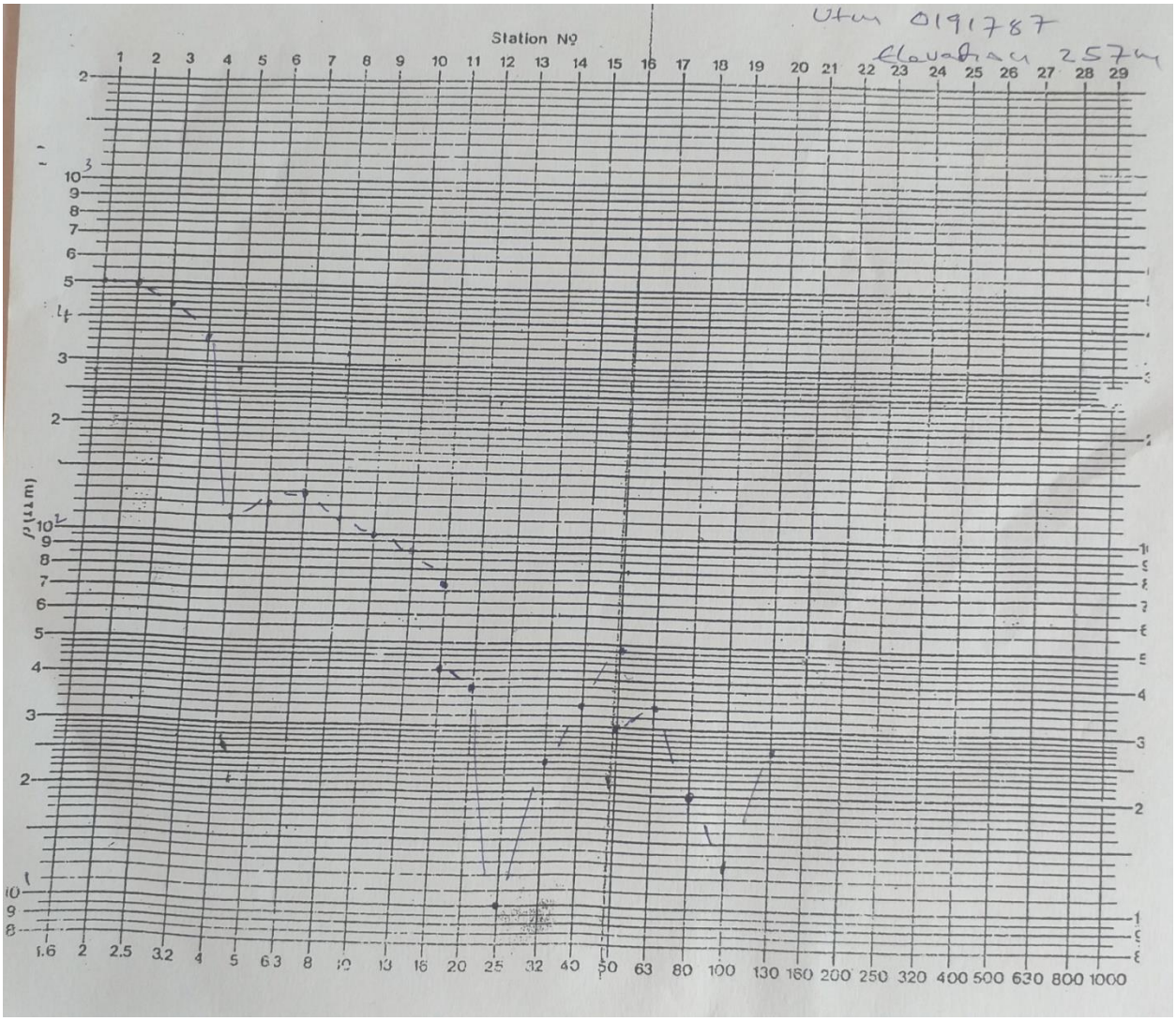

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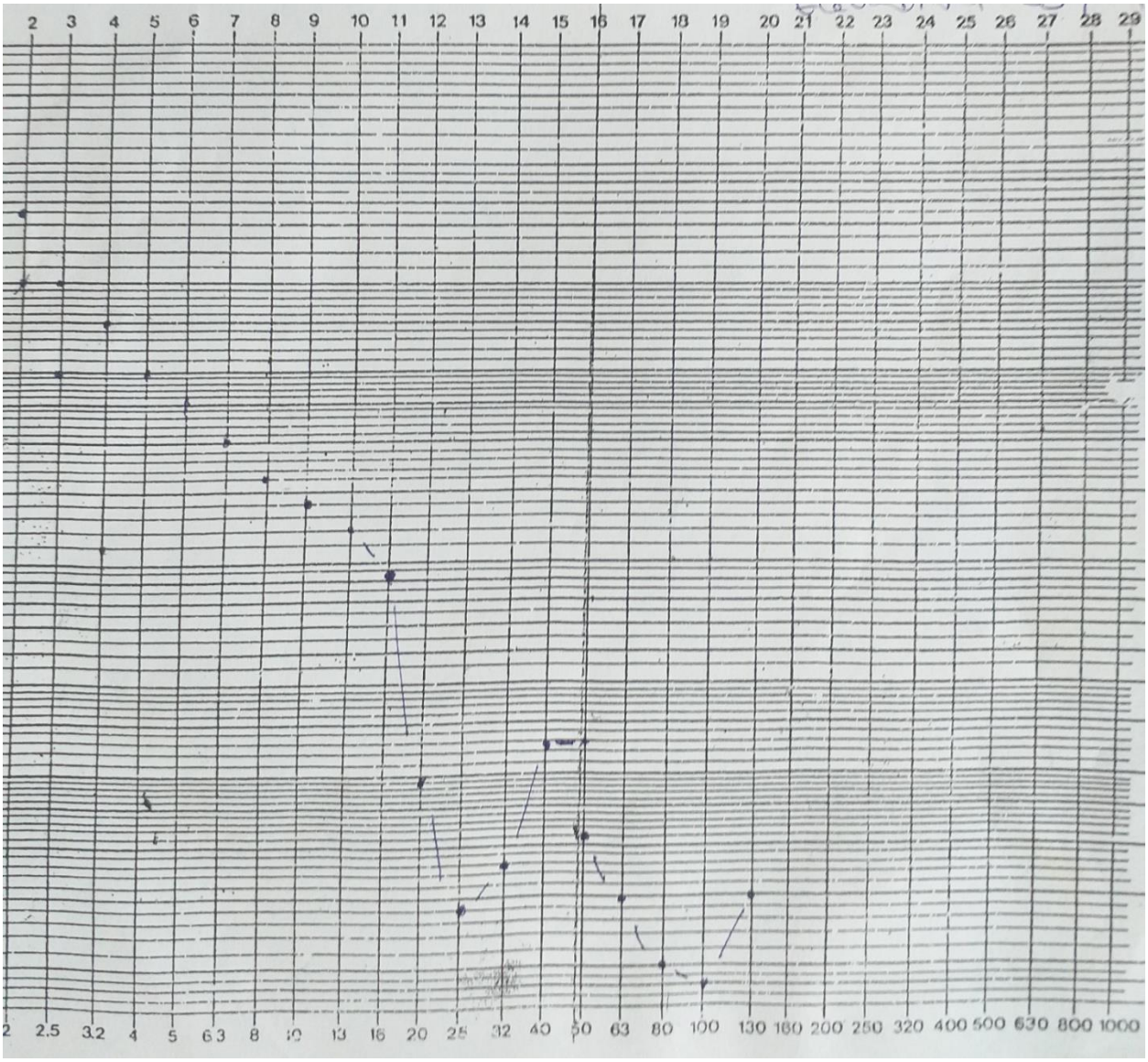
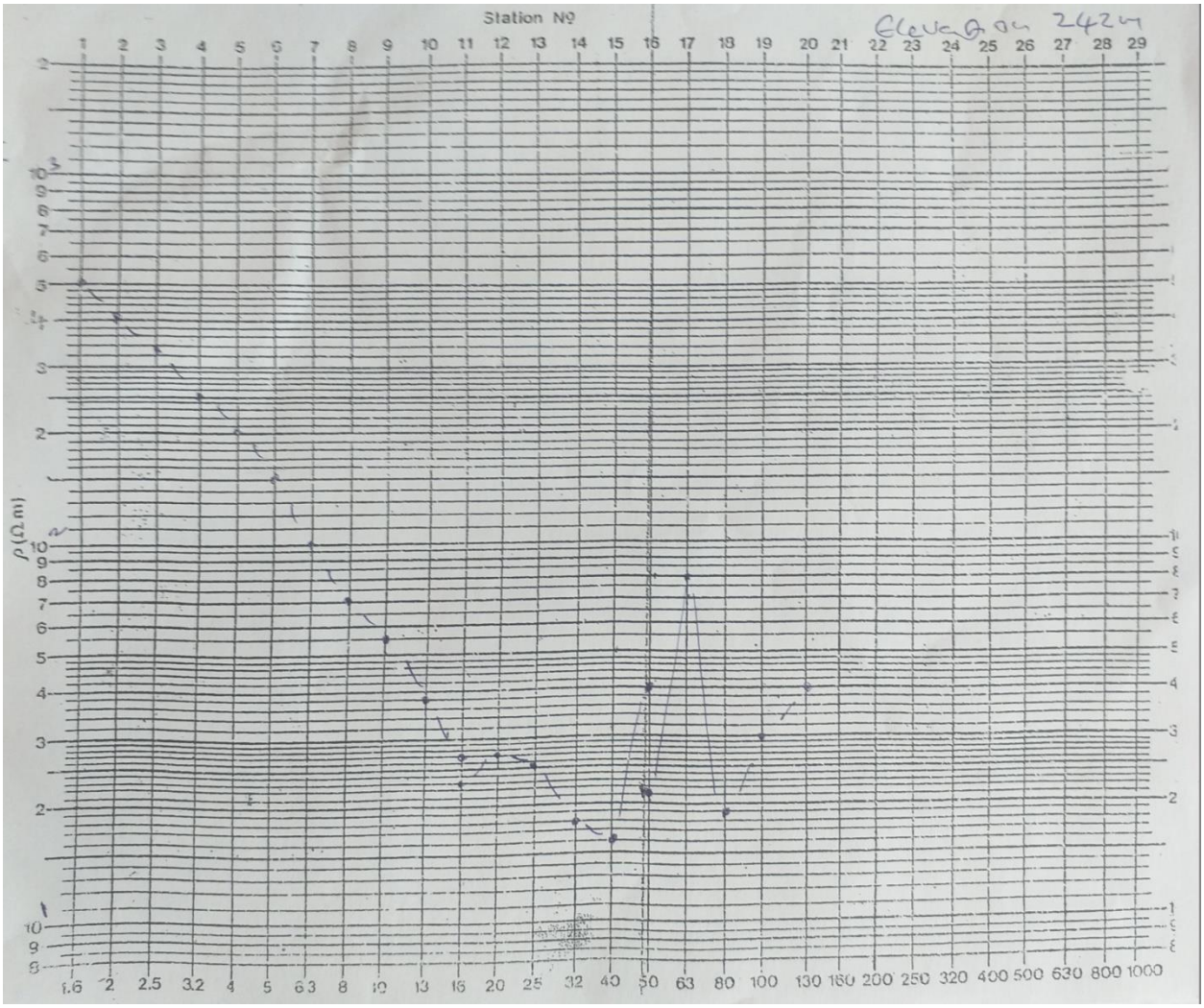
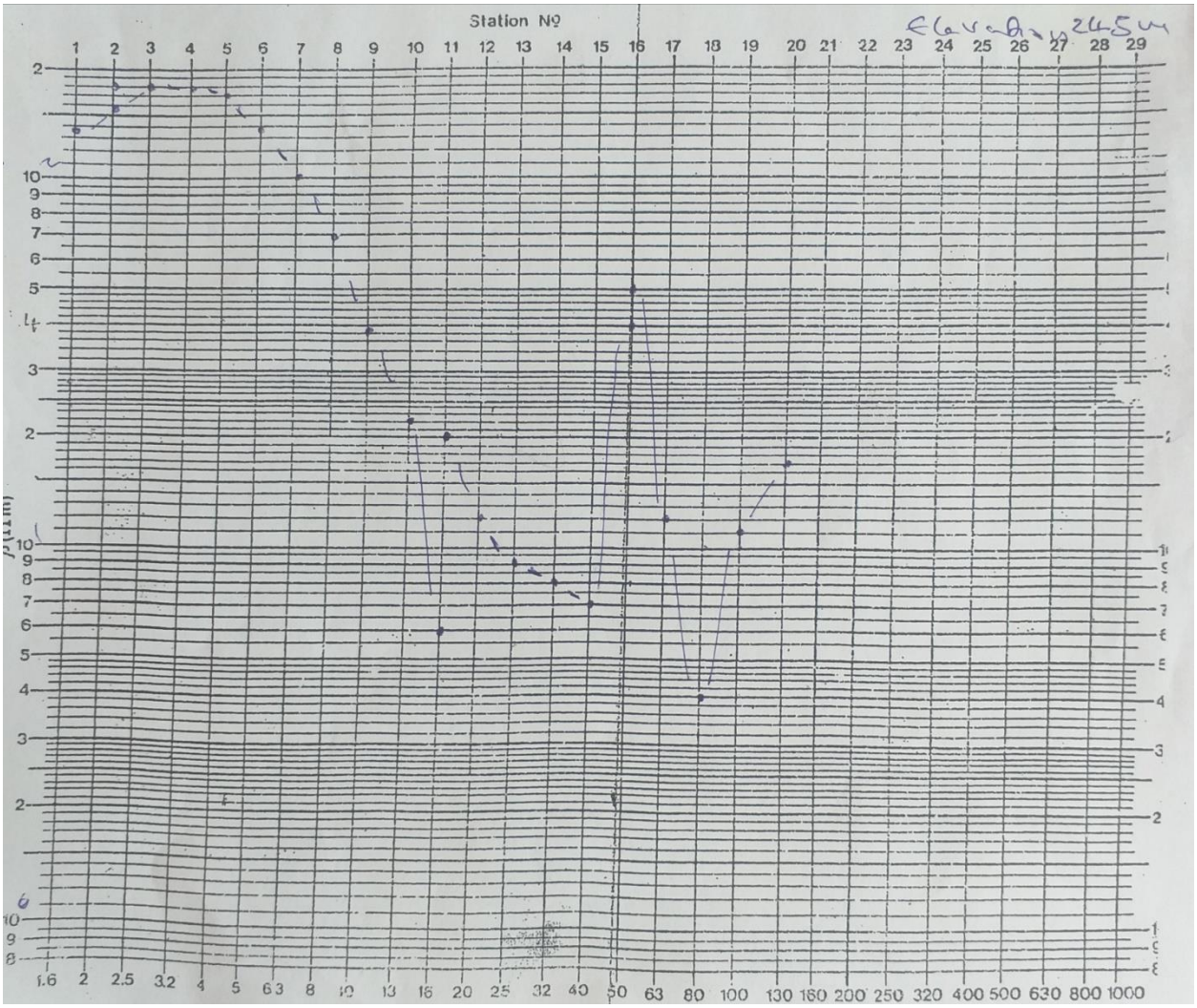


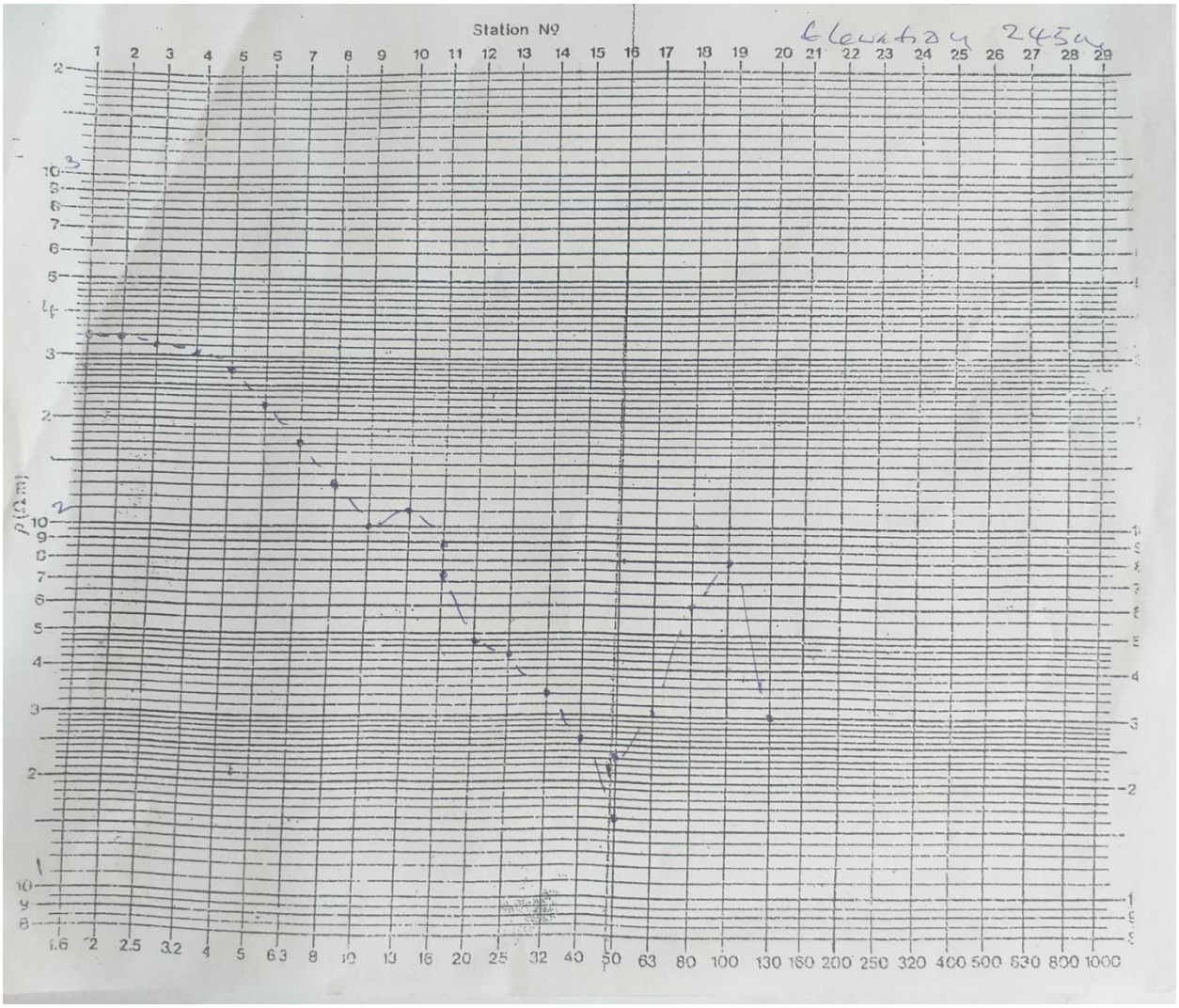
Lambiib ves: R00598



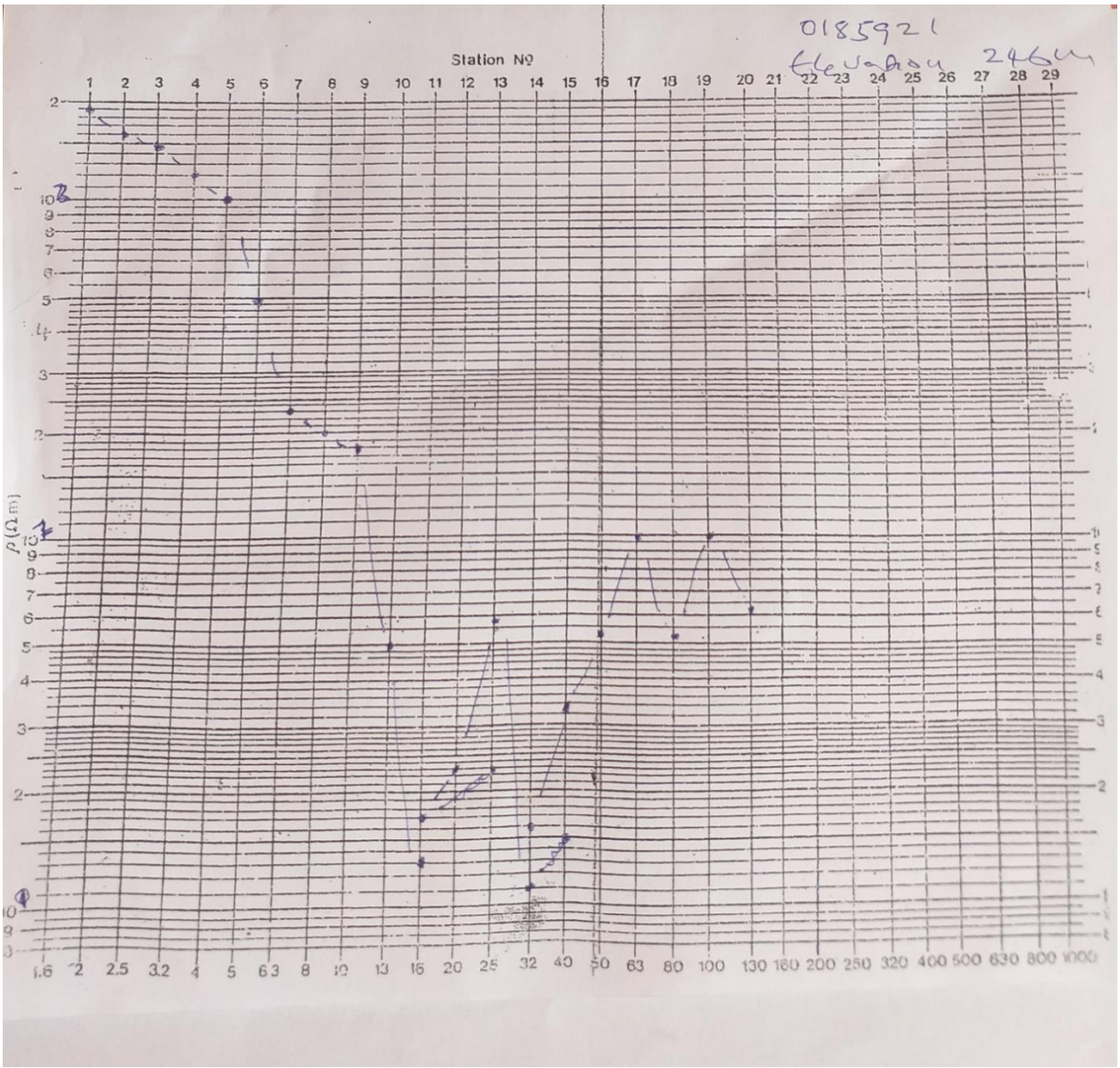
Qumbi ves: R00599



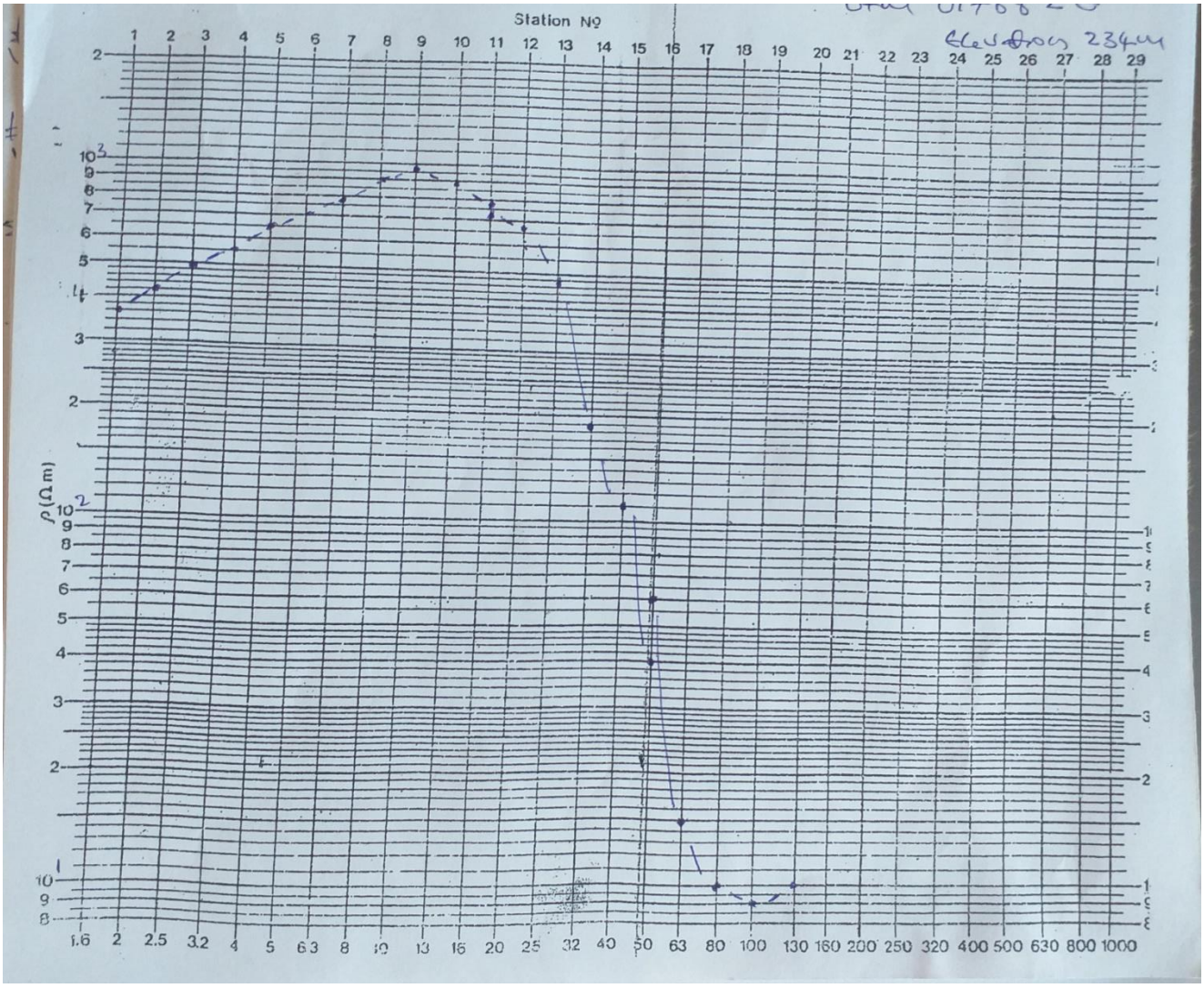
Qumbi ves: R00600



Qumbi ves: R00601


Station Nº
ρ (Ωm)

Qumbi ves: R00602



Leheley: Ves R00603

TECHNICAL SPECIFICATIONS

1. BOREHOLE DRILLING

1.2 REGULATIONS AND STANDARDS

The borehole shall be drilled at the site to be identified by the Project Manager. Each borehole shall be drilled to a depth specified in the hydrogeological survey report. It shall be drilled through all strata encountered.

The Employer will acquire the relevant permits and Government authorizations.

1.2 MOBILIZATION, DEMOBILIZATION AND RESTITUTION

1.2.1 The Contractor shall mobilize to the site in accordance with the Agreed Programme. The sum for mobilization/demobilization shall include transportation of machinery, erection, dismantling and preparation of temporary camps as the Contractor deems necessary, provision of drilling and development fluids (bentonite, foam, water),water for camping, personnel sanitary facilities.

1.2.2 The Contractor shall minimize disturbance to neighbouring plots. This shall particularly include ensuring that bailed fines and pumped test water are discharged in a manner that does not create a nuisance either to the public or private property.

1.2.3 Site re-instatement under the conditions of contract shall include the removal of all hydrocarbons spilled, leaked or otherwise released and associated packaging and cotton waste. Site re-instatement is deemed an integral part of mobilization. This activity shall be costed taking into account the items above and expressed as a lump sum.

1.3. DRILLING

1.3.1 Unless otherwise approved by the Project Manager, drilling shall be by the air hammer method, by flush rotary drilling or by the percussion method. Drilling shall continue through all strata encountered. Drilling fluids and additives used must be approved by the Project Manager prior to use. The Contractor shall provide the appropriate tools and equipment and maintain them in good condition capable of operating to the manufacturer's rating to ensure a smooth, a smooth, straight hole.

1.3.2 Drilling shall continue to the stipulated total depth at a minimum diameter of 205mm (8 inches) to provide for a finished borehole of a cased internal diameter of 152mm after allowing for 50mm thick gravel pack and temporary casings as found necessary. The Project Manager reserves the right to stop drilling operation if he considers that further drilling is unlikely to be advantageous. In this event payment shall only be made for the amount of work actually executed.

1.3.3 All materials used in the borehole construction other than temporary works shall comply with the relevant standard specifications. A tolerance in dimensions will be permitted provided that the material quality is not inferior to specification and work is in no way impaired.

1.3.4 The boreholes shall be drilled straight and vertical.

1.4 SAMPLE COLLECTION, STORAGE AND RECORD KEEPING

1.4.1 Samples of the drill cuttings returned to the surface shall be collected at two (2) metre intervals, dried and bagged. Each bag shall be clearly marked with the sample depth interval and borehole number. The Contractor shall record the depth and any zone of lost circulation for which no sample was taken.

1.4.2 TheContractor shall maintain a log of the penetration rate on a metre by metre basis, in minutes per meter drilled. A stopwatch shall be used for this purpose so that only the net drilling time is recorded, excluding any time taken in drilling disruptions.

1.4.3 The depth of any voids, or of particular rapid penetration, or significant changes in rig noise shall also be noted.

1.4.4 Water level shall be measured and recorded at the start and end of every shift, after significant breaks in activity (such as meal breaks), and during periods of plant downtime (as appropriate). The water levels shall be measured using a sounding and/or lighting dipper approved for use by the Project Manager.

1.5 SUPPLY AND INSTALLATION OF CASINGS AND SCREENS

1.5.1 CASING AND SCREEN SPECIFICATIONS

a). Casings shall be new, 152mm (6 inches) internal diameter, black pipe class B, with a minimum wall thickness of 4.0mm in 6 meter lengths.

b). Mill slotted screens shall be constructed from new 152mm internal diameter black pipe class B with a minimum wall thickness of 4.0mm. Slots shall not exceed 1.0 mm in width, and should constitute not less than 6.0% open space area. Gas slotted casing screens are not acceptable.

1.5.2 CASINGS AND SCREEN INSTALLATION

a). Before installation of the casings and screens, the Contractor shall ensure that the hole is clear to the total depth and shall flush out any backfilled materials present. The Project Manager shall provide the design of the casings and screens string prior to installation by the Contractor.

b). Casing jointing shall be by either flush square-section threading or tree pass electric arc welding. Screens may be welded to casing, or screw-jointed by means of flush square-section threads. Externally socket joints may be welded to the casing, or screw-jointed by means of flush square-section threads. Externally socketed joints will not be accepted. Where screwed joints are deemed by the Project Manager to be below standard, joint shoulders shall be spot welded at 900mm interval around the casing circumference at no extra cost. If screens and casing are to be welded, the appropriate welding electrode must be used.

c). During welding, casing and screen lengths must be held absolutely vertical in order to ensure a plumb installation. All joints to be welded must be beveled at the butt end; three continuous weld passes must be made to ensure a sound joint and the oxide coating be removed before the second and third passes.

d). Burn-through and subsequent deposition of metal on the inside of the casings and screens must be avoided. The base of the casing shall be sealed, unless otherwise directed by the Project Manager, with a circular plate of black pipe class B of thickness not less than 4.0mm (1/4 inch) fixed with a continuous weld to the casing strip. The appropriate welding electrode shall be used. The weld passes will be made, with oxide coating removed prior to the second and third passes. The top of the casing straight shall terminate not less than 600mm above the highest recorded level of ground at the site.

e). The contractor shall be responsible for the provision of temporary casings as necessary, including the insertion and removal. Where the Project Manager deems it necessary to have temporary casings left in the borehole as a measure of securing the borehole, this will be indicated in the item for other works in the bill of quantity.

1.5.3 ADMISSIBLE RATES

a). Rates shall be expressed as supply and installation of casing or screen per Unit Linear Metre.

1.6 SUPPLY AND INSTALLATION OF GRAVEL PACK

1.6.1 SPECIFICATIONS

a). The Contractor shall supply and install filter pack/formation stabilizer. The material shall be 2-4 mm diameter, clean well rounded riverbed siliceous gravel with no more than 5.0% non-siliceous material. The pack must be approved by the Project Manager prior to installation. Granular calcium hypochlorite will be introduced into the annular space along the pack material at a concentration of 500 grammes per cubic metre of pack.

The gravel pack shall be placed in the production boreholes to a thickness of 50mm around the casing upto where all screen zones are covered with the gravel as per the Project Manager's satisfaction.

This will initiate the process of sterilizing the wellbore. The Contractor shall provide the Project Manager with the bulk density of the pack material (Kg/M^3).

b). Installation of the filter pack/formation stabiliser may be water wash down or reverse circulation methods. In the latter case a pump set or airlift string shall be installed in the bore so as to encourage material settlement. The filter pack shall terminate not less than 3.0 metres above the uppermost screen when stabilized, or as otherwise directed by the Project Manager. The Contractor shall provide a means by which this level shall be measured.

1.6.2 ADMISSIBLE RATES

Rates shall be expressed as supply and installation of gravel pack per Unit Cubic Metre.

1.7 INSTALLATION OF BACKFILL

1.7.1 SPECIFICATIONS

a). Backfill material shall comprise of fine clayey drill cuttings and shall be installed from the top of the filter pack to 3.0 metres below ground level unless otherwise directed by the Project Manager. The installation method must ensure that no bridging occurs within the annular space.

b). The Contractor shall measure the depth to the top of the backfill and provide the means by which this level may be measured.

1.7.2 ADMISSIBLE RATES

Rates shall be expressed as installation of backfill per Unit Linear Metre.

1.8 DEVELOPMENT

Development shall comprise both Physical and Chemical development, and shall include the following operations:-

1.8.1 BOREHOLE CLEANING

a). The Contractor shall clean the borehole to its "completed depth" using any of the methods listed below or as otherwise authorized by the Project Manager:-

- By bailer with percussion drilling rig
- By means of airlift, which may use a light or stable foam to assist in the removal of materials from the borehole.
- By means of educator airlift, with or without light or stable foam.

b). Bailers and other down hole plant shall adopt diameter limits of half a normal size or smaller (12.5mm or ½ inch) than the smallest casing or screen diameter.

c). Water levels shall be measured and recorded at the start and end of every shift, at significant breaks in activity (such as meal breaks), and during periods of plant downtime (as appropriate). Water levels be measured using a sounding and/or lighting dipper previously approved by the Project Manager.

d). The borehole shall be deemed clean when measured drilled depth has been reached and when insignificant or no materials is removed from the base of the borehole. Cleaning costs shall be expressed as a rate Per Hour.

1.8.2 CHEMICAL DEVELOPMENT

a).When the Project Manager has deemed the borehole clean; he may instruct the Contractor to commence with Chemical development. Chemical development shall comprise of an approved Polyphosphate as a desaggregate that shall break down the silty concentrations, any buildup clay or silts, or other fine materials within and adjacent to the borehole. The decision as whether chemical development shall be adopted and what dosage rates shall be made by the Project Manager.

b). Typical dosage shall comprise of powdered Sodium Hexametaphosphate dissolve in hot water. The polyphosphate shall be dosed at 10 to 15 Kg/m3 of water depending on the concentration of clays in the aquifer matrix. This shall be mixed with calcium hypochlorite at a dose of 200grammes per cubic metre to inhibit bacteria activity. The volume of polyphosphate dosed water shall be one and a half times the Volume of water within the screen section.

c) Both polyphosphate and added water shall be introduced by means of a pipe, the bottom end of that shall be located in the middle of the screen section of the borehole. The Contractor may get the liquids into the screened section using a jetting head if he wishes.

d). After dosing, the borehole shall be left overnight to allow disaggregation to occur. The borehole shall then be subject to physical development.

e). Chemical development costs shall be expressed as an Hour rate, and include all labour and materials (including clean water) required for the operation. Chemical development undertaken by a Contractor familiar with the technique shall take no longer than three (3) hours.

1.8.3 PHYSICAL DEVELOPMENT

a). Physical development may adopt any of the commonly used methods, including but not necessarily restricted to the following:-

- Surging
- Bailing
- High Velocity Water Jetting
- Airlift raw hiding
- Airlift raw hiding with educator pipe.

b). Development shall be considered complete when the water discharged is clear and contains no more than an estimated 5 parts per million of suspended solids and the borehole has been restored to the cleaned total depth or as otherwise directed by the Project Manager.

c) The Contractor shall describe the method he proposes to adopt and the plant required for physical development in his method statement. **Over pumping** shall not be considered a development method. The rate submitted by the Contractor for physical development is deemed to include installation and removal of necessary plant. The quantities given in the bills of quantities only apply to actual development time. Costs for physical development shall be expressed as an Hour Rate.

1.9 AQUIFER TESTING

Borehole testing will be conducted according to British Standard BS 6316 (1992) (Code of Practise for Test Pumping of Water Wells). The following elements are required.

- A pre-test
- A step drawdown test
- A constant discharge test
- A recovery test

1.9.1 INSTALLATION, PLANT AND METHODOLOGY

Pumping plant and dipping tube shall be installed in the borehole to be tested. The Contractor shall investigate and agree with the Project Manager the anticipated discharge and pump intake depth.

a) **PUMPING PLANT**

i) Pumps used for test pumping should be electrical submersible.

ii) The pump used in tests must have a fully functioning **non-return valve** either in the pump itself or in the rising main immediately above the top of the pump.

iii) The Contractor must have pumps covering the anticipated discharge range.

iv) The water pumped from the borehole shall be discharged to waste at a distance and in such a manner that it does not pond or flow back towards the borehole.

v) The Contractor must provide a generator or other prime mover for powering the pump, as power is not necessarily available at the sites.

b) **DISCHARGE MEASUREMENT AND CONTROL**

Discharge measurements shall be by an approved accurate method, such as an Orifice Plate, calibrated flow meter or a V-notch weir. If volumetric methods are proposed, the Contractor will ensure the container to be used has been calibrated. When time to fill measurements is made, each discharge measurement shall be calculated from the average of three time measurements. Discharge shall vary by no more than 15%across each step of step drawdown test, and across the constant discharge test.

c) **WATER LEVEL MEASUREMENT**

Water level measurements shall be by electric sounding and/or lighting dipper, and shall be made in a dipper tube installed alongside the test pump rising main and tied securely to it. The Project Manager will check the dipper for stretch and any other inaccuracies prior to accepting its use. Accuracy measurements must not be less than 1.0 cm. Water level measurements using an air line will not be acceptable on the grounds of poor precision.

d) **TIME MEASUREMENT**

All times shall be measured by means of a stopwatch. The Contractor shall ensure that spare batteries etc for all equipment are available prior to commencing tests.

i) **CONSTANT DISCHARGE TEST**

Constant discharge test shall typically last not less than twenty four (24) hours,or as otherwise determined by the Project Manager. A water sample will be procured towards the end of the test for subsequent analysis by a competent laboratory.

ii) **RECOVERY TEST AND REMOVAL OF PLANT**

Recovery tests shall not continue for more than twenty four (24) hours, or as otherwise directed by the Project Manager. Only after the completion of recovery data collection may pumping and ancillary plant be removed from the borehole, though above ground components may be dismantled during the recovering phase.

iii) **ADMISSIBLE RATES**

Rates of pumping and recovery are deemed to include the cost of plant installation and removal. The rates are deemed inclusive of installation, removal, plant use, testing and data collection.

1.10 WATER SAMPLING AND ANALYSIS

- In the closing hour of the constant discharge test a water sample shall be collected for chemical and bacteriological analysis by a competent laboratory. The water samples shall be collected in containers supplied by the laboratory, in the manner conventionally used by the laboratory.
- The Contractor's unit rate of sampling and analysis will include the cost of analysis and transportation to and from the laboratory for the sampling exercise.

1.11 BOREHOLE DISINFECTION

After removal of test equipment, the borehole shall be disinfected with Chlorine/water solution at a concentration of 50 milligrams per litre or greater of free chlorine. This will be sprayed into the borehole so as to ensure that all exposed borehole wall surfaces are coated. In preparing their Tenders, Contractors should allow for one (1) cubic metre of solution per borehole. This item shall be costed as a unit Lump Sum

1.12 BOREHOLE HEAD WORKS

a) SANITARY SEAL CASING

A sanitary seal shall be constructed at the wellhead. This shall comprise the following elements:

- A 3.2 metre length of internal diameter 205 mm (8 inch) plain black pipe class B sanitary steel casing installed around the permanent casing string.
- A grout seal between the 254mm sanitary seal casing and the 152 mm permanent casing string.
- A 1.0x1.0x1.0 metre reinforced concrete block (Y8/1:2:4) cast around the Sanitary seal casings.
- A lockable steel cap.

b). GROUT SEAL

A sanitary ground seal shall be installed between the 152 mm (6 inch) and 205 mm (8 inch) casings and grouted into place. Grout shall be a cement slurry, or cement and fine sand and shall have a density of at least 1175 Kg/lt.This shall be introduced into the annular space from the top of the inert backfill to the ground level, using a method that must be approved by the Project Manager.

c) CONCRETE PLINTH

The ground surface at the wellhead shall be excavated to a depth of one (1) metre, and be one metre square, to allow s Concrete Plinth to be cast. The 1.0x1.0x1.0 metre pit will be filled with concrete, to be finished flush with the ground surface. Concrete shall be 1:2:4 OPC: sand: half-inch ballast. This must be

cast with two 0.8 metre lengths of 12 mm reinforcing steel bar welded to the 205 mm (8 inch) casing, 0.7 metre below ground level.

d). **TEMPORARY CAP**

The top of the borehole shall be sealed with a cap that shall comprise a round plate of mild steel, of thickness not less than 3.0mm. This will be continuously welded in single pass to the mild steel borehole casing or should be lockable.

1.13 RECORDS

After completion of all works at the borehole, the Contractor shall submit to the

Project Manager within four (4) days a complete document with the following additions: -

- Drilling penetration Log

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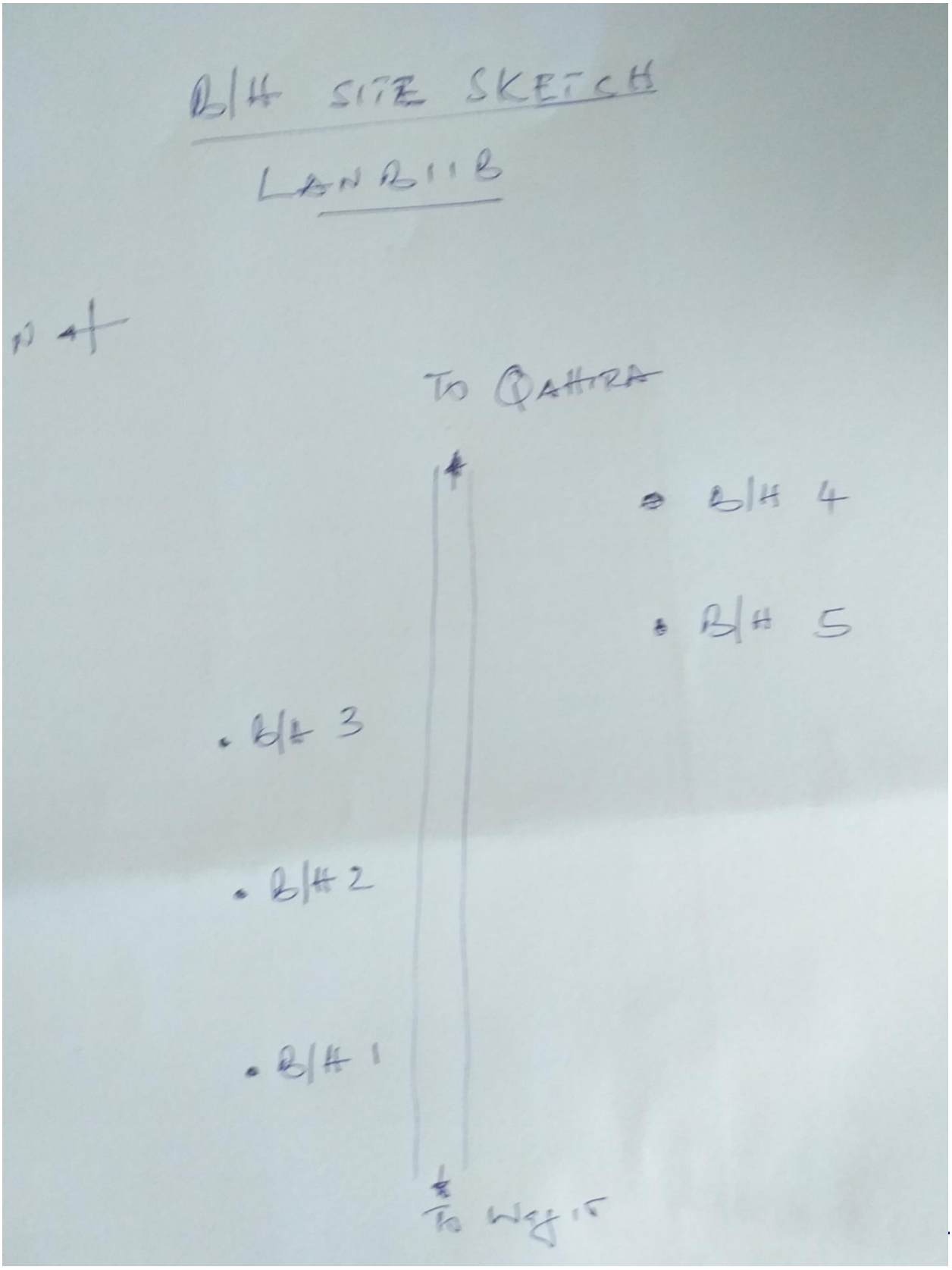

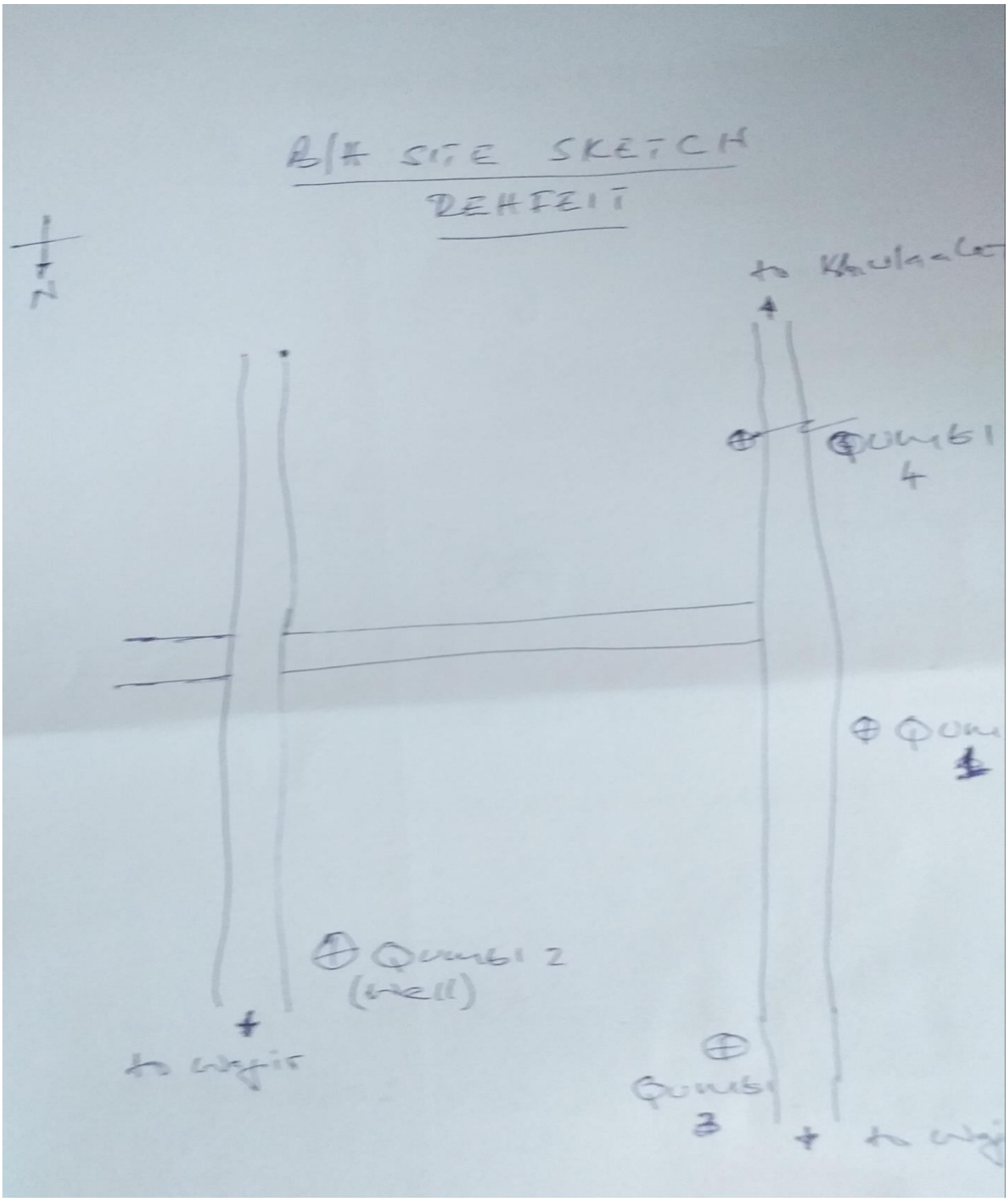
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