



AFRICAN DEVELOPMENT BANK GROUP

Bomet-Mulot Water Supply Project

Environmental and Social Impact Assessment

CRVWWDA on Behalf of LVSWWDA

29 May 2020

ESIA Study Report

ATKINS

Member of the SNC-Lavalin Group

Notice

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Designation	

Declaration


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05 JUN 2020

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Abbreviations

AfDB	African Development Bank
amsl	above mean sea-level
BOD	Biological Oxygen Demand
CAPEX	Capital expenditure
CEMMP	Construction Environmental Management and Monitoring Plan
CIDP	County Integrated Development Plan
COD	Chemical Oxygen Demand
CRVWWDA	Central Rift Valley Water Works Development Agency
EC	Electrical Conductivity
EMCA	Environmental Management and Coordination Act
EMMP	Environmental Management & Monitoring Plan
GWP	Global Warming Potential
HDPE	High-Density Polyethylene
HGV	Heavy Goods Vehicles
KES	Kenya Shilling
KIHBS	Kenya Integrated Household Budget Survey
LVSWWDA	Lake Victoria South Water Works Development Agency
MSDS	Materials Safety Data Sheets
NAC	No Additional Cost
NEMA	National Environment Management Authority
NWSS	National Water Services Strategy
PPE	Personal Protective Equipment
OD	Outside Diameter
OEMMP	Operational Environmental Management and Monitoring Plans
O&M	Operations and Maintenance
OPEX	Operating expenditure
OS	Operational Safeguard
OSHA	Occupational Safety and Health Act
ROW	Right of Way
STDs	Sexually Transmitted Diseases
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UB	Universal Beam
WRA	Water Resources Authority
WRUA	Water Resource Users Association
WWDA	Water Works Development Agencies

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Executive summary

Project background

Access to safe and clean water in Bomet County is low, and access to piped water is currently at 25%. Majority of the population draws water from rivers, water pans and springs. Rainwater harvesting is also practiced by the households that have corrugated iron roofs. The existing water supply infrastructure for Bomet, and other urban centres in the County is inadequate to meet the current water demand. Operation and maintenance costs for these schemes are also high due to high energy requirements for pumping.

It is due to such challenges that the Government of Kenya applied for and received a loan/grant from the African Development Fund (ADF) towards the implementation of the Small Towns Rural Water Supply and Sanitation Project in Kenya. The objective of the project is to improve water supply, sanitation/ sewerage services in the urban, peri-urban and rural communities. The Ministry of Water and Sanitation & Irrigation through the Central Rift Valley Water Works Development Agency (CRVWWDA) - on behalf of Lake Victoria South Water Works Development Agency (LVSWWDA) intends to implement the Bomet-Mulot Water Supply Project to improve access to clean water in Bomet, Silibwet, Longisa and Mulot towns and their environs. The Project entails abstraction of water from Nyangores River inside Mau Forest to serve the entire project area and is comprised of a run-of-river intake on Nyangores river; a 5km raw water gravity main; a full 18,000m³/day conventional water treatment works; 117km of treated water transmission pipelines; pumping stations; and storage tanks.

The ESIA study

The Environmental Management and Coordination Act (EMCA) 1999 and the Amendment Act of 2015 provides for the completion of an Environmental and Social Impact Assessment (ESIA) and the preparation and submission of a Project/Study Report before undertaking a project of the proposed nature. The purpose of the ESIA is to assess environmental and social risks and impacts that are likely to arise from implementation of the proposed project.

Key activities in the conduct of an ESIA include: the collection and analysis of baseline environmental and socioeconomic data in the study area; identification and assessment of the potential environmental and social impacts in the design, construction and operation of the proposed project; Liaison with interested and affected parties in the area in order to seek their views on pertinent issues related to the proposed project; identification of mitigation measures for the actual and potential adverse impacts; and development of environmental and social management plans suitable for the proposed works, activities and anticipated environmental impacts.

Study approach

An environmental and social scoping exercise for the proposed project was undertaken to determine the range of issues to be addressed in the subsequent ESIA study. The scoping work produced a preliminary list of issues that needed to be further investigated. These included general environmental, health and safety issues common to infrastructure projects, and the more specific issues related to water supply projects. Specific considerations included: erosion and sedimentation from vegetation removal and excavation; effects of river abstraction for consumptive use; potential benefits of implementing the project; climate risks on the project; and the project's vulnerability to climate change. Other sociocultural considerations for the water project included: the cultural heritage of the communities in the project area; community engagement; land acquisition and resettlement impact; and potential community benefits (both direct and indirect).

Data collection

The key methods that were used to gather information in the ESIA study included desktop studies, field surveys and stakeholders' consultations. The study area was delimited from the available project designs thereby establishing the extent of terrestrial/aquatic habitat, and socioeconomic field surveys. General County and project area information was obtained from County Plans and other thematic studies/publications.

Regulatory framework review

The relevant policy, legal and regulatory framework for the water project was reviewed, identifying key provisions that affect the design, construction and/or operations of the project. Key legislation includes the EMCA, 1999 and its subsidiary legislation, the Water Act 2016 and the Water Resource Management Rules 2007, and the Occupational Safety and Health Act 2007 and its subsidiary legislation.

Stakeholder Consultations

Various methods were applied in stakeholder consultations including interviews, administration of questionnaires and stakeholder/community meetings. A stakeholder map was developed to identify the stakeholders who should also be consulted in the ESIA. Identified stakeholders included: the local community in the project Area of Influence; National and County government representatives; elected leaders in the project area; water sector players; regulatory bodies such as the National Environment Management Authority (NEMA), Water Resources Authority (WRA); Kenya Forest Service (KFS) and other interest groups. Outcomes of the consultations revealed that the project was a welcome and valuable investment that would enhance the socioeconomic status of the local community in the project area. The main concern was on how the affected landowners would be compensated for the loss of their land to the project, and on whether the project would create employment opportunities for local communities.

Prediction and evaluation of impacts and mitigation measures

Potential impacts of construction, operation and decommissioning the project were identified and their significance evaluated. In determination of impact significance, event magnitude (extent/scale, frequency, duration, and intensity) and receptor sensitivity (presence and resilience) were considered. Significance was either categorized as Negligible, Minor, Moderate or Major.

The ESIA established that significant beneficial impacts were expected, such as the creation of employment and business opportunities during construction and operations, and improvement of the socioeconomic status of the community from better access to clean and sufficient quantities of water, and reduced disease burden from water-borne diseases.

Adverse impacts identified included the economic displacement of members of the community with potential loss of livelihoods, the potential increase in noise pollution, air pollution, soil and water resources pollution, loss of biodiversity, and increased health and safety hazards during construction phase of the project. Reduced river flow from abstraction for consumptive use, deterioration of aquatic habitat quality downstream of the intake, and community health and safety hazards are some of the significant impacts during operations, with potential to adversely affect aquatic ecology, downstream users of the river, and surrounding communities.

Conclusion

Although potential adverse impacts were identified in the construction and operation of the proposed project, various opportunities were also identified for the mitigation of these impacts. It is considered that with good environmental and social practices and procedures during construction, the project has potential to enhance benefits and sustainability, while avoiding environmental degradation.

The safeguards identified in this Report when applied by the Contractor and the project proponent will ensure environmental protection, health and safety of the workers and the public. Sound environmental management practices during operations will also enhance community benefits and social acceptance of the project.

An environmental audit of the project is recommended upon completion of the construction works to corroborate the implementation of the proposed mitigation measures. Any unforeseen project impacts will be identified and addressed through annual environmental audits.

The Consultant proposes that project approval and an Environmental Impact Assessment license be issued by NEMA based on the environmental and social management measures contained in this ESIA Report.

1. Introduction

This Report details the findings of an Environmental and Social Impact Assessment (ESIA) of the proposed Bomet – Mulot Water Supply Project (hereafter referred to as ‘The Project’).

The Environmental Management and Coordination Act (EMCA) 1999 and the Amendment Act of 2015 provide for the conduct of an ESIA before undertaking a project of the proposed nature. The ESIA should be carried out at the planning stages of the proposed undertaking to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation and decommissioning stages of the project.

This Study Report has therefore been prepared to comply with Section 58 of the EMCA, 1999 and the Amendment Act 2015, Legal Notice No 31 of April 2019 on the Act, Part 2 Section 7 of the Environmental (Impact Assessment and Audit) Regulations, 2003, and Legal Notice No 32 of April 2019 on the Regulations.

1.1. Background information

Water supply and sanitation in Bomet County is managed by Bomet Water and Sanitation Company (BOMWASCO) which is a wholly owned subsidiary of the County Government of Bomet. There are a number of water supply schemes under the management of BOMWASCO including Itare, Sotik, Bomet, Longisa, Sigor, Olbutyo, Kamureito, Yaganeke and Ndanai water supply schemes.

There are also community water projects such as the Silibwet and Ndarawetta water supply schemes which are supported by the County Government, national institutions such as Water Service Trust Fund (WSTF), and State Department of Water.

1.1.1. The problem

Kenya is considered one of the most water-scarce countries in Africa. In 2004, the country's water availability was estimated at 936 cubic metres per capita, against the globally accepted minimum of 1,000 cubic metres per capita (WRI, et al., 2007). The country's water resources are unevenly distributed, being denser in the central and western regions. The lakes and other water resources found in the country are mostly supplied by a network of perennial rivers that originate from five water towers: Mount Elgon, the Aberdare Range, the Mau Escarpment, Cherangani Hills and Mount Kenya.

All sectors of the Kenyan economy depend on the availability of water, from agriculture, manufacturing, hydropower production, fisheries, water and sanitation, etc. Domestic water consumption accounts for the second-largest demand for water in Kenya. However, connections to piped water service are very low relative to the country's population, and many Kenyans particularly in rural areas, obtain their water supply from open water sources. These sources carry health risks - especially during flood periods, when drinking water becomes polluted, increasing the chances of outbreaks such as cholera and malaria (UNDP, 2012).

Access to safe and clean water in Bomet County is still low, and access to piped water is currently at 25% (County Government of Bomet, 2018). Majority of the population draws water from rivers, water pans and springs. Rainwater harvesting is also practiced by the households that have corrugated iron roofs.

Bomet town's water supply is abstracted from Nyangores River through a pumping system and treated at a conventional treatment works. About 1,000m³/day - which is less than the current water demand of c.6,500m³/day, is supplied to the town with resultant perennial water shortages and rationing within the town. BOMWASCO spends about Kenya Shillings (KES) 6 million per month on pumping costs which makes the existing water supply system unsustainable.

Silibwet and Ndarawetta are served by community water projects which also abstract from Nyangores River through a pumping system independent from the Bomet Town water supply system. There is no conventional treatment plant in Silibwet and Ndarawetta towns. Instead, chlorine dosing is done at the storage tanks. The community water supply projects cover a small area and majority of the people have no reliable source of water supply. The households which are not connected to the community water system buy water from vendors.

There are also other abstractors mainly institutions such as hospitals and schools that have intakes on Nyangores River. A key institution is Tenwek Hospital which has its own independent water supply system with an intake, treatment works and distribution system. These abstractors have emerged and increased due to the inability of the municipal water supply to meet individual demand.

Longisa and Mulot are served by one water supply system. Water is pumped from Mulot River to treatment and storage tanks located at Longisa hills from where it flows by gravity to Longisa and Mulot towns. Mulot Town does not have a water distribution system and is served by water kiosks.

1.1.2. The proposed solution

Kenya has adopted policies and strategies to address current and anticipated levels of water scarcity. As a whole, these policies give focus on the economic benefits derived from improved access to and use of water resources. The overarching policy framework is Kenya's Vision 2030, which aims to increase access to improved water and sanitation services in rural and urban areas through mechanisms that increase supply and conserve water sources.

Legal provisions have also been enacted according every person in Kenya the right to access water resources, and to clean and safe water in adequate quantities. To ensure a realization of these rights, a National Water Services Strategy (NWSS) is mandated to map existing water services, the number and location of those lacking basic water services and to draw investment and financing plans for the provision of these services. Water Works Development Agencies (WWDA) have also been established with the responsibility to *inter alia* undertake the development, maintenance and management of the national public water works in support of the objectives of the NWSS.

The Government of Kenya applied for and received a loan/grant from the African Development Fund (ADF) towards the implementation of the Small Towns Rural Water Supply and Sanitation Project in Kenya. The objective of the project is to improve water supply, sanitation/ sewerage services in the urban, peri-urban and rural communities. The Ministry of Water and Sanitation & Irrigation through the Central Rift Valley Water Works Development Agency (CRVWWDA) acting on behalf of Lake Victoria South Water Works Development Agency (LVSWWDA) intends to implement the Bomet-Mulot water supply project to improve access to clean water in Bomet, Silibwet, Longisa and Mulot towns and their environs.

The Project entails abstraction of water from Nyangores River to serve the entire project area and is comprised of a run-of-river intake on Nyangores river; a 5km raw water gravity main; a full 18,000m³/day conventional water treatment works; 117km of treated water transmission pipelines; two pumping stations; and storage tanks. The scheme would provide mainly gravity water supply with pumping in two areas to overcome topographical challenges. The Figure below provides the project's layout and coverage.

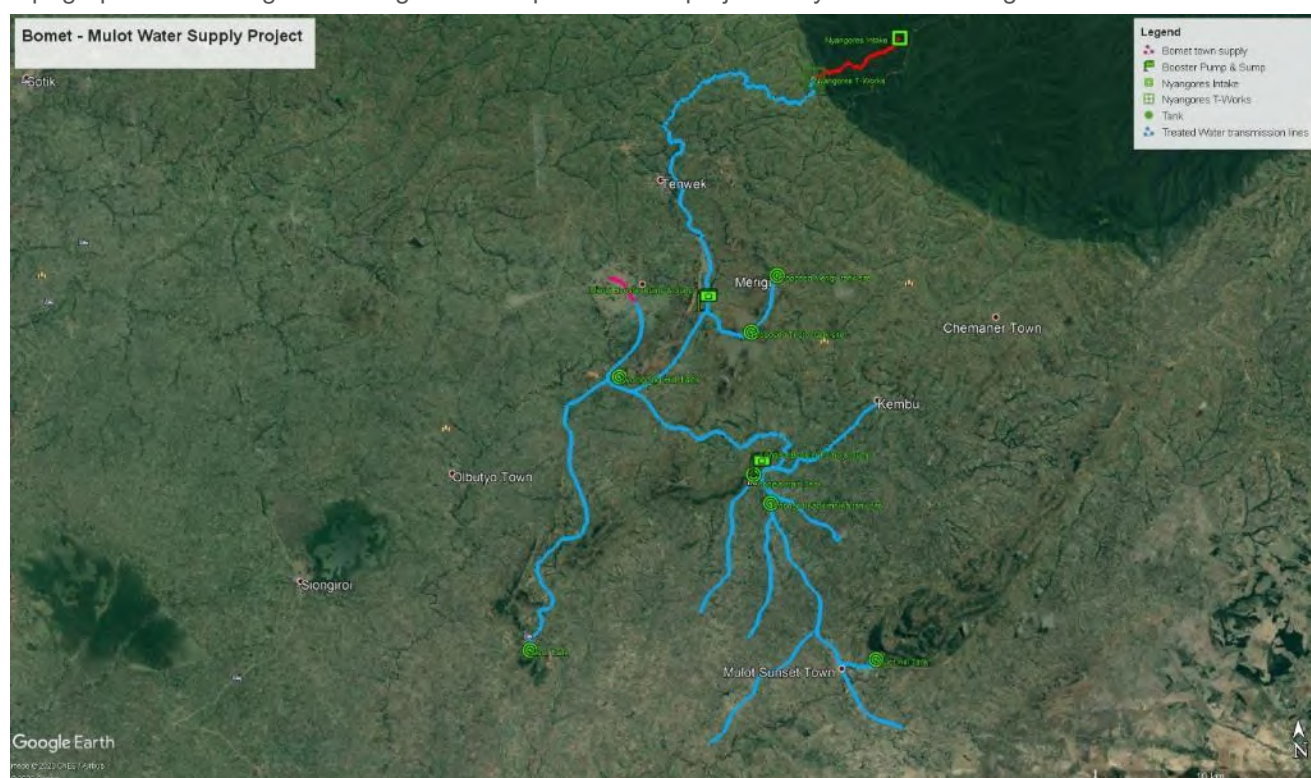


Figure 1-1 Project layout and coverage

1.2. Objectives of the ESIA

The overall aim and purpose of the study was to assess environmental and social impacts that are likely to arise from implementation of the proposed Project. Specific objectives of the ESIA were to:

- Collect and analyse baseline environmental and socioeconomic data in the study area;

- Identify and assess potential environmental impacts in the design, construction and operation of the proposed project;
- Liaise with interested and affected parties in the area to seek their views on pertinent issues related to the proposed project;
- Identify mitigation measures for the actual and potential adverse impacts; and
- Develop environmental and social management plans suitable for the proposed works, activities and anticipated environmental impacts.

1.3. Approach to the ESIA

The ESIA was carried out in line with the provisions of the Environmental Management and Coordination Act, 1999, the Environmental (Impact Assessment and Audit) Regulations 2003, and other international guidelines on environmental and social sustainability.

1.3.1. Scoping

A scoping exercise was carried out in October 2019 to determine the range of issues to be addressed in the ESIA, the significant issues that would need detailed study and those that were not significant, and the stakeholders to be consulted in the ESIA. The exercise established the following issues to be investigated in the study:

- General environmental, health and safety considerations in relation to construction sites waste generation; Soil erosion and sediment control; Fugitive dust and other emissions; Noise from heavy equipment and construction traffic; hazardous materials and hydrocarbons spillages;
- Water abstraction and supply-specific considerations including erosion and sedimentation of the river; effects of abstraction on the flow regime; effects of ponding at the intake site; climate risks on the Project and its vulnerability to climate change; and potential benefits of implementation of the Project; and
- Socioeconomic and cultural considerations including cultural heritage of communities in the project area; land acquisition and resettlement impact; needs and priorities of the local community

From the scoping exercise, the ESIA Terms of Reference were prepared and submitted to the National Environment Management Authority (NEMA) for review and approval. A copy of the approved ToRs is attached as **Appendix F** of this Report.

1.3.2. Literature review

A comprehensive review of literature related to the Project and the project area was carried out. The literature included feasibility studies and design reports for the Project, and other studies on physiography, geology, hydrology, water resources and socio-economics of the project area. Both local and international legislation, policies and procedures in social and environmental management were also reviewed.

1.3.3. Baseline data collection

Field visits were carried out between October 2019 and January 2020. Baseline data was collected on aspects such as topography, local flora and fauna, soils and geology, existing and past activities including human settlements, local surface and ground water resources, ambient air quality and noise levels, waste management practices, natural resources and cultural heritage aspects of the project area.

Additional baseline data was collected in subsequent field surveys on:

- Biodiversity in Mau forest from the forest edge at Masese to the intake works 5km into the forest;
- Socioeconomic information on project affected people: Desktop reviews of published work on the socioeconomic baselines of the project area were carried out to extract relevant information. These were complemented with household socio-economic surveys to obtain site-specific data on the project area. Structured questionnaires were administered to households to assess the socio-economic status of the residents in the project area. Data collectors were identified at each locality who then received a short training on questionnaire administration before actual work. Additional information was also collected through key informant interviews with individuals/representatives knowledgeable in socioeconomic issues of the project area.

1.3.4. Identification, prediction and determination of environmental impacts

A systematic approach was used to rank identified impacts according to their significance determined by consideration of project activity **event magnitude** and **receptor sensitivity**. The expected significance of environmental impacts was assessed considering:

Event Magnitude determined by the following parameters:

- **Extent** – the size of the area across which the effect of the activity extends;
- **Duration** – the length of time over which the effect of the activity occurs;
- **Frequency** – how often the activity occurs; and
- **Intensity** of the impact – concentration of an emission or discharge with respect to standards of acceptability that include applicable legislation and international guidance, its toxicity or potential for bioaccumulation, and its likely persistence in the environment, and degree and/or permanence of disturbance or physical impact

Receptor Sensitivity determined by:

- **Presence** – whether biological species present are unique, threatened, protected or not vulnerable and are present during a period of high sensitivity (e.g. breeding, spawning or nesting). For human receptors, whether they are permanently present to uncommon in the area of impact and for physical features whether those present are highly valued or of limited or no value. For physical receptors/features, whether they are national or international value (e.g. state protected monument), local or regional value and is sensitive to disturbance or none of the above; and
- **Resilience** – how vulnerable people and/or species and/or features are to the change or disturbance associated with the environmental interaction with reference to existing baseline conditions and trends (such as trends in ecological abundance/diversity/status, ambient air quality etc.) and their capacity to absorb or adapt to the change. For physical receptors/features, highly vulnerable, undergoes moderate but sustainable change which stabilizes under constant presence of impact source, or unaffected or marginally affected.

Socio-economic impacts were assessed considering event magnitude and receptor sensitivity. However, a more qualitative approach was applied, which considered how significant the change would be on social, economic and cultural dynamics, the potential for governmental and stakeholder intervention, the value of the receptor (on a local, regional, national or international scale) and the resilience of the receptor to change or adapt to a given change.

Impact significance was assessed considering existing control measures that are incorporated into the project design.

Sets of criteria were defined for both impact magnitude and receptor sensitivity and these were then combined in an appraisal matrix to identify relative degrees of impact significance. The matrix is accompanied by ancillary definitions of the resulting final significance categories.

1.3.5. Stakeholder consultations

A Stakeholder Engagement Plan (SEP) was developed to guide engagement with relevant stakeholders throughout the ESIA and in future operations of the project. The SEP is a live document which will be updated periodically as new stakeholders are identified through the different phases of the project, or as means of engagement with the identified stakeholders change. The initial SEP is attached as **Appendix E** of this Report.

Stakeholder consultations during the ESIA were carried out to: inform project stakeholders of the proposed project; to explain the likely impacts (positive/negative) of implementing the Project; and to obtain views, concerns, comments and suggestions from interested and affected parties regarding the proposed project.

Stakeholder identification and analysis was carried out to determine who are the project affected people and the most appropriate means of engagement. The methods of engagement ranged from questionnaires, interviews and public meetings with the stakeholders.

1.3.6. Reporting

A Draft and Final ESIA Report, including Environmental and Social Management Plans was prepared and submitted to CRVWWDA and LVSWWDA for review and endorsement.

This Final ESIA Report is submitted to NEMA for review and approval.

1.4. The ESIA study team

The ESIA was undertaken by a multidisciplinary team of consultants from Atkins Consulting Engineers that included the following:

Table 1-1 The ESIA Team

Name	Expertise
Mr Simon Wandeto (Lead Expert, Reg. No 0885)	Environmentalism
Beatrice Githinji	Sociologist
Thomas Mwadime	Taxonomist
Eng. Phyllis Njoki	Water Engineer
Prof. John M. Gathenya	Hydrologist
Dr Wilberforce Oundo	Valuer
Peter Mugo	Surveyor

As required under Regulation 14 of the Environmental (Impact Assessment and Audit) Regulations 2003, Atkins and the above-named environmental experts are registered and licensed by NEMA as Environmental Impact Assessment and Audit Experts. Registration certificates and licenses for the Firm and Lead Expert are attached in **Appendix G** of this Report.

2. Project description

2.1. Project design horizon

For design purposes, the design period for the project is 20 years. The initial year (when the new works are expected to be commissioned) is 2021, with the future and ultimate years being 2031 and 2041 respectively.

2.2. Population projection

An exponential growth model was used in projecting the population in the project area. The exponential equation used was;

$$P_t = P_0 e^{rt}$$

Where;

- P_t = the projected population
- P₀ = the initial/base population
- r = the projected population growth rate
- e = base of the natural logarithm (3.2)
- t = intercensal duration

Three population growth rate scenarios were explored:

High Growth Rate: Where population growth is expected to occur at rates that are significantly higher than the rates in the last intercensal period. This can only happen due to rapid changes in socio-development factors resulting in subsequent high levels of immigration to the area.

Medium Growth Rate: Where population growth is expected to occur gradually at rates comparable with historical growth rates. Increased population will result in increased settlement in adjacent peri-urban and rural areas.

Low Growth Rate: where population growth is expected to reduce with high migration rates due to negative changes in the socio-economic development landscape of the area.

Population projections for the population growth rate scenarios are given in the graph below;

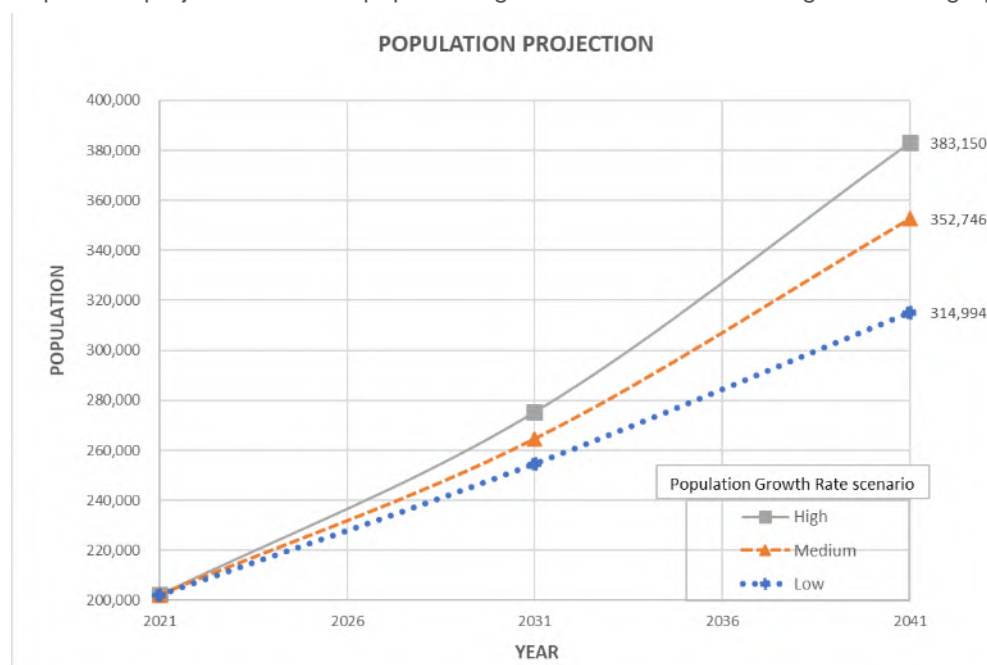


Figure 2-1 Projected populations based on growth rate scenarios

The medium growth rate scenario was adopted as the most probable scenario for the future population projections of Bomet, Longisa and Mulot Towns up to the 2041 design year. The total population projected for the entire project area in the ultimate year is 393,849. A breakdown of this population projection is provided in **Appendix A** of this Report.

2.3. Water demand

Water demand in the project area has been calculated to include domestic, livestock, industrial, health, commercial, education and health water demand. The Ministry of Water and Irrigation (MWI,2005) Guidelines from the practice manual for water supply services in Kenya were used to estimate the demand for each category. The overall water demand projection for the project area in the ultimate year is 17,808m³/d. A breakdown of this demand projection is provided in **Appendix A** of this Report.

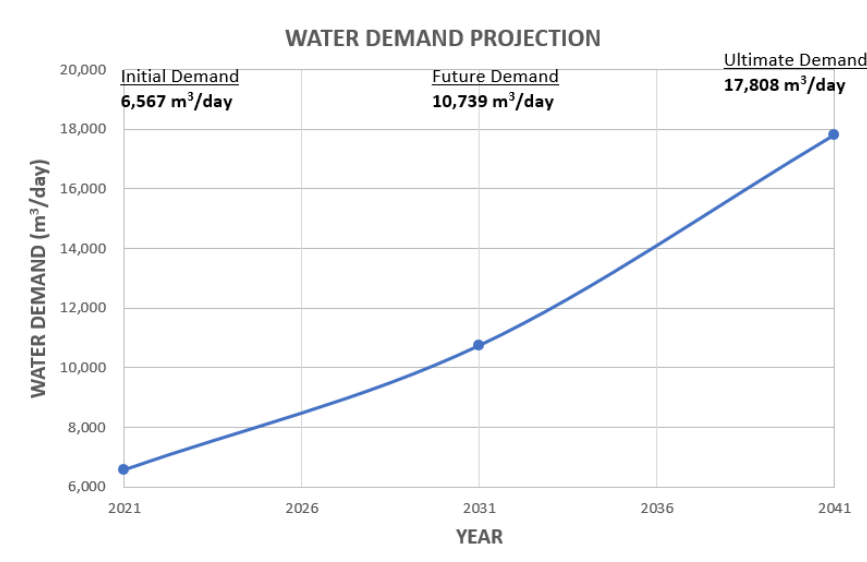


Figure 2-2 Projected water demand for the Project area

2.4. Project designs

2.4.1. Intake works and raw water transmission

2.4.1.1. Intake works

A suitable intake site has been identified on Nyangores River approximately 5Km within the Mau Forest (Lat 0°41'37.76"S, Long 35°27'14.21"E). A run-of-river intake is proposed upstream of a waterfall approximately 5m high. The reinforced concrete weir will be constructed across the river, approximately 10m wide. The weir will reduce velocity of the water and direct it to the intake chamber. A scouring arrangement will be provided with control penstocks for constant desilting.

The intake works will also include coarse and fine screens to minimize blockages. Suitable slope protection e.g. gabions will be provided on the site to protect the riverbed and riverbanks upstream and downstream of the weir.

2.4.1.2. Raw water gravity main

A ferrous raw water gravity main of diameter 450mm and 5km long is proposed from the intake works to the water treatment plant (WTP). The raw water main will be laid on the right bank of the river riparian for the entire length, only detouring in the last 200m to the WTP.

2.4.2. Water treatment works

2.4.2.1. Raw water quality

Full chemical, bacteriological and jar tests were carried out to establish the raw water quality and determine the extent and type of treatment required. The water quality was found to be acceptable with most parameters within permissible values. Coagulation and sedimentation will be achieved using alum, while pH correction will be done using soda ash. This will be added in varying in dosage throughout the year. Substances like Nitrates, Chloride, Fluoride, Sulphates, Copper, Sodium, Potassium, Aluminium and Lead etc. are within permissible limits.

2.4.2.2. Treatment works

The new treatment works will be located in Masese at the edge of Mau Forest (Lat 0°42'25.92"S, Long 35°25'13.34"E) adjacent to the Nyayo Tea Zone/plantation. The site is characterized by steep topography. Based on the quality of raw water, full conventional treatment is proposed comprised of coagulation/flocculation, sedimentation, sand filtration with air/water backwashing and disinfection using chlorine.

The treatment units to be provided include:

- Stilling well for velocity reduction;
- Inlet channel for flow measurement and chemical dosing with soda ash and alum;
- Flocculation basins for coagulation;
- Sedimentation in horizontal flow tanks;
- Filtration using rapid gravity sand filters;
- Disinfection by chlorination and pH correction of treated water;
- Backwashing of filters using air and water;
- Backwash water to be collected in lagoon and after settlement, to be recycled to inlet works;
- Administration / chemical dosing building, pump house and chlorine storage building, junior staff housing, etc. and other ancillary works

The various units are arranged such that the flow will be entirely by gravity. The treatment works is designed on four equal streams (flocculation basins, sedimentation tanks and filters) to provide flexibility in system operations especially during maintenance procedures.

The project location plan and a layout plan of the treatment works is provided in **Appendix B** of this Report.

2.4.2.2.1. Treated water tank

The treated water tank will be a reinforced concrete structure of capacity 500m³. The tank will provide more than 1-hour retention time to allow for the minimum recommended contact time of 30 minutes. A baffle wall in the tank will ensure adequate circulation and contact time is attained prior to distribution.

2.4.2.2.2. Pumps and air blowers

The pump house is located adjacent to the Treated Water Tank to ensure a positive suction arrangement and will house the following:

- 2Nr. centrifugal pumps (1 duty, 1 standby) to pump water to the elevated steel tank used for filter backwashing. Pump parameters; Q – 180m³/hr, Head – 30.0m, Power 18.5kW;
- 2Nr. compressors (1 duty, 1 standby) to provide air scour for backwashing of filters. Parameters; Air rate 23m³/min, 0.5 bar pressure, Power required 24kW motor;
- 2Nr. plinths for future pumps to serve the local community in future phase of construction;

The pump house is a one-level building with a floor mounted switch gear control panel. A Universal Beam (UB) gantry is provided for the removal of the pumps, motors and compressors for repairs when breakdowns occur. A drainage sump will be constructed in the pump sump to drain water from the ground floor to the site drainage.

2.4.2.2.3. Backwash water lagoon

A backwash water lagoon 22x 8x 2.5m deep, is provided with submersible pumps to decant water used for filter backwashing before recycling. The lagoon volume is sufficient to store water from 2Nr. filter backwashes. After detention, the water will be pumped to the stilling well for re-treatment.

2.4.2.2.4. Sludge drying beds

2Nr. sludge drying beds, 1.25m deep and with a total area of 107m², are provided for sludge from the sedimentation tanks. The sludge drying beds consist of slotted pre-cast concrete slabs laid on an 80mm thick layer of sand (size 1 -3mm) below which is an 80mm layer of size 10 - 15mm gravel. Underneath the sand and gravel are large stones (size 20mm - 35mm, minimum 200mm thick) surrounding an open-jointed pre-cast concrete pipe, laid to falls, for collecting the filtrate.

After sludge in the sedimentation tank has reached 25% of the tank volume, the sludge will be applied on to the sludge drying basins via an OD 315mm diameter uPVC pipe which discharges into the inlet chamber where the sludge is distributed into the beds. Dried sludge is to be removed from the bed before the sludge from the next

sedimentation tank is applied. The filtrate from sludge percolates through the media and is collected in the open-jointed pipe and discharged into the river.

2.4.2.2.5. Administration and staff facilities

The administration building will be a single level building with a floor area of 75.4m² consisting of the laboratory, store, offices, tea room and toilets.

A laboratory will be provided with facilities to perform water quality tests necessary to determine dosages required for the various chemicals used in the operation of the works. Equipment will be provided to regularly check pH values, turbidity and residual chlorine in the treated water. The laboratory will be located within the administration building.

Two staff houses will be provided in one block at the treatment works site. Each house will have a floor area of approximately 150m² comprising of living room, kitchen, two bedrooms and sanitary facilities.

2.4.2.2.6. Access road

A new treatment works access road will branch off from the existing gravel road to the south of the treatment works site and will take a generally north-easterly direction to the location of the treatment works. Parking bays will be provided proximal to buildings that require vehicular access such as chemical stores, chlorine and pump houses. A pedestrian access has also been provided from the parking bays to staff quarters.

2.4.2.2.7. Power requirements at treatment works site

The total load is the sum of the backwash pumps, air blowers, administration block, street lighting, staff quarters and the gate house. The total power requirement is 104kW comprised of; pumps and air blowers (57kW); buildings (44kW); and street lighting (3kW). This will require a dedicated transformer of 200kVA to meet the demand. Power will be tapped from an 11kV KPLC power line passing about 3km away from the site.

2.4.2.2.8. Ancillary site works

Storm-water drainage: Invert block drains and earth drains will be provided to cut-off stormwater extraneous to the site and channel all stormwater to an adjacent stream draining into Nyangores River.

Sewerage: A 3.0m³ capacity septic tank will be provided to take foul-water from the administration building and gate house. Another 3.0m³ capacity septic tank will be provided to take foul-water from staff houses.

Fencing and gates: A chain link fence will be provided around the perimeter of the proposed treatment works site. A 4m wide gate with one integrated 915mm wide pedestrian gate will be constructed for access to the treatment works site.

2.4.3. Water transmission mains

Water from the WTP will be transmitted through a gravity transmission pipeline terminating at Mulot town, approximately 50Km away. There are several pipeline offtakes to serve enroute areas i.e. Bomet town, Sigor, Kembu, Kiplabotwa, Kapkimolwa, Longisa, Olokyin, Mulot hill and Tiroto hill.

The transmission pipelines are sized for the ultimate water demand. The topography on the pipeline route is characterised by several high points and the pipeline is sized to reduce friction losses ensuring gravity flow through the high points.

2.4.3.1. Pipeline material

Steel pipes will be used where design require diameters larger than 350mm. For pipe diameters smaller than 350mm, HDPE pipes will be used. Pipes and fittings will be provided to suit the design static pressure ratings along the pipeline.

2.4.3.2. Pipe sizes and lengths

A summary of pipe sizes and lengths is given in the Table below.

Table 2-1 Summary of pipe sizes and lengths

Pipeline Description	Pipe Dia, mm	Length, m	Pipe Material
Main pipeline from Masese Treatment Works to Kapkimolwa Tank	700	21,500	Ferrous pipes
	600	8,500	
	500	5,750	

Pipeline Description	Pipe Dia, mm	Length, m	Pipe Material
	315	1,650	HDPE PE 100
	200	644	
Mulot transmission main	250	7,980	Ferrous pipes
	160	4,160	HDPE PE 100
Bomet town pipeline	400	1,200	Ferrous pipes
	200	5,125	HDPE PE 100
Kyogong tank line	200	480	
Sigor pipeline	315	8,400	
	250	6,576	
Kembu pipeline	250	5,755	
	250	1,000	
	160	6,100	
Kapkimolwa pipeline	110	4,135	
Kiplabotwa pipeline	110	5,715	
Olokyin pipeline	160	7,300	
Longisa pipeline	250	1,000	
	160	6,100	
Mulot tank pipeline	200	2,200	
Merigi pipeline	200	2,900	
Tiroto pumping main	200	1,500	Ferrous pipes
	250	1,225	HDPE PE 100
Longisa pumping main	125	395	
Total Length		117,290	

2.4.3.3. Pipeline installation

Pipes will be jointed and embedded in trenches. The pipe trench will be backfilled mostly with excavated material. The minimum depth of cover will be 0.6m above the crown of the pipe. Ferrous pipes will be used at road/ river crossings with concrete surround protection added at road/ river crossings. Where rock is encountered, pipes will be laid on granular bed material borrowed from approved pits to minimize damage to the pipe coating and improve drainage underneath the pipe.

Concrete pipe anchors will be provided where pipes are laid on steep slopes, while thrust blocks will be provided at bends for steel pipes.

2.4.3.4. Pipeline appurtenances

Air valve - Double air valves will be provided at all high points and single air valves where the rising grade reduces or falling grade increases. Air valves will be compatible in size, type and pressure ratings with the system.

Washout valve - Washout valves will be located at low points to drain the pipeline as required. Type one washouts drain to the natural environment as the topography allows while type two washouts have a piped outlet for pumped evacuation of drain water where gravity drainage is not possible.

Section valves - These will be provided along the pipeline profile to isolate portions of the system during repairs or routine maintenance. Installation distances will be determined by location of consumer connections, washout requirements, etc.

Water meters - Volumetric flow meters will be provided at the outlet of all storage tanks. Location of bulk meters will be decided in conjunction with the water service provider during project implementation.

2.4.4. Proposed pumping stations

2.4.4.1. Cheboin pumping station

Cheboin pumping station will be located along the transmission line at Lat 0°47'43.55"S, Long 35°22'28.16"E. The station will pump water from the main treatment works transmission pipeline up to Tiroto hill to serve Merigi and adjacent areas. The pumping station will have a 50m³ masonry holding tank to balance flows and prevent frequent pump start - stops. The pump house will have two pumps (Q 46m³/hr, H 310m), duty and standby with an additional plinth for installation of future pumps. Staff houses will be provided for two pump house operators within the compound.

The pump station will have a total power load of 49.6kW which is the sum of the backwash pumps, air blowers, administration block, street lighting, staff quarters and the gate house. Power supply for the station will be tapped from an 11kV KPLC power line passing about 1km away from the site. A 100kVA transformer will be required to meet the demand.

2.4.4.2. Longisa pumping station

Longisa pumping station will be located along the transmission line at Lat 0°51'36.49"S Long 35°23'32.13"E. The station will pump water from the main treatment works transmission pipeline to a proposed tank at the existing Longisa treatment works to serve Longisa town, hospital and their environs. The pumping station will have a 50m³ masonry holding tank to balance flows and prevent frequent pump start - stops. The pump house will have two pumps (Q 23m³/day, H 70m), duty and standby with an additional plinth for installation of future pumps. Staff houses will be provided for two pump house operators within the compound.

The station's power load will also be 49kW comprised of the demand for backwash pumps, air blowers, administration block, street lighting, staff quarters and the gate house. Power will be tapped from an 11kV power line. A 100kVA transformer will also be required.

2.4.5. Proposed water storage tanks

Storage tanks are required to provide balancing storage to cater for diurnal variations in water demands i.e. high water demands during peak times of early morning, midday and early evenings. The storage tanks also provide a buffer supply when interruptions in supply occur due to emergency diversions, pipe bursts, routine operation and maintenance procedures.

Tanks of 500m³ capacity will be located at termination points of proposed pipelines at Tiroto (Lat 0°48'16.54"S, Long 35°23'27.61"E), Kapkimolwa (Lat 0°52'15.48"S, Long 35°23'46.07"E), Mulot hill (Lat 0°56'2.19"S, Long 35°26'4.71"E), Sigor (Lat 0°55'26.57"S, Long 35°17'58.92"E), Kyogong (Lat 0°49'9.11"S, Long 35°20'22.29"E), and Longisa. A 200m³ capacity tank will also be constructed at Merigi (Lat 0°47'0.28"S, Long 35°24'6.76"E).

Pipelines serving shopping centers will terminate at a water kiosk with a 5,000-litre storage tank.

2.4.6. Project cost estimates

The project is estimated to cost KES 2.6 Billion to construct and commission.

2.4.7. Project implementation

The Project construction period is estimated to be 24 months due to the scale of the works.

2.5. Description of expected project activities

2.5.1. Construction overview

Construction of the water supply project is expected to be undertaken by contractor experienced in the type of work, who would be contractually obliged to complete the works in accordance with approved construction programs, project specifications, applicable government regulations and requirements, project permits and authorizations.

The Contractor is expected to develop construction programs which would consider factors such as critical habitat protection, ground conditions, topography, hydrology, presence of pre-existing infrastructure and weather conditions.

Within the regulatory framework, the selection of detailed construction methodologies and plant for the works would be the responsibility of the contractor. As such, a detailed approach in terms of the construction

methodology cannot be defined at this stage. The sequencing of the construction activities and the direction of construction would also be at the contractors' discretion.

Prior to the commencement of the construction program, the construction contractor would develop method statements for the works to be performed. These documents would incorporate the reasonable requirements of landowners/occupiers and agencies such as NEMA, WRA and other regulatory authorities in Kenya, and the mitigation measures outlined in this ESIA.

2.5.2. Pre-construction works

All construction activities would be undertaken within demarcated areas based on the design and the construction contractor's method statements. Intake works construction would take place on the demarcated areas for the weir and associated facilities. Transmission pipelines construction would also be on a strip of land known as the 'working width', which would generally be 8m wide within the rural areas and 3m in developed areas.

Before construction begins on the pipelines, the routes would be surveyed and marked to establish the precise alignment. The pipeline routes would be expected, as far as practicable, to avoid and/or minimize direct impacts on private property and on known resources.

2.5.2.1. Access roads

Access to work areas is not expected to be a problem as these are mostly along existing roads. However, a new access road to the intake site and treatment works site would have to be created to give adequate and safe access for equipment, materials and personnel to the construction site and permanent works.

2.5.2.2. Materials and equipment transport

An important aspect of the construction process is the transport of aggregate, sand, cement, steel, pipe sections, plant and other equipment to the construction areas, dedicated storage areas and construction camps. Transportation would be accomplished through the use of the existing and new road infrastructure in the project areas. Materials for the intake works, treatment works, and pipe delivery would represent the majority of movements associated with the construction phase.

Although some of the pipe sections can be transported directly to the ROW, it is likely that most would be stored initially in pipe yards. From the pipe yards, pipe sections would then be transported to the ROW on trucks that would travel along approved access routes.

2.5.2.3. Temporary construction facilities

Temporary facilities comprise storage yards, project offices and construction camps. The location and number of sites would be determined by the construction contractor and agreed with the Project Management Team. The construction contractor would be required to assess the environmental/social sensitivity of the site(s) prior to their approval for adoption.

Potential sites for construction camp and storage yards would be identified based upon but not limited to the following criteria:

- Sufficient ground for pipe storage to meet anticipated quantities;
- Reasonable road access/egress; and
- Proximity and access to construction sites.

2.5.3. Construction procedures

2.5.3.1. Setting out/staking of the facilities and pipeline route

The initial activity associated with construction is the final surveying and setting out or staking of the plinth areas, pipeline ROW and any additional temporary workspaces. This may include flagging to indicate the construction workspace boundaries. Environmental compliance personnel would participate in the pre-construction identification (e.g. flagging) of environmental resources to be protected during the construction process. Examples of such resources include:

- Identified ecological resources (e.g., tree or plant specimens to be protected); and
- Watercourses, setbacks/buffer zones, and wetlands.

Environmental activities may also comprise additional data collection, rare plant translocation, and pre-construction surveys for rare or protected wildlife. Other activities such as the location and exposure of existing pipelines and other services would also be conducted at this time.

Broadly, the following are the expected construction procedures in advancing the project. These procedures also include best practices for environmental, health and safety management in construction activities:

2.5.3.2. Weir construction

The area to be covered by the weir would be pegged out prior to commencement of any works. It would then be cleared and grubbed before excavation.

Construction would begin by de-watering the part of the river valley where the weir would be placed. This would be achieved by diverting the river through a tunnel/channel built through one side of the valley around the planned construction area.

A cofferdam would be built upstream of the main construction area to act as a barrier to the river and cause it to flow through the diversion tunnel. Another cofferdam would be built downstream to prevent water flowing back into the construction area. Pumps would be used to remove any water that seeps through the cofferdams.

Topsoil would be heaped in areas outside of the area to be covered by the weir and all trees, scrub and roots removed. Topsoil would be placed in layers not exceeding 2 meters and planted with grass if it is to be left for a considerable time (more than 6 months). This would conserve the integrity of the topsoil.

While keeping construction site dry, the river bed of the construction site would be excavated until all the organic materials deposited therein have been removed and to the depth where hard foundation is found. The foundation of the weir would be further excavated to reach solid bedrock.

Reinforcement bars would be assembled for the base concrete and weir wall after which the framework (shuttering) would be assembled to enable placing of concrete. Concrete would be poured into the framework layer by layer to the design height.

2.5.3.3. Treatment works, transmission and distribution lines

2.5.3.3.1. Surface preparation and grading

The proposed treatment works site would require clearing, cutting and filling to obtain the necessary levels for the facility. The pipeline routes would also need to be cleared and graded in some areas to permit the safe installation of the pipelines. This process would include the levelling and stripping of the top cover and the removal of scrub, trees and shrubs. Clearance work would be undertaken using hand tools and earth-moving equipment.

To ensure that the pipeline ROW can be properly reinstated and to allow the re-growth of vegetation, the topsoil and subsoil would be removed as required and stored separately. Areas such as roads that are subject to open trench crossings would be prepared by removing material only directly over the width of the pipe trench. This material would be kept separate from other stripped or excavated material.

2.5.3.3.2. Trenching

The first step of trenching is the staking and marking of the trench centerline. Where possible, existing third-party services (e.g., underground cables or pipelines) would also be located and marked prior to the commencement of excavation work.

The trench would be dug to a depth that allows pipeline installation with a minimum of 0.6m of cover from the top of the pipe to the pre-existing ground surface. On average trench depth will be between 1.5 - 2m, while the width will vary from a minimum of 600mm to a maximum of 1.5m. The presence of sub-surface structures (such as other pipelines) and surface features (such as hills, rivers) may require deeper installation of the pipeline in some areas.

The trenching operation would be undertaken using methods to suit the local terrain and ground conditions. It is expected that trenching equipment would include hand tools, backhoes and/or excavators. In confined areas, such as areas adjacent to existing pipes, a combination of backhoes and hand tools would be used to open and reinstate the trench.

Where the ROW is near settlements, measures would be taken to limit public access to the ROW or excavated trench. At locations where it is necessary to provide public access across the trench, safe trench crossings would be constructed. Warning signs and barricades would be erected around the trench, and adequate warning lights/reflective material would be provided during the hours of darkness.

2.5.3.3.3. Pipeline crossings

Crossings are defined as the intersection between the proposed pipeline route and pre-existing features such as rivers/watercourses, public roads/ tracks, and underground services.

The construction technique chosen for watercourse crossings would be subject to ground conditions i.e. topography and size of the watercourse. This could range from open-cut crossings where the construction methodology would assume flowing water, or the immediate potential for flowing water during construction. To avoid interruption of the flow of the watercourse, wet-trenching or flumed water crossing techniques would be used. Where appropriate and advantageous, seasonal constraints on construction activities could be imposed to ensure that crossings are built during low flow conditions. Watercourse bank and bed material would be stored separately and would not be placed where flow or drainage will be obstructed. The disturbed portion of the watercourse bed and banks associated with any open cut crossings would be returned to pre-construction conditions, where possible. The trenching of the watercourse banks and bed would be undertaken immediately prior to installing the pipeline and the trench would then be back-filled as soon as possible following pipeline installation.

Where the size of the watercourse is such that an open cut crossing is impractical, or will result in too much environmental disruption, trenchless techniques could be used. These would include spanned crossings, horizontal directional drilling, micro-tunneling and auger boring. Spanned crossing can be through a single span structure or span structure with in-stream support.

Minor road crossings would be accomplished by open trenching of one-half of the road at a time, maintaining one lane of through traffic at all times. Smaller rural roads could be closed to through traffic, following consultation with local officials and residents. Appropriate signs, barricades, and other traffic management measures would be used to minimize road user inconvenience and promote safety during temporary closure of roads.

2.5.3.3.4. Construction of the water treatment plant

The sequence of the construction program for the WTP is likely to be as follows:

- Site surveying to determine the geotechnical, geophysical and topographical features of the site;
- Perimeter demarcation and setting out;
- Establishment of temporary fences and gates;
- Site clearance and preliminary grading;
- Establishment of construction facilities (e.g., materials stores, laydown areas, offices etc);
- Site excavation and placement to achieve the required cut and fill profile for the facility;
- Installation of underground piping, drainage systems, utility lines and chambers;
- Construction of buildings and other structures;
- Connection of the facility to the raw water and treated water mains;
- Installation of all above ground utilities and services;
- Placing of granular surfacing to all unpaved areas;
- Landscaping (as necessary) including the supply, planting and establishment trees and other appropriate plant species; and
- Reinstatement of temporary and permanent roads, services and other items that have been damaged because of the work.

2.5.3.3.5. Pipeline testing and commissioning

The pipelines would be subjected to hydrostatic pressure testing to prove the strength and integrity of the pipeline system. Hydrostatic testing of the pipeline would involve filling sections with water and raising the pressure to a minimum of 1.5 times the maximum allowable operating pressure. The pipeline would be tested in sections to:

- Limit the volume of test water needed at one time;
- Limit elevation changes, allowing the test pressure to be maintained between the minimum required test pressure and maximum pressure which the pipeline will safely withstand; and
- Accommodate the maximum stress criteria for each wall thickness.

Hydrostatic testing activities would be carried out in sequence and would include the following:

- plugging each end of the pipeline test section;
- Controlled filling of pipeline sections with water;
- Pressurization of the pipeline test section;
- A test pressure hold period (i.e., commencement of up to 24-hour strength and leak test);
- De-pressurization of the pipeline test section;
- Controlled dewatering of the pipeline test section; and
- Removal of test ends.

The displaced hydrostatic test water could be transferred to another section of pipe or discharged at a suitable location. Discharge locations and rates would be agreed in advance with the relevant authorities.

2.5.4. Reinstatement and erosion control

Prior to the commencement of the construction program, the Contractor would develop project-specific Reinstatement Plans based on the project Reinstatement Specification. The project-initiated access roads, pipeline ROW and all other project areas would be re-instated in accordance with the Reinstatement Plans on completion of the works. The contractor would also be required to incorporate reinstatement measures in his method statements for each critical element of the construction program.

The key areas that would require reinstatement include:

- Working areas at the intake site and treatment works site;
- The pipeline ROW;
- Pumping stations and storage tank sites;
- Construction camps and materials storage yards; and
- Waste management and disposal sites.

2.5.5. Site clean-up

Prior to demobilization of construction personnel and equipment, clean-up activities would be conducted in accordance with environmental standards and industry best practice. Clean-up activities would consist of the removal and/or disposal of temporary buildings, equipment, tools, and excess material brought onsite or generated during the construction and commissioning program.

2.5.6. Operational activities

The main activities that would be undertaken during project operations include:

- Abstraction of water from Nyangores River;
- Treatment and transmission of water to storage tanks;
- Distribution of water to consumers; and
- Maintenance of the water supply infrastructure.

2.5.7. Project decommissioning and abandonment plans

The environmental (Impact Assessment and Audit) Regulations 2003 provide for outlining of activities that shall be undertaken during the project construction, operation and **decommissioning** phases. Further, the environmental management plan shall detail project activities, impacts, mitigation measures, time schedule, costs, responsibilities and commitments proposed to minimize environmental impacts of activities, including monitoring and environmental audits during implementation and **decommissioning** phases of a project.

Decommissioning and abandonment plans for the water supply infrastructure would entail:

- Demolition of the weir;
- Removal of all surface installations;
- Abandonment or demolition of buildings and structures at intakes, treatment works pumping stations and storage tank sites;

- Disconnection of pipelines from supply of water, and abandonment in place or removal where abandonment causes a risk to the environment; and
- Re-vegetation of the sites consistent with the terrain features and other prevailing conditions.

An ESIA would be prepared prior to implementation of this plan, to assess and minimize potential environmental and social impacts arising from the decommissioning and abandonment operations. This decommissioning/abandonment ESIA would be submitted to NEMA for approval.

2.5.8. Expected inputs and outputs

Table 2-2 Inputs and outputs

Phase	Inputs	Outputs
Pre-construction (Site clearance)	Fossil fuels for running machinery/ equipment; human labor	Biomass from cleared vegetation; Exhaust emissions Dust, noise and vibrations
Construction	Fossil fuels for running machinery/ equipment; Water; Raw materials such as rock, ballast, sand, cement, gravel, iron/steel bars, Steel and HDPE pipes, masonry blocks, etc	Exhaust emissions; Material spoils (wastes); dust, noise and vibrations; construction wastewater
Operation	Routine maintenance/ repairs; Various consumables Chemicals for treatment of water	Sludge from water treatment process and other ordinary wastes
Decommissioning	Fossil fuels for running machinery/ equipment	Solid waste/ rubble; Exhaust emissions; Dust, noise and vibrations

3. Analysis of alternatives

Various options were analysed for the Project. these included the 'No Project' option, water source options, and supply point options.

3.1. The No Project Option

This alternative assumes the status quo is maintained with no development of the proposed water source and associated transmission network. This would avoid a realization of the impacts concomitant to development and operation of a water supply system. However, with the projected population increase and the growing deficit in water supply, a lack of development of new water sources could hamper the socioeconomic development of Bomet County from the inadequate supply to meet basic human needs. Residents could experience an increase in water-borne diseases from consumption of contaminated water, and other economic costs from lost time in search of clean water and/or treatment.

The No development option was therefore discounted on the basis that adequate supplies of clean water are a necessity for population health and socioeconomic growth.

3.2. Source of water

There are two main rivers that could be utilized to supply the project area: **Amala River** that crosses near Mulot Town at the border with Narok County and **Nyangores River** that forms the southern limit of Bomet Town.

The water intakes would be located upstream near the Mau Forest so that most of the project area is supplied by gravity. Additionally, the quality of the raw water in the river near the forest is better than near urban areas.

The three options for water supply sources considered were:

3.2.1. Option 1 – Amala River

This Option considers an intake on Amala River to abstract up to 17,808m³/day of water in the ultimate year.

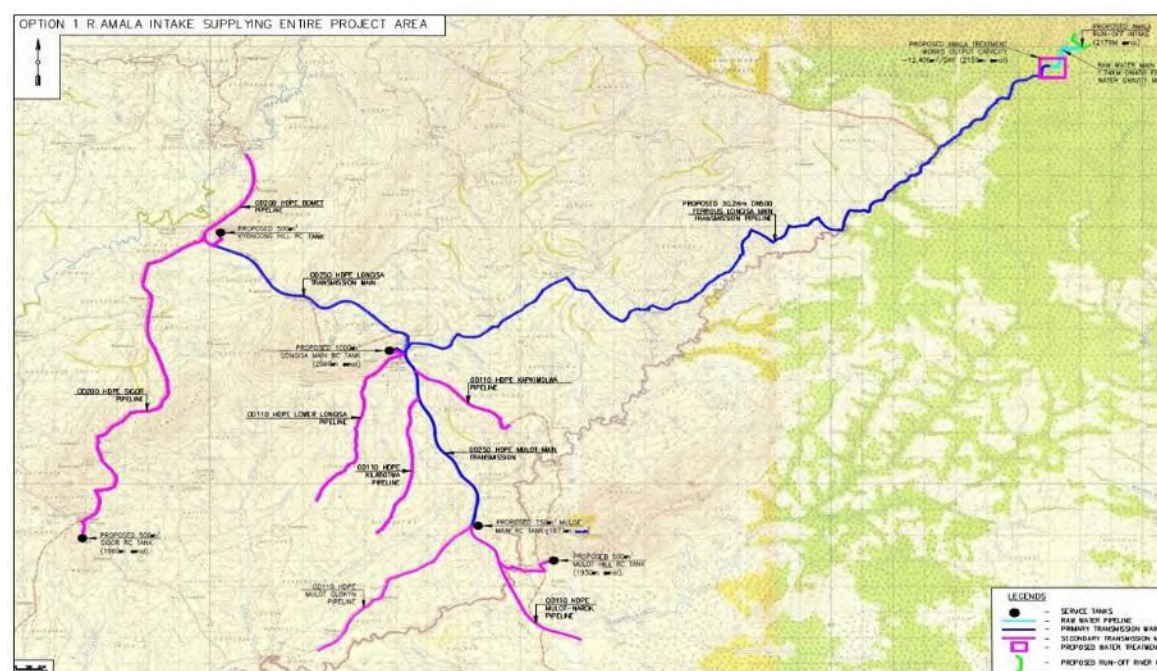


Figure 3-1 Option 1 – Supply Project Area from Amala River

3.2.2. Option 2 – Amala and Nyangores Rivers

This option considers intakes on Amala and Nyangores Rivers. The intake on Nyangores River would abstract 9,795m³/day while that on Amala River would abstract 8,013m³/day in the ultimate year.

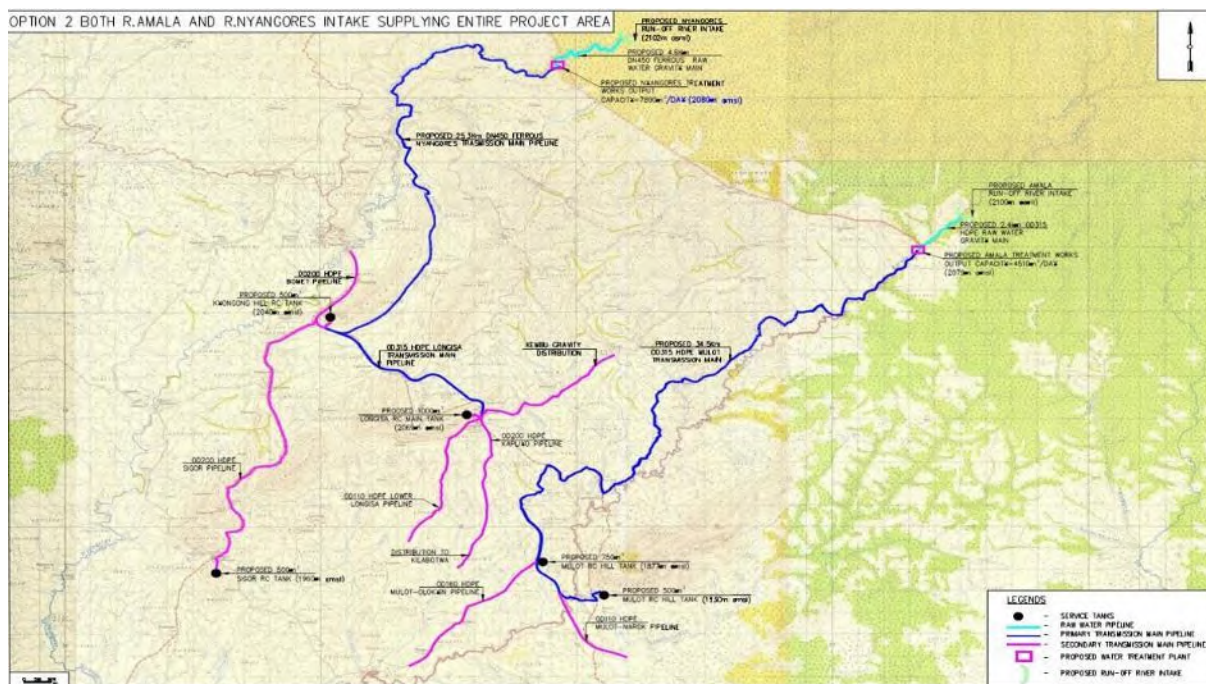


Figure 3-2 Option 2 – Supply Project Area from both Nyangores and Amala Rivers

3.2.3. Option 3 – Nyangores River

This option considers an intake on Nyangores River to abstract up to 17,808m³/day in the ultimate year.

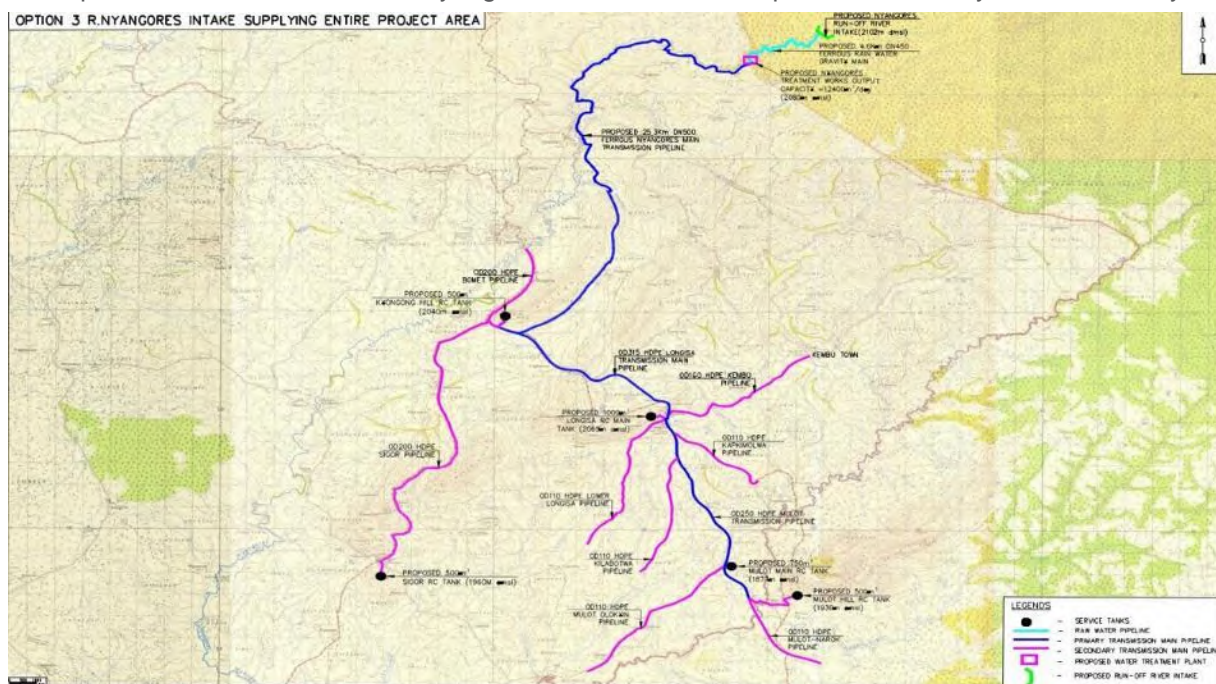


Figure 3-3 Option 3 – Supply Project Area from Nyangores River

The hydrology of the rivers was considered and their capacity to meet the population's water demand in the ultimate year as shown in the Tables below:

Table 3 -1 Flow characteristics for Option 1 on River Amala

Month	Q ₉₅ m ³ /day	Q ₈₀ m ³ /day	Flow available for abstraction (Q ₉₅ – Q ₈₀) m ³ /day	Water Demand, m ³ /day	Water deficit (m ³ /day)	% of demand met by supply
Jan	6,000	24,142	18,142	17,808	-	100%
Feb	8,878	16,691	7,813	17,808	9,995	45%
Mar	8,615	13,659	5,044	17,808	12,764	29%
Apr	6,980	32,783	25,802	17,808	-	100%
May	34,355	176,721	142,367	17,808	-	100%
Jun	44,154	136,434	92,280	17,808	-	100%
Jul	77,523	164,038	86,514	17,808	-	100%
Aug	96,720	253,810	157,090	17,808	-	100%
Sep	156,157	248,555	92,399	17,808	-	100%
Oct	30,227	93,521	63,294	17,808	-	100%
Nov	51,550	79,347	27,797	17,808	-	100%
Dec	33,851	53,428	19,577	17,808	-	100%

Table 3 -2 Flow characteristics for Option 2 on River Nyangores

Month	Q ₉₅ m ³ /day	Q ₈₀ m ³ /day	Flow available for abstraction (Q ₉₅ – Q ₈₀) m ³ /day	Water Demand, m ³ /day	Water deficit (m ³ /day)	% of demand met by supply
Jan	33,145	46,059	12,914	9,795	-	100%
Feb	20,242	27,301	7,059	9,795	2,736	72%
Mar	15,532	20,242	4,710	9,795	5,085	48%
Apr	23,668	60,575	36,906	9,795	-	100%
May	60,575	220,876	160,301	9,795	-	100%
Jun	76,600	180,951	104,351	9,795	-	100%
Jul	133,026	196,839	63,813	9,795	-	100%
Aug	136,490	217,442	80,952	9,795	-	100%
Sep	161,850	238,805	76,955	9,795	-	100%
Oct	85,134	122,776	37,642	9,795	-	100%
Nov	63,122	103,284	40,162	9,795	-	100%
Dec	43,770	71,095	27,326	9,795	-	100%

Table 3 -3 Flow characteristics for Option 2 on River Amala

Month	Q ₉₅ m ³ /day	Q ₈₀ m ³ /day	Flow available for abstraction (Q ₉₅ – Q ₈₀) m ³ /day	Water Demand, m ³ /day	Water deficit (m ³ /day)	% of demand met by supply
Jan	6,000	24,142	18,142	8,013	-	100%
Feb	8,878	16,691	7,813	8,013	200	98%
Mar	8,615	13,659	5,044	8,013	2,969	63%
Apr	6,980	32,783	25,802	8,013	-	100%
May	34,355	176,721	142,367	8,013	-	100%
Jun	44,154	136,434	92,280	8,013	-	100%
Jul	77,523	164,038	86,514	8,013	-	100%
Aug	96,720	253,810	157,090	8,013	-	100%

Month	Q ₉₅ m ³ /day	Q ₈₀ m ³ /day	Flow available for abstraction (Q ₉₅ – Q ₈₀) m ³ /day	Water Demand, m ³ /day	Water deficit (m ³ /day)	% of demand met by supply
Sep	156,157	248,555	92,399	8,013	-	100%
Oct	30,227	93,521	63,294	8,013	-	100%
Nov	51,550	79,347	27,797	8,013	-	100%
Dec	33,851	53,428	19,577	8,013	-	100%

Table 3 -4 Flow characteristics for Option 2 - Combined Rivers Amala and Nyangores

Month	Q ₉₅ m ³ /day	Q ₈₀ m ³ /day	Flow available for abstraction (Q ₉₅ – Q ₈₀) m ³ /day	Water Demand, m ³ /day	Water deficit (m ³ /day)	% of demand met by supply
Jan	39,145	70,201	31,056	17,808	-	100%
Feb	29,120	43,992	14,872	17,808	2,936	85%
Mar	24,147	33,901	9,754	17,808	8,054	55%
Apr	30,648	93,358	62,708	17,808	-	100%
May	94,930	397,597	302,668	17,808	-	100%
Jun	120,754	317,385	196,631	17,808	-	100%
Jul	210,549	360,877	150,327	17,808	-	100%
Aug	233,210	471,252	238,042	17,808	-	100%
Sep	318,007	487,360	169,354	17,808	-	100%
Oct	115,361	216,297	100,936	17,808	-	100%
Nov	114,672	182,631	67,959	17,808	-	100%
Dec	77,621	124,523	46,903	17,808	-	100%

Table 3 -5 Flow characteristics for Option 3 - River Nyangores

Month	Q ₉₅ m ³ /day	Q ₈₀ m ³ /day	Flow available for abstraction (Q ₉₅ – Q ₈₀) m ³ /day	Water Demand, m ³ /day	Water deficit (m ³ /day)	% of demand met by supply
Jan	33,145	46,059	12,914	17,808	4,894	74%
Feb	20,242	27,301	7,059	17,808	10,749	41%
Mar	15,532	20,242	4,710	17,808	13,098	27%
Apr	23,668	60,575	36,906	17,808	-	100%
May	60,575	220,876	160,301	17,808	-	100%
Jun	76,600	180,951	104,351	17,808	-	100%
Jul	133,026	196,839	63,813	17,808	-	100%
Aug	136,490	217,442	80,952	17,808	-	100%
Sep	161,850	238,805	76,955	17,808	-	100%
Oct	85,134	122,776	37,642	17,808	-	100%
Nov	63,122	103,284	40,162	17,808	-	100%
Dec	43,770	71,095	27,326	17,808	-	100%

Table 3 -6 Summary of Options for sources of water

	Option 1	Option 2	Option 3
Abstraction in the ultimate year	17,808m ³ /day from Amala River	9,795m ³ /day from Nyangores River and 8,013m ³ /day from Amala River	17,808m ³ /day from Nyangores River

	Option 1	Option 2	Option 3
Project Cost (CAPEX)	KES 1.66 Billion + land acquisition costs	KES 2.42 Billion + land acquisition costs	KES 1.84 billion + land acquisition costs
OPEX needs	Gravity system with low O&M costs Only one system to be managed	Some pumping with increased O&M costs Two systems to be managed	Some pumping with increased O&M costs Only one system to be managed
No of Months with water deficit in the ultimate year	2 months	2 months	3 months
Contract administration	One contract with an 18-month construction period	Two contracts, high administration costs but lower implementation period	One contract with an 18-month construction period

3.2.4. Selected option

Selection of the most feasible water supply option was based on the hydrological studies carried out; System capital expenditure (CAPEX) and operating expenditure (OPEX) costs; and consultations with various stakeholders in the water sector. The stakeholders included CRVWDA, LVSWDA, Bomet Water Company, NEMA, Water Resource Users Association (WRUA), the County Government of Bomet, representatives from the County Assembly of Bomet, residents and representatives from major institutions in the project area.

Option 3 was selected as the source of water for the Project. The hydrological analysis however showed that Nyangores River would for three months annually, be unable to meet the water demand in the ultimate design horizon. In future, the development of an additional scheme on Amala River will augment flows to the system in the ultimate horizon and beyond.

3.3. Supply point options

Due to the hilly topography of the supply area, decisions had to be made on where to locate storage tanks – sufficiently elevated ground to where water would be pumped for onward supply by gravity. Locations such as Tiroto Hill, Merigi Hill were considered for siting of a tank, with other methods also being considered for supply of Chemaner area.

3.3.1. Options for Water Supply to Merigi Area

Merigi is a high-level area 2275m above mean sea-level (amsl) which can be supplied with water from the main transmission line and pumped to a high point to enable gravity water supply to the larger part of the area and limited pumping to local high points. The two high points which could be used for water supply are;

- Tiroto Hill, 2310m amsl which is the highest point
- Merigi Hill, 2275m amsl which does not supply the Tiroto high point at 2310m amsl

A comparison of the proposed options and associated costs is given in the Table below

Table 3 -7 Options of supply to Merigi area

Water Supply Options	Description	Capital Cost, KES	Monthly Power charge, KES
Option 1 - Tiroto Hill Covers Tiroto, Cheboin, Chepkolon, Merigi, Cheptilwal, Kogotik and Emitot	<ul style="list-style-type: none"> - Tee off from Main gravity line at Cheboin - 1.2Km 250mm dia gravity pipeline - Pumping Station, Q - 3,691m³/d, H - 250m - 1.3Km 250mm dia pumping Main - 1,500m³ capacity storage tank on Tiroto Hill - 3.0Km 200mm dia gravity pipeline to Merigi 	127 Million	1 Million
Option 2 - Merigi Hill covers Cheboin, Chepkolon, Merigi and Cheptilwal sub-locations	<ul style="list-style-type: none"> - Tee off from Main gravity line at Cheboin - 1.5Km 200mm dia gravity pipeline - Pumping Station, Q - 1,833m³/d, H - 235m - 3.0Km 200mm dia pumping Main - 1,000m³ capacity storage tank on Merigi Hill 	89 Million	0.5 Million

Option 1 was selected because it serves a large area of Bomet East while Option 2 is more capital intensive and covers half the service area covered by Option 1.

3.3.2. Options for Water Supply to Chemaner Area

Chemaner is a high elevation area near Mau Forest edge which can be supplied either from Kembu supply line or Amala River. A comparison of water supply options and associated costs is given in the Table below:

Table 3 -8 Options of supply to Chemaner area

Options	Description	Capital Cost, KES	Monthly Power charge, KES
Option 1 - Supply from Kembu	<ul style="list-style-type: none"> - Supply from Kembu Line - 1.4Km 200mm dia gravity pipeline - Pumping Station, Q – 2,031m³/d, H – 240m - 5.7Km 200mm dia pumping Main - 1,000m³ capacity storage tank at Chemaner 	102 Million	2 Million
Option 2 - Supply from Amala River	<ul style="list-style-type: none"> - Intake on Amala River - Water Treatment Plant and Pumping Station, Q - 800m³/d, H - 285m - 4.2Km 160mm dia pumping Main - 500m³ capacity storage tank at Chemaner 	141Million	0.6 Million

Option 2 - Supply to Chemaner and its environs from Amala river is more economical in terms of O&M costs which are significant in the long term. It is proposed that another scheme be implemented in future comprising of a water supply system using Amala river as its source. This system would supply Chemaner and other adjacent high-level areas near Mau Forest more economically. In the meantime, water can be supplied to the area using a water bowser to a water kiosk from the main project water supply.

4. Environmental and social baseline conditions

4.1. County overview

4.1.1. Location

Bomet County is located in the Rift Valley and is bordered by four counties namely: Kericho to the north, Nyamira to the west, Narok to the south and Nakuru to the north-east. The County has a surface area of 2,037.4km² (County Government of Bomet, 2018).

Administratively, the County is divided into five (5) Sub-Counties (Constituencies), 25 wards, 66 locations, 177 sub-locations and 1,977 villages.

Table 4-1 Bomet sub-counties and Wards

Sub-County (Constituency)	Wards
Bomet Central	Silibwet, Singorwet, Ndaraweta, Chesoan and Mutarakwa
Bomet East	Longisa, Kembu, Chemaner, Merigi and Kipreres
Chepalungu	Sigor, Kongasis, Chebunyo, Nyongores and Siongiroi
Sotik	Ndanai/Abosi, Kipsonoi, Kapletundo, Chemagel and Manaret/Rongena
Konoin	Kimulot, Mogogosiek, Boito, Embomos and Chepchabas

The project covers the areas bounded by Nyangores and Amala Rivers in Bomet County including Bomet Central, Bomet East, and Chepalungu Sub-counties. The only exception outside these boundaries is a small area past Mulot Town in Narok West sub-county of Narok County.

4.1.2. Topography

A large part of the County is characterized by undulating topography that gives way to flatter terrain in the south. The overall slope of the land is towards the south, except the north eastern part which rises eastwards towards the 3,000m high Mau Ridges. The land slopes gently from Kericho plateau to about 1,800m in the lower area where the land is generally flat with a few scattered hills in Chepalungu and Sigor plain.

4.1.3. Hydrology and drainage

The major rivers in the County include: Kipsonoi River which flows through Sotik to Lake Victoria; Chemosit River which flows through Kimulot in Konoin Sub-County; Nyangores River which flows from the Mau Forest southwards through Tenwek area; Amala River which originates in the Transmara Forest (Kimunchul) and flows along south western boundary of the County; and Tebenik/Kiptiget Rivers which flow along the northern boundaries of the County.

Sisei River originates from several swamps in Bomet Central Sub-county but is fast diminishing due to intensified cultivation along its banks and catchment areas.

There are also numerous springs in the County which are utilized by residents for water supply.

4.1.4. Geology and soils

The underlying geology of the County is comprised of volcanic, igneous and metamorphic rocks. In addition to tertiary lava (phonolites) and intermediate igneous rocks, there are basement systems (granite), volcanic ash mixtures and other pyroclastic rocks. Also present are quaternary volcanoes to the south west parts and faults along the Mau escarpment bordering Narok County.

The soils of the county are those developed on ashes and other pyroclastic rocks of recent volcanoes. In some areas, they are imperfectly drained, moderately deep to deep, very dark greyish brown to dark yellowish brown, firm to very firm, slightly sodic, silty clay loam to clay, abruptly underlying a thick topsoil of friable, silt loam to clay loam (solodic PLANOSOLS). In other areas, the soils are an association of well drained, very deep, dark reddish brown, very friable and smeary, sandy clay loam to clay, with a thick humic topsoil; on interfluvial (mollic ANDOSOLS), to well drained, moderately deep, dark brown to dark reddish brown, very friable and slightly

smeary, clay loam to clay; on valley sides (ando-eutric CAMBISOLS, partly lithic phase) (Sombroek, Braun, & van der Pouw, 1982).

4.1.5. Climate

The climate in Bomet is warm and temperate and is considered to be Cfb according to the Köppen-Geiger climate classification (Climate-Data.Org, 2019).

The County has generally high rainfall, ranging from 1,000-1,400 mm annually, with an average of 1247 mm. The rainfall is distributed unevenly throughout the year. The most precipitation falls in April at an average of 221 mm, while the driest month is July with 54 mm of rain.

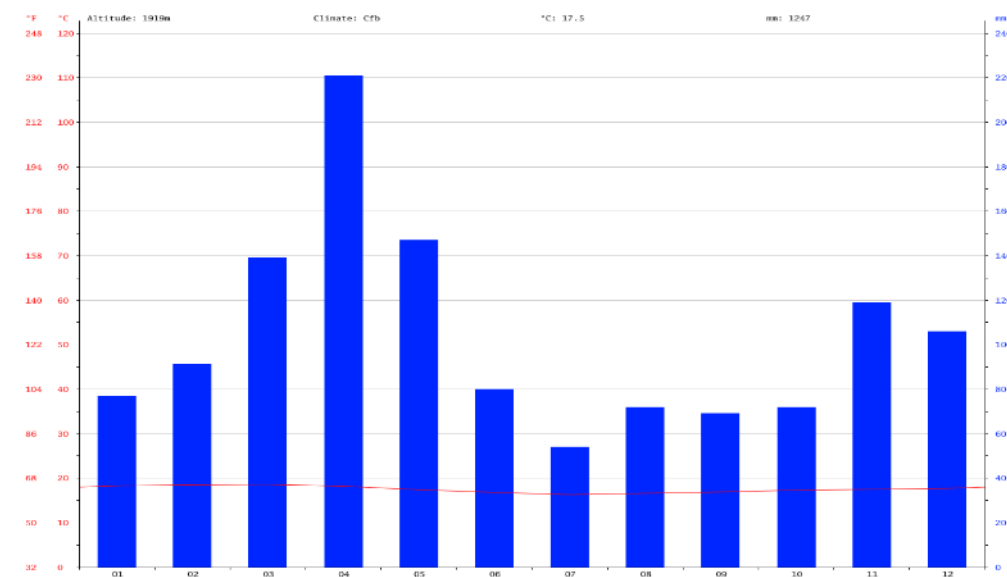


Figure 4-1 Climate Graph of Bomet County (source <https://en.climate-data.org>)

The lower highland part of the County has the highest rainfall, but this decreases in the upper midland zone which lies to the west of the rift valley, and further decreases in the upper midland zone in the southern part of the County (MoALF, 2017).

The average monthly temperatures in the County range from 16-24°C. March is the warmest month of the year when the temperatures average 18.6 °C. on the other hand, July has the lowest average temperature of the year at 16.3 °C.

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	18.3	18.5	18.6	18.2	17.4	16.8	16.3	16.6	16.9	17.3	17.5	17.7
Min. Temperature (°C)	10.1	10.2	10.5	11	10.5	10	9.5	9.5	9.3	9.6	9.9	10.1
Max. Temperature (°C)	26.6	26.9	26.8	25.4	24.4	23.7	23.2	23.7	24.5	25.1	25.1	25.3
Avg. Temperature (°F)	64.9	65.3	65.5	64.8	63.3	62.2	61.3	61.9	62.4	63.1	63.5	63.9
Min. Temperature (°F)	50.2	50.4	50.9	51.8	50.9	50.0	49.1	49.1	48.7	49.3	49.8	50.2
Max. Temperature (°F)	79.9	80.4	80.2	77.7	75.9	74.7	73.8	74.7	76.1	77.2	77.2	77.5
Precipitation / Rainfall (mm)	77	91	139	221	147	80	54	72	69	72	119	108

Figure 4-2 Weather averages in Bomet County (source <https://en.climate-data.org>)

4.1.5.1. Climate change in the County

Analysis of temperature trends in the County over 25 years (1981 to 2005) has shown that temperatures have increased by approximately 0.5 °C for both the first and second seasons. Despite these increase in

temperatures in both seasons, there has not been an increase in the number of heat stress days (MoALF, 2017).

On the other hand, analysis of average annual rainfall measured over a 35-year period (1981-2015) has shown no significant change in both seasons. Rainfall has however become more variable, with an increase in extremes (both highs and lows) from year to year, which has resulted in an increase in both flood and drought risk in the first season and an increase in drought risk in the second season.

Looking ahead to the period 2021-2065, climate projections based on two representative concentration pathways¹ (RCPs) indicate that under both scenarios, mean temperatures are expected to continue to increase. This results in an increase in drought risk, with the number of consecutive drought stress days rising from a historical average of less than 60 days in each half of the year to as high as 80 consecutive dry days.

Under both scenarios, there is also expected to be an increase in flood risk with the maximum 5-day precipitation average rising by approximately 20-25% from the historical average.

Under the high emissions scenario there is also expected to be a reduction in rainfall in both seasons.

4.1.6. Flora and fauna

Bomet County is rich in biodiversity found in the important ecosystem of Mau and the smaller but no-less important Chepalungu Forest including the Siongiroi fragment. Mau Forest is especially home to rare animal species like bongo, giant forest hogs, cooper tailed monkeys, black and white Columbus monkeys, elephants, leopards, buffalos and abundant birdlife.

The County has claim over the South-western Mau Forest Block covering 841.29 km² and Chepalungu Forest Reserve which covers 49.77 km². These forests are the source of the major rivers such as Nyangores, Amala and Kipsonoi in the County, and a source of forest products mainly timber, honey and herbal medicine.

Other important forests in the County include Chelelach, Ndoinet and Kipsegon Forests.

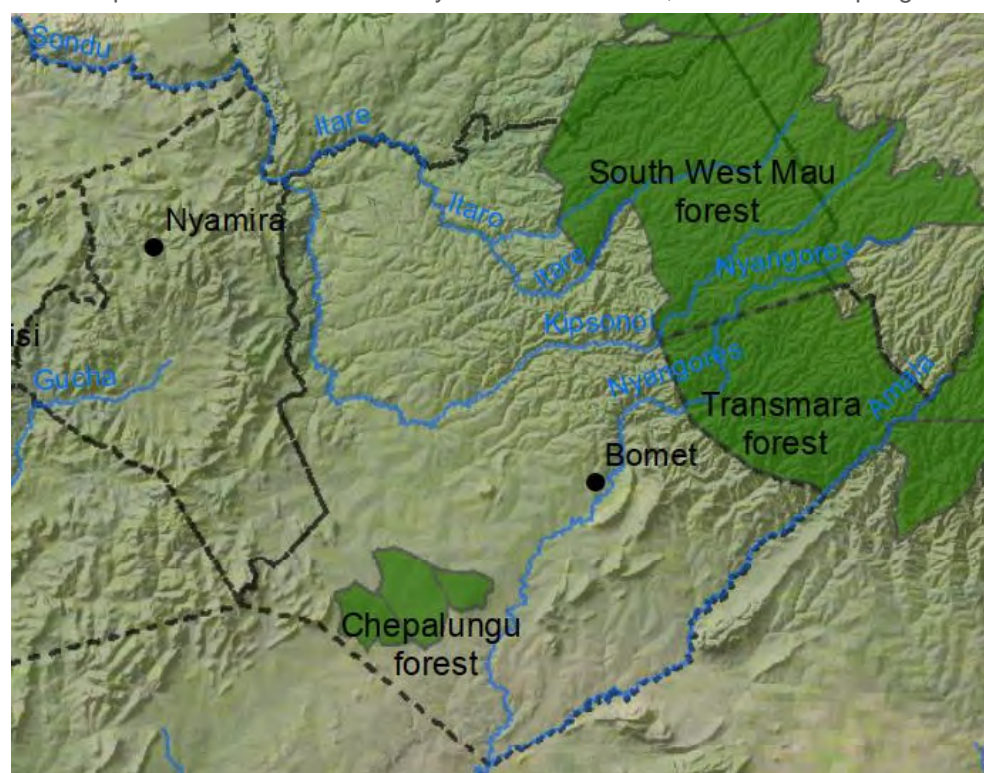


Figure 4-3 Important conservation areas in Bomet County

¹ The two RCPs, RCP2.6 and RCP8.5, are named after a possible range of radiative forcing values in the year 2100 relative to pre-industrial values. The pathways are used for climate modelling and research and describe two possible climate futures considered possible depending on how much greenhouse gases are emitted in the years to come. RCP 2.6 assumes that global annual GHG emissions (measured in CO₂-equivalents) peak between 2010 and 2020, with emissions declining substantially thereafter. In RCP 8.5, emissions continue to rise throughout the 21st century

There are however threats on the biodiversity mainly from human encroachment on the conservation areas. Some species of plants, birds and insects are reported to be already extinct, while others are critically endangered from the encroachment.

4.1.7. Socioeconomic profile

4.1.7.1. Demographics

The population of Bomet County was estimated at 875,689 (49.6% men and 50.4% women) in the 2019 Population and Housing Census. These were contained in about 187,641 households. The population in the three sub-counties served by the project was 484,327, representing about 55% of the total population in Bomet County (KNBS, 2019).

The County has a child rich population where 0-14-year olds constitute 42% of the total population. This is due to high fertility rates among women in the County.

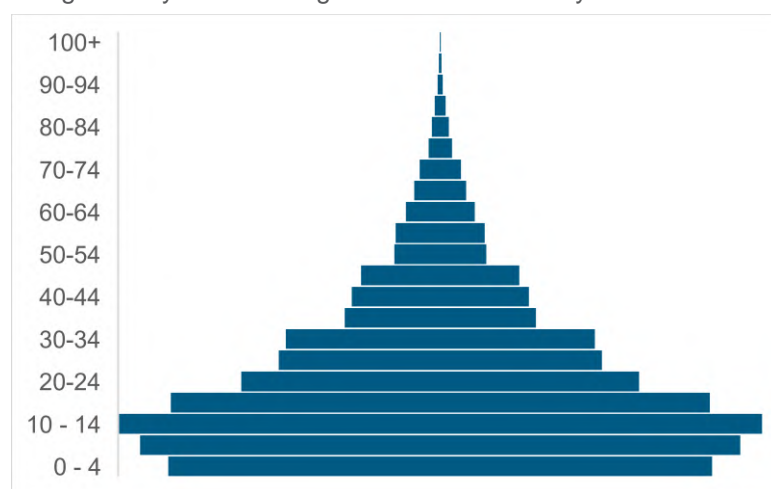


Figure 4-4 County Population Pyramid

4.1.7.2. Employment and education

About 90% of the Bomet County's population has some form of education, with 9% having never gone to school. There are more males with some level of education than females in the County.

Table 4-2 Education levels in Bomet County

	Total	At School		Left School After Completion		Left School Before Completion		Never Been to School		Don't know	
	Number	Number	%	Number	%	Number	%	Number	%	Number	%
Total	810,122	400,330	49.4	169,658	20.9	160,702	19.8	72,627	9	6,730	0.8
Male	400,694	205,930	51.4	88,746	22.1	72,327	18.1	30,078	7.5	3,572	0.9
Female	409,407	194,390	47.5	80,911	19.8	88,369	21.6	42,545	10.4	3,158	0.8

Only 47.5% of the population in Bomet County is economically active. The Table below summarises the distribution of the population aged 5 years and above by activity status: whether working, seeking work, or outside the labour force in the County

Table 4-3 Overall employment levels in Bomet County

Age Bracket	Total	Working	Seeking Work / No Work Available	Persons outside the Labor Force
	762,274	362,007	16,249	383,946
5 - 14	253,691	5,838	-	247,839
15 - 17	71,333	5,172	332	65,820
18 - 24	119,220	59,234	4,876	55,099
25 - 34	128,309	112,525	7,011	8,765
35 - 64	158,008	149,701	3,801	4,483
65 +	31,710	29,537	229	1,940

4.1.7.3. Land use

Agriculture is the main economic activity in Bomet County with over 80% of the total population engaging in crop and livestock production or being employed on farms. The higher altitudes in the north eastern parts of the County are particularly suitable for tea and dairy farming. The middle part of the county which lies 2,300m above sea level is suitable for tea, maize, pyrethrum and coffee farming.

In the southern parts of the County such as Sigor and parts of Longisa, the main economic activity is livestock production, while milk production is a major economic activity in Sotik sub-county. Areas between 1,800m and 2,300m above sea level are mostly suitable for maize, pyrethrum, vegetables and beef production.

The main farming systems practiced in the County include, small-scale mixed crop-livestock systems and medium to large-scale mono-cropping systems. The main crops grown for subsistence are: maize, beans, sweet potatoes and cabbages while the major cash crops include tea, coffee and pyrethrum.

Dairy and beef cattle and poultry production constitute the main livestock activities in the County. The main livestock reared include Friesian and Ayrshire dairy cows, various breeds of beef cattle and poultry. Rabbit farming is an emerging enterprise practiced by some farmers in the county.

Fisheries and aquaculture are also practiced but at small scale. The main types of fish farmed include tilapia and various trout species.

Table 4-4 Distribution of households practicing agriculture, fishing and irrigation

	Total	Farming	Crop Production	Livestock Production	Aquaculture	Fishing	Irrigation
BOMET	187,641	152,564	146,327	127,375	379	866	1,990
Bomet East	29,958	26,472	25,650	22,463	58	110	428
Chepalungu	33,931	31,910	30,692	28,939	71	217	728
Konoin	38,178	23,845	22,535	17,669	75	102	170
Sotik	47,315	40,497	38,952	34,567	117	277	346
Bomet Central	38,259	29,840	28,498	23,737	58	160	318

Apart from agriculture, other key economic activities include small-scale industries such as carpentry and mechanics, the jua kali sector, artisanal mining for precious stones and quarrying for stones and sand. The important ones which are currently under exploitation are: murram, ballast and building stones. Local sand is found in Koiwa location in Konoin Constituency and at Kyogong area of Chepalungu constituency. Building stones are also found at Chepkositonik area of Bomet East Sub-County.

4.1.7.4. Infrastructure

4.1.7.4.1. Roads and rail networks

The County has a road network which is mainly gravel and earth surface. A small portion of the road network is made of bitumen. The total number of kilometers of road network in the County is 2,041 Kms out of which 237 Kms is under bitumen or is in the process of being upgraded to bitumen status and 1,804 Kms is under gravel and earth surface (County Government of Bomet, 2018).

The County has 69 Kms of class B6 road (A1 Kisii-Keroka-Sotik-Litein-Chemosit-A12 Kericho) and class B7 road (B6 Kaplong-Bomet-Narok-A8 Mai Mahiu). The two roads are maintained by Kenya National Highway Authority (KeNHA). The Bomet-Silibwet-Litein (C24) which is also paved is under Kenya Rural Roads Authority (KeRRA) maintenance.

Kenya Urban Roads Authority (KURA) and KeRRA are in the process of upgrading some roads to paved status through the low volume seal technology. These roads include: C704 Silibwet - Olenguruone- Molo; KCC-Ndanai-Gorgor; Daraja sita - Chebole- Siongiroi-Chebunyo; Soymet – Kapletundo- Mogogosiek; Kaptengecha –Koiwa- Embomos- Kimulot Changoi; Kapmusa-Kiplelji-Singorwet-Aisaik- Ndaraweta-Teganda; and Kapkwen-Kapsimotwo-Silibwet.

4.1.7.4.2. Energy access

The main sources of energy in the County are electricity and wood fuel with approximately 85% of households in the county using wood fuel for cooking compared to 68% at the national level.

Electricity coverage in the county is at 65% with all the market centers and 85% of learning institutions connected to the national grid. The current electrification level is at 23.6% of households and is expected to increase to 70% by the year 2020 through the Last Mile Programme (LMP) connectivity.

4.1.7.4.3. Solid waste management facilities

There is no sanitary landfill/designated dumping site in Bomet town or the other major urban centers including Sotik, Silibwet, Sigor, Mogogosiek, Longisa and Chebunyo. Solid waste collection and management in these centers is still basic, and illegal dumping around open areas is rampant. Solid wastes are observed to be littered along the streets, market places, roads and drainage channels. In the recent past however, the County Government has procured and installed litter bins around Bomet town in an effort to address the waste management problem. A 10-acre piece of land has also been identified in Bomet town for use in solid waste management activities.

Table 4-5 Main mode of solid waste disposal (%) at County and sub-county levels

	Conventional Households	Collected by County Government	Collected by Community Association (CBOs Youth Groups Faith based organizations)	Collected by private company	Dumped in the compound	Dumped in the street/ Vacant plot / Drain/ Waterways	Dumped in the Latrine	Burnt in open	Buried	Compost pit	Burnt in a pit
Bomet	187,230	2.1	0.1	2.5	2.2	0.2	2.8	44.8	1.9	5.7	37.8
Bomet East	29,897	1.4	0.1	0	1.4	0.1	3.1	57.3	2	4.5	30.1
Chepalungu	33,850	0.1	0	0	0.3	0	1.4	45.2	0.8	1.2	51.1
Konoin	38,123	1	0	11	3.9	0.1	2.1	33.5	3.6	16.4	28.3
Sotik	47,265	1.9	0.2	0.7	2.4	0.4	3.6	48.3	1.6	3.2	37.6
Bomet Central	38,095	5.8	0.2	0.3	2.2	0.1	3.5	41.7	1.6	3.1	41.6

4.1.7.4.4. Water supply and access

Access to safe and clean water is still low in the County. In 2019, 35% of Bomet County residents used improved sources of water, with the rest relying on unimproved sources. Improved sources of water comprised protected spring, protected well, borehole, piped into dwelling, piped and rain water collection, while unimproved sources included pond, dam, lake, stream/river, unprotected spring, unprotected well, jabia, water vendor and others.

The County Government, NGOs and various communities have established water supply schemes to improve access to clean water. Bomet Water Company Limited, a semi-autonomous government agency of the County Government, currently manages nine (9) water supply schemes. These are Itare, Sotik, Bomet, Longisa, Sigor, Chepalungu (Olbutyo), Kamureito, Ndanai and Sergutiet. There are also several community water projects supported mainly by the County Government, national institutions such as Water Service Trust Fund (WSTF) and State Department of Water, and other development partners e.g. African Development Bank (AfDB).

Table 4-6 Main source of drinking water (%) at County and Sub-County levels

	Conventional Households	Pond	Dam/ Lake	Stream/ River	Protected Spring	Unprotected Spring	Protected Well	Unprotected Well	Borehole/ Tube well	Piped into dwelling	Piped to yard/ Plot	Bottled water	Rain harvested water	Water Vendor	Public tap/ Standpipe	Not Stated
Bomet	187,230	7.7	4.2	40.1	5.8	5.4	2.4	1.8	2	5	5.7	0.3	13.8	1.5	4.3	0
Bomet East	29,897	2.5	4.3	51.2	9.2	6.8	3.2	2	3.8	1.4	1.3	0.4	9.3	1.1	3.5	0
Chepalungu	33,850	25.2	8.3	22.5	3.2	3.9	1	3.3	0.2	2.3	6.5	0.1	15.1	0.7	7.6	0
Konoin	38,123	0.3	0.3	48.4	5.1	3.9	2.3	0.5	1.7	16.8	9.2	0.1	5.3	0.5	5.7	0
Sotik	47,265	8.9	6.3	31.1	5.6	6.7	2.3	2.7	2.1	1.2	4.2	0.3	24.8	1.6	2.2	0
Bomet Central	38,095	2.2	2	49.9	6.4	5.4	3.1	0.6	2.4	2.9	6.8	0.6	11.2	3.1	3.4	0

4.1.7.4.5. Sanitation

In 2019, 86% of Bomet County residents used improved sanitation, while the rest used unimproved sanitation. Improved sanitation included use of main sewer, septic tank, cess pool, VIP latrine or pit latrine for human waste disposal, while unimproved sanitation included use of uncovered pit latrines, bucket, bush or other means for human waste disposal.

At the household level, pit latrines are the most widely used of waste disposal, while septic tanks are mostly used by institutions and commercial developments in urban centers.

A new sewerage system has been constructed in Bomet town to convey and treat approximately 750 m³/day. The current network is comprised of 2kms of trunk sewers and 5kms of lateral sewers. The plan is to lay a sewer network to cover the entire town, and construct new systems for other towns of Sotik, Mogogosiok, Longisa and Mulot.

Table 4-7 Human Waste disposal methods (%) at County and sub-county levels

	Conventional Households	Main Sewer	Septic tank	Cess pool	VIP Latrine	Pit latrine covered	Pit Latrine uncovered	Bucket latrine	Open/ Bush	Bio-septic tank / Biodigester
Bomet	187,230	0.3	1.2	0.1	6.7	77.5	13	0.2	1	0.1
Bomet East	29,897	0	0.4	0	4.9	74.4	17.8	0.2	2.3	0
Chepalungu	33,850	0	0.2	0	2.8	84.1	11	0.4	1.6	0
Konoin	38,123	0.4	1.5	0.3	8.6	77.9	10.4	0.1	0.7	0.2
Sotik	47,265	0.2	1.3	0	7.4	78.3	12	0.2	0.5	0.2
Bomet Central	38,095	0.6	2.2	0.2	8.7	72.9	14.8	0.1	0.4	0.1

4.1.7.4.6. Health facilities

Bomet County has a referral hospital (Longisa County Referral Hospital), three sub-county hospitals, 19 health centres, 107 dispensaries and 39 community units. The County also has one outreach support through the Beyond Zero mobile clinic and one community outreach supported by Tenwek Mission Hospital.

The most prevalent diseases treated at these health facilities include malaria, respiratory tract infections, skin diseases and diarrhea.

4.1.7.5. Environmental Issues

The main environmental threats in the County include:

- Loss of biodiversity as a result of pressure from increasing population
- Erratic weather conditions and climate change
- Deforestation and encroachment on water catchment areas;
- Cultivation of river banks resulting in excessive siltation of rivers
- Landslides in some parts of Konoin sub-county
- Invasive noxious aquatic species such as e.g. *Salvinia molesta*
- Maize lethal necrosis disease
- In-door air pollution

4.2. Site-specific description

4.2.1. Topography and site drainage

The topography of the project area is hilly and ranges between 2315 at the highest point (Tiroto hill tank site), 2110m at the intake site in Mau Forest, to 1787 at the lowest point along the pipeline. The land slopes westwards in the upper sections, and south-westwards and southwards in the lower sections. Drainage of the project area is determined by topography, with rivers and streams forming a dendritic drainage pattern. These converge downstream, forming headwaters of the Mara River.

4.2.2. Land use

The surrounding land use in the project area is agricultural with on-farm settlements, and commercial establishments at trading centres. Other land uses include medical and learning institutions, agro-processing industries, and quarrying of sand and rock around hillsides.

4.2.3. Vegetation

Vegetation of the project area outside Mau Forest is mostly comprised of crops and farm woodlots except along the riparian areas of Nyangores River where natural vegetation is found.

Common tree species found in the project area include *Cupressus lusitanica*, *Pinus* sp, *Podocarpus* sp, *Eucalyptus* sp, *Croton* sp, *Acacia mearnsii*, *Cordia* sp and *Jacaranda mimosifolia*. Some invasive species such as *Solanum incanum* and *Lantana camara* have also colonised disturbed areas.

4.2.3.1. Biodiversity in Mau Forest (Trans-Mara forest block)

The Trans-Mara forest block of Mau Forest Complex covers c.35,270Ha of indigenous forest and forms the catchment for Nyangores River. The forest block borders the larger South West Mau Forest to the North and Olposimoru and Maasai Mau to the south-east. It is part of the upper catchment of Mara River as many tributaries that feed into the Nyangores River start from the forest.

The forest block provides ecological and hydrological services and supports a wide array of floral and faunal species. The forest also plays watershed regulation functions including soil conservation - control of siltation and sedimentation (The forest plays an important role in preventing sedimentation of Lake Victoria); water flow regulation (flood and storm protection); and water quality regulation - including nutrient outflow (LVBCS, 2011).

A total of 64 tree species, 38 shrubs, 46 climbers and 132 herbaceous species have been recorded in the forest. The forest has four distinct vegetation zones: the bamboo *Arundinaria alpina* zone; mixed bamboo/forest transition; relatively closed canopy forest zone of *Podocarpus latifolius*, *Prunus africana*, *Albizia gummifera* and *Olea capensis* species; and open canopy zone of *Neoboutonia macrocalyx*.

The character of the forest at lower altitudes was substantially changed by extensive and destructive logging that took place from 1979 to 1986. Dominant large timber trees once included species such as *Polyscias kikuyuensis*, *Albizia gummifera* and *Olea hochstetteri*, but few specimens of these or other timber species now remain (Bennun, 1991). Timber removal near the forest boundary left little high canopy cover. There has however been substantial regrowth of non-timber species such as *Neoboutonia macrocalyx* and *Tabernaemontana stapfiana*. Removal of the canopy trees in many places resulted in a dense and tangled undergrowth layer, dominated by *Mimulopsis* sp. and *Piper capense* giving way to *Acanthus eminens* at higher altitudes. In damper sites, especially valley bottoms, *Brilliantiasia* is common in the understory and extensive stands of tree ferns *Cyathea manniana* also occur (Bennun, 1991).

Vertebral fauna species found in the Forest include spotted hyena; leopards; rare golden cat; yellow backed duiker; bongo; elephants; forest primates such as the red-tailed blue monkey, bush babies, and white and black colobus monkeys. The forest also has a rich and diverse invertebrate fauna. A total of 29 orders have been identified. Over 200 species of butterflies are found in the forest, at least 20 of which are known to be forest dependent species.

The Forest also has a rich diversity of bird fauna. A total of 49 of Kenya's 67 Afro-tropical highland bird species are known to occur in the forest, including the grey-throated Barbet, bush Shrike, equatorial Akalat, red-chested Owlet, banded Prinia and black-faced rufous Warbler. Of these bird species, 11 are listed in CITES I and II category, including the Verreaux eagle, Amani sunbird and Taita thrush. Others include regional endemic species, such as Hartlaubs turaco, the restricted range Hunter's Cisticola and Jackson's Francolin (LVBCS, 2011). Bennun in his survey recorded 92 species within the Trans-Mara forest block, of which 82% were forest or forest-edge birds.

4.2.4. Air quality

A qualitative assessment of the ambient air in the project area was carried out by identifying the potential sources of pollution. These were found to be mainly farmlands in the project area which generate dust when left bare after crop harvests, as the loose topsoil is exposed to winds. This is a significant source of dust especially in the dry season when ploughing of fields also takes place. Other sources of dust include the scattered sand and stone quarries mainly around hillsides, and local earth/murram roads.

4.2.5. Water quality

Historical studies by researchers in the project area (from sampling at the Silibwet bridge) indicated that the water quality of Nyangores River was generally good with low conductivity at 0.066mS/cm, Dissolved Oxygen levels above 82% average Turbidity of 28NTU, and a sediment load of 32.6mg/L (WRMA, 2016).

4.2.6. Socioeconomic profile

The socioeconomic profile of the community in the project area was obtained through questionnaire administration to a sample of the population in the towns/trading centres of Mulot, Ndarawetta, Cheboin, Longisa, Sigor and Mugango.

Information on gender, age, marital status, education, religion, sources of income, energy sources, water sources among other variables was obtained from the respondents.

4.2.6.1. Gender of the respondents

Of the sampled population 56% (73No) were male and 44%(57No) were female.

4.2.6.2. Age of the respondents

Of the interviewed respondents 23%(30No) were aged between 18-28 years,30%(40No) were between 29-38 years, 27%(36No) were between 39-49 years, 10%(12No) were between 49-58 years, 6% (8No) were between 59-68 years, 2% (2No) were between 69-78 years, 2% (2No) were over 79 years of age.

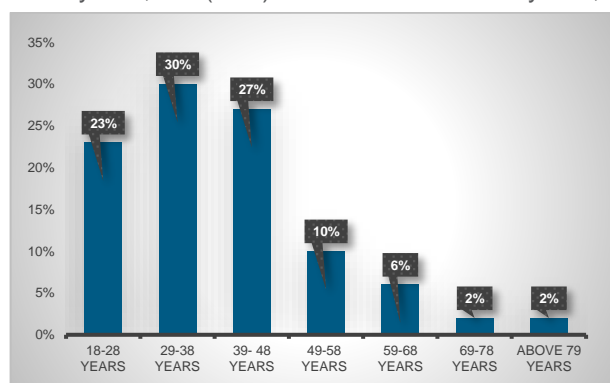


Figure 4-5 Age of the respondents

4.2.6.3. Education level of the respondents

Of the interviewed respondents, 5%(7No) never attended school,19%(25No) have up to primary school level education, 39%(51No) have up to secondary school level of education, 26%(34No) have college level of education and 10% (13No) had attained university education.

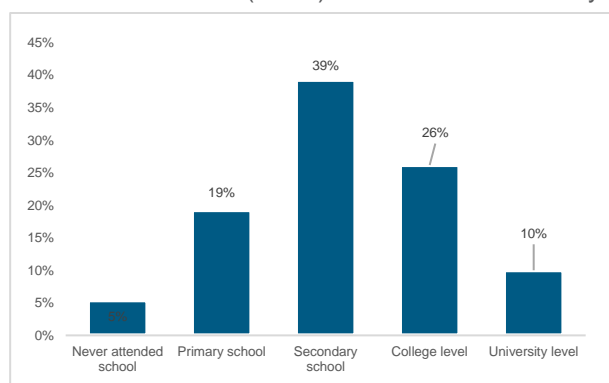


Figure 4-6 Education level of respondents

4.2.6.4. Marital status of the respondents

78%(102No) of the respondents were married,16%(21No) were single, 5%(6No) were widowed and 1%(1No) was divorced.

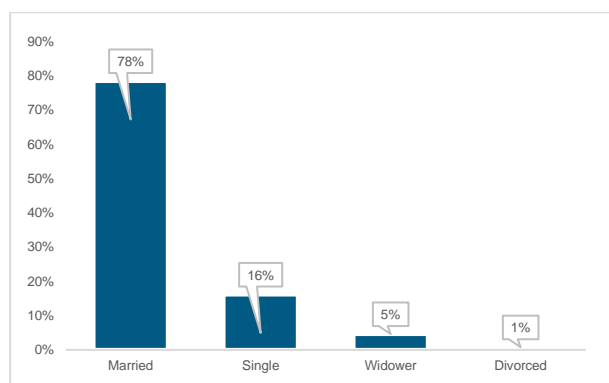


Figure 4-7 Marital status of the respondents

4.2.6.5. Religious affiliation

96%(125No) of the respondents are Christian,1%(1No) are of indigenous religion and 3%(4No) are Muslims.

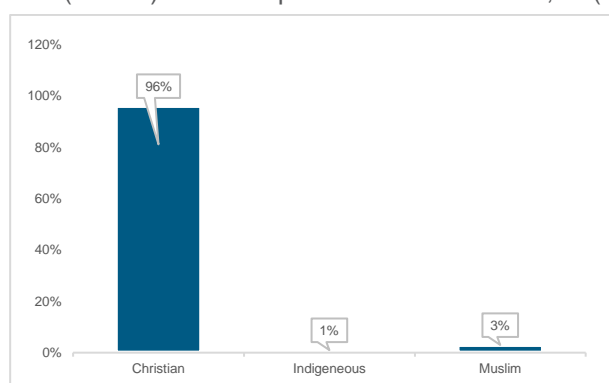


Figure 4-8 Religious affiliation of the respondents

4.2.6.6. Main source of income

From the population sampled, 50%(65No) practice farming as their main source of livelihood,13% (17No) depend on formal employment as their main source of livelihood, 26%(35No) were self -employed, 2%(1No) depended on livestock keeping,1%(1No) depend on sand harvesting 8%(11No) depend on both employment and farming as their source of livelihood.

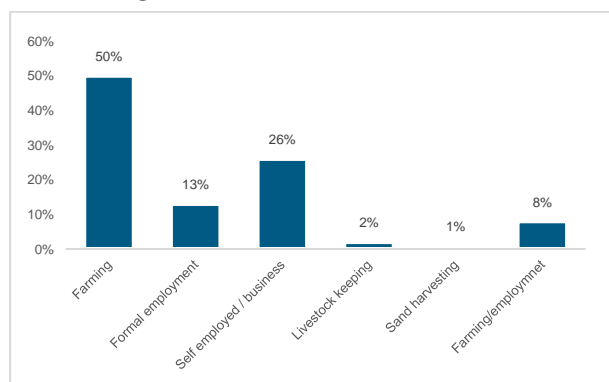


Figure 4-9 Livelihood activities of the respondents

4.2.6.7. Energy sources for lighting

From the population sampled 22%(29No) depend on electricity for lighting, 7%(6No) paraffin lantern, 64%(85No) depend on solar, 25(3No) depend on candle, 5%(7No) depend on paraffin lanterns and solar as a source of lighting.

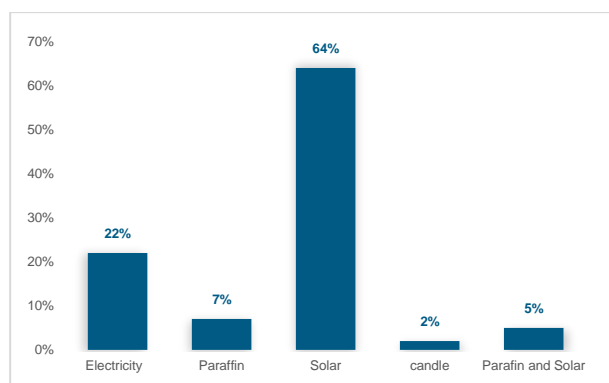


Figure 4-10 Sources of energy for lighting

4.2.6.8. Energy sources for cooking

Of the population sampled, 90%(118No) depended on firewood, 3%(3No) depend on charcoal, 3%(3No) depend on LPG gas and 4%(6No) depend on bio gas.

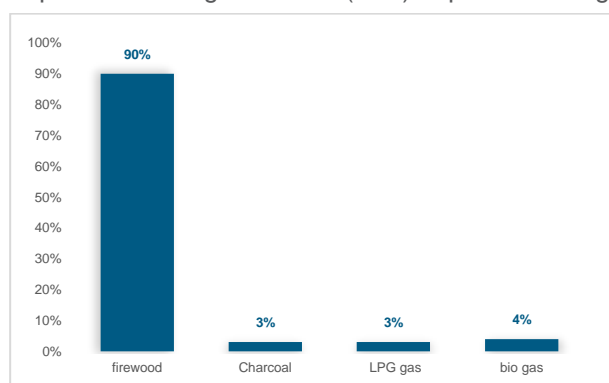


Figure 4-11 Respondents sources of cooking energy

4.2.6.9. Access to health facilities

From the study, it was established that 83%(108No) attend public health facilities, 15%(20No) attend private hospitals, and 2%(2No) visit a chemist.

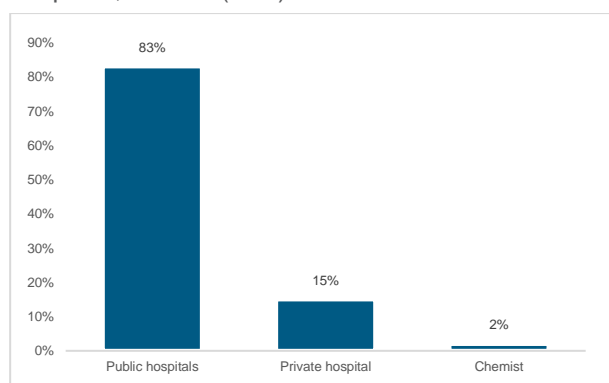


Figure 4-12 Respondent's access to health facility

4.2.6.10. Distance covered to access health facility

From the study it was established that 28% (36No) travel for less than 1km, 56%(72No) travel for 1-5km, 10%(11No) travel 6-10 km, and 8%(11No) travel 11-20km to a health facility.

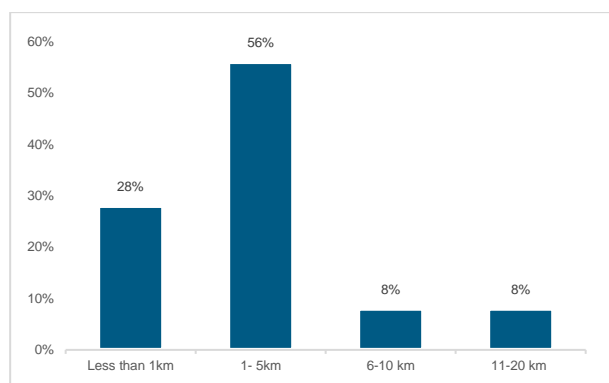


Figure 4-13 Respondent's access to health facility

4.2.6.11. Water sources

The study established that 70%(92No) of the population depends on rivers/streams, 18%(23No) depend on rain water harvesting, 2%(2No) have access to piped water, 2%(3No) depend on water vendors, 2%(2No) depend on shallow wells, and 6%(8No) depend on both rivers and rain water.

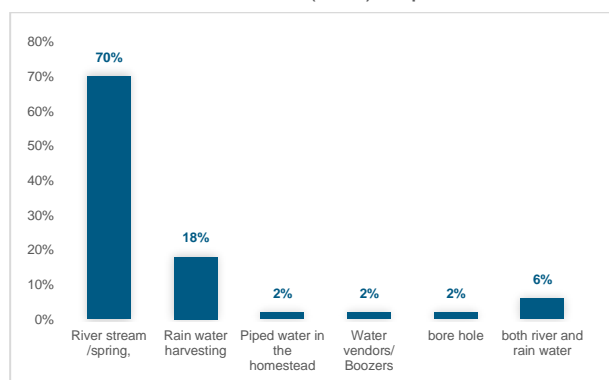


Figure 4-14 Sources of water

4.2.6.12. Distance travelled to access water

From the study, it was established that 42%(54No) travel for less than 1km to access water, 50% (66No) travel for less than 5 km, 8%(10No) travel for 6-10km.

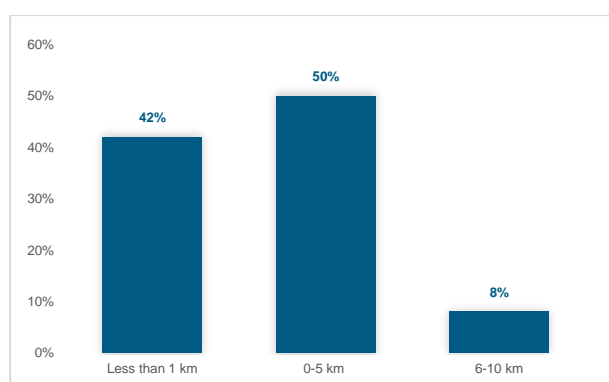


Figure 4-15 Distance travelled in search of water

4.2.6.13. Amount paid for water in a month

From the study it was established that 78%(102No) do not pay for the water, 6%(8No) spend KES 501-1,000, 5%(6No) spend KES 51-100, 5%(7No) spend KES 101-200, 3%(4No) spend KES 201-500 and 3%(3No) spend over KES1,000.

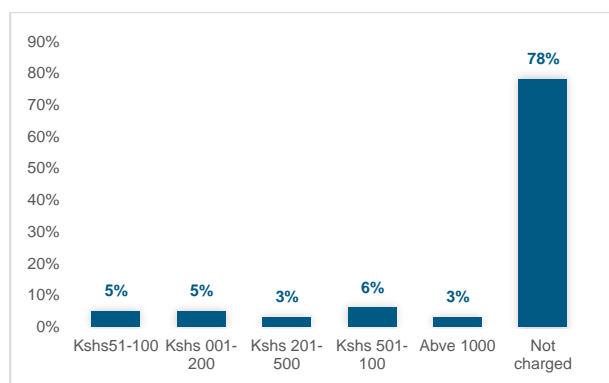


Figure 4-16 Amount charged for water in a month

4.2.6.14. Treatment of water consumed

From the study, it was established that 52%(68No) respondents do not treat the water at all to ensure the safety of the water consumed, 27%(34No) of the population sieves the water, 10%(13No) add chlorine, 5%(7No) boil and 6%(8No) wait for the water to settle.

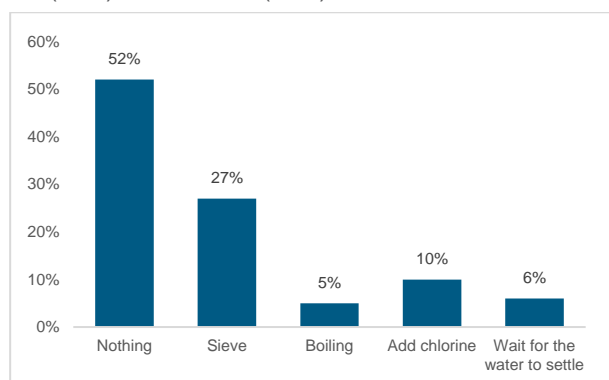


Figure 4-17 Water treatment methods

4.2.6.15. Willingness to pay for the water after project completion

From the survey, it was established that 94%(122No) of the population were willing to pay for the water once they get connected and 6%(8No) were not willing to pay for the water.

4.2.6.16. Sanitation

From the study it was established that 93% (121No) of the population owned a toilet as sanitation facility and 7%(9No) did not have sanitation facilities in their households.

4.2.6.17. Type of sanitation facility

From the study, it was established that 85%(111No) of the population owned pit latrines and 8%(10No) owned flush-toilets. However, 7% (9No) did not have sanitation facilities.

4.2.6.18. Waste disposal methods

From the study, it was established that 53%(70No) bury or burn their trash, 38%(49No) throw waste in compost pits, 2%(2No) accumulate for collection by the municipal council, 6%(8No) dispose by the road side/path, and 1%(1No) throw behind the house.

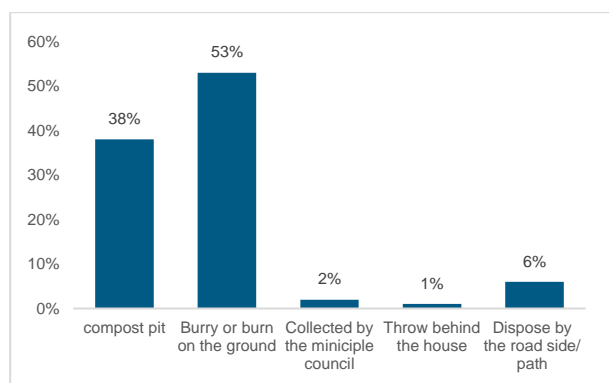


Figure 4-18 Waste disposal methods

4.2.6.19. HIV/AIDS Knowledge and testing

From the study it was established that 94%(122No) of the respondents were aware of HIV/AIDS, 6% (8 No) were not aware of HIV/AIDS. It was also established that 83% (108No) had taken a HIV/AIDS test and 17%(22No) had never taken a HIV/AIDS test.

4.2.6.20. Methods used to protect against HIV/AIDS and other STIs

From the study it was established that 20%(26No) use condoms, 24%(31No) abstain, and 56%(73No) are faithful to one partner.

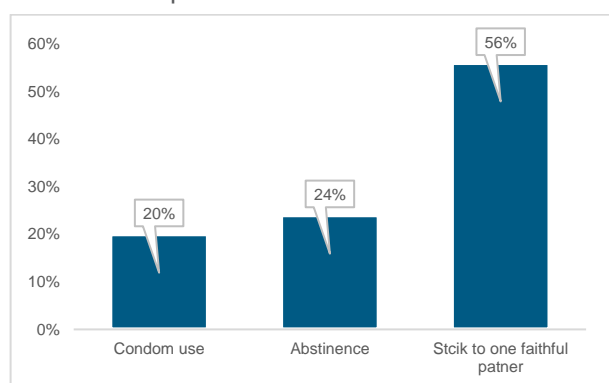


Figure 4-19 Methods used to protect against HIV/AIDS and other STIs

4.2.6.21. Other Projects utilising Nyangores River

From the study, it was established that other projects also abstract water from Nyangores River. These include:

- Tenwek Hospital;
- Mogombet Community Water Project;
- Kapcheruch Community Water project;
- Tirgaga Tea Factory;
- Mutigo Tea Factory; and
- Stegro Sacco Tea Factory

4.2.6.22. Community use of Nyangores River

The community makes use of Nyangores River in various ways including:

- Irrigation farming;
- Fetching water for domestic use;
- Fishing activities;
- Forecasting of the rainy seasons;
- Setting up of tree nurseries; and

- Swimming

4.2.6.23. Features of cultural significance along Nyangores River

There are several features of cultural significance along Nyangores River in the project area. These include:

- There are initiation ceremonies that take place along the river;
- Religious groups baptise their members in the river; and
- There is a water fall that attracts tourists to the area

4.2.6.24. Challenges faced while using Nyangores River

From the study, some of the challenges cited include nuisance and pollution by solid waste, washing of cars and clothes in the river, soil erosion and odour.

5. Policy, legal and regulatory framework

5.1. Introduction

This section provides an initial review of the policy, legal and regulatory framework relevant to The Project. It identifies the most pertinent policies, legislation, regulations and standards governing the anticipated activities in implementation of The Project.

Development interventions, whether past, present or proposed pose various environmental and social challenges. The challenges include environmental degradation such as pollution (of air, soil and water resources) loss of biodiversity, habitat and ecosystem services, climate change, involuntary resettlement and/or livelihoods disruption.

In recognition of these challenges, the Government of Kenya has put in place a wide range of policy and legal frameworks to ensure environmental protection and conservation in development or any other activity. These are all anchored in the Constitution of Kenya which obligates the government to ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, protect genetic resources and biological diversity, and establish systems of environmental impact assessment. The constitution also gives effect to the general rules of international law, and any treaty or convention ratified by Kenya.

The single-most significant framework legislation governing environmental protection is the Environmental Management and Coordination Act (EMCA), 1999, and the Amendment Act of 2015. The Act provides for the establishment of an appropriate legal and institutional framework for the management of the environment and related matters. This includes: establishment of the Authority (NEMA) responsible for supervision and co-ordination of all matters relating to the environment; requirements for the preparation of National and County Action Plans; measures for the protection and conservation of various aspects of the environment; environmental quality standards, among other issues.

The Act also provides for Environmental Impact Assessment (EIA) of all types of development projects listed in the Second Schedule to ensure that the associated potential environmental and social impacts are identified, and that appropriate mitigation measures are developed for adverse impacts.

Infrastructure projects including water abstraction works and water supply and distribution infrastructure are listed in the Schedule as Medium Risk projects for which an intermediate level of assessment shall be undertaken.

The key policy and legal instruments and institutional framework relevant to the proposed project are outlined in the tables below:

5.2. Policies, strategies and action plans

Table 5-1 Summary of applicable, strategies and action plans

Policy, Plan or Strategy	Relevant environmental obligations
The Constitution of Kenya, 2010	<p>Article 42 – Supporting public involvement in ensuring the rights to a clean and healthy environment.</p> <p>Article 43 – Supporting public involvement in ensuring the need for every person to have access to clean and safe water in adequate quantities,</p> <p>Article 69 - Environment and natural resources</p> <p>(1) (d) Encouraging public participation in the management, protection and conservation of the environment</p> <p>(f) Supporting environmental impact assessment, environmental audit and monitoring of the environment</p> <p>(g) Eliminating processes and activities that are likely to endanger the environment; and</p> <p>Article 66 – Regulating use of any land or any interest or right over any land, in the interest of public health or public planning</p> <p>Article 185:</p>

Policy, Plan or Strategy	Relevant environmental obligations
	22 - Protection of the environment and natural resources with a view to establishing a durable and sustainable system of development
Vision 2030	<p>The Vision for the water and sanitation sector is “to ensure water and improved sanitation availability and access to all by 2030”. Kenya is a water-scarce country with renewable fresh water per capita at 647 m³ against the United Nations recommended minimum of 1,000 m³.</p> <p>The water strategy aims to intensify Kenya’s access to safe water and better sanitation using the national network of water services boards (now changed to water works development agencies), and the private sector, where necessary. The water programmes will integrate both water and sanitation components, thereby ensuring simultaneous development of water and sanitation with the right pricing. This is expected to bring individual and social benefits that will outweigh the investment costs</p>
National Climate Change Response Strategy (NCCRS) 2009	Relevant national strategic actions include ensuring that all new infrastructure is climate-proof over its lifespan
National Environment Action Plan (NEAP) 2009-2013	<p>All development sectors expected to support the following environmental interventions: -</p> <ul style="list-style-type: none"> • Enhancing the protection of wildlife resources • Reforestation and conservation of water catchment areas • Protection of flora & fauna • Ensuring protection of water catchments • Supporting soil erosion and siltation control • Management of invasive alien species • Promoting efficient water harvesting and storage • Controlling of fire outbreaks
National Biodiversity Strategy and Action Plan (NBSAP) 2000	<p>Protection of important biodiversity areas and hotspots</p> <p>Other activities include adopting best practices in conservation and management of natural resources</p>
National Spatial Plan 2015-2045	Preventing the pollution of rivers due to urban and industrial waste disposal which reduces water quality leading to loss of biodiversity through deaths of aquatic plants and animals. Most of the affected rivers are those that flow within the commercial and residential areas. Water bodies also face a constant danger of siltation following increased soil erosion especially during rainy seasons
Bomet County Integrated Development Plan, 2018-2022	<p>The CIDP outlines the County Government’s Vision in Water, Sanitation and Environment which is the Sustainable development and management of environment and natural resources. The County Government’s mission is to develop, conserve, utilize, protect and sustainably manage water, environment and natural resources for improved livelihoods for the people of Bomet County</p> <p>The CIDP also identifies the County’s development priorities and strategies which include:</p> <ul style="list-style-type: none"> • Resolving the County’s perennial water problems and enhancement of access to clean water; • Protection of wetlands and rivers, and acquiring water-treatment technologies in line with Goal 6 of the SDGs
Sessional Paper No. 10 of 2014 on the National Environment Policy	<ul style="list-style-type: none"> • Increasing tree cover • Rehabilitation and restoration of degraded forest ecosystems and water catchment areas

Policy, Plan or Strategy	Relevant environmental obligations
	<ul style="list-style-type: none"> • Sustainable use of freshwater and wetland resources and the conservation of river and lake ecosystems • Rehabilitation and restoration of degraded wetlands, riverbanks and lakeshores • Sustainable use of marine resources and the conservation of vulnerable coastal ecosystems • Appropriate land use planning and watershed management practices for sustainable development of mountain ecosystems • Implementing the National Biodiversity Strategy and Action Plan (NBSAP) • Protecting, conserving and improving the habitats, corridors and wildlife dispersal areas • Protect endangered wildlife species • Protecting fish breeding grounds • Promoting adaptation of the cleaner production concept in all energy production and consumption activities • Early warning and awareness on disasters • Empowering communities in disaster risk reduction • Improving the management and conservation of water supply sources • Maintaining an inventory of sources, types and quantities of radioactive materials, periodically monitor status and trends and enhance protection measures • Strengthening capacities for handling and management of radio-active waste
Sessional Paper No. 1 of 1999 on National Policy on Water Resources Management & Development	<ul style="list-style-type: none"> • Preserve, conserve and protect available water resources • Reducing the upstream-downstream impacts of development on water resources
National Water Policy (2012)	<ul style="list-style-type: none"> • Increased per capita water availability above the international benchmark of 1000 m³ by 2030 • Water pollution control • Public participation in water resources management
Sessional Paper No. 3 of 2009 on National Land Policy	<ul style="list-style-type: none"> • Protection of watersheds, lakes, drainage basins and wetlands • Ensuring that all land uses, and practices conform to land use plans and the principles of biodiversity protection, conservation and sustainable development
Sessional Paper No. 1 of 2017 on National Land Use Policy	<ul style="list-style-type: none"> • Prohibiting settlement and other activities within sensitive ecological zones • Conserving all areas of those habitats where only less than 20% of original cover is remaining • Securing wildlife dispersal and migratory corridors • Protection and sustainable utilization of inland water bodies
National Wetlands Conservation and Management Policy, 2014	<ul style="list-style-type: none"> • Prevention of reclamation, alteration and conversion of wetlands • Prevention of wetland pollution
Sessional Paper No. 3 of 2016 on National Climate Change Framework Policy	Mainstreaming low carbon growth options

Policy, Plan or Strategy	Relevant environmental obligations
The National Climate Change Action Plan (NCCAP) 2018 -2022	<ul style="list-style-type: none"> The plan aims to further Kenya's development goals by providing mechanisms and measures to achieve low carbon climate resilient development in a manner that prioritizes adaptation The plan seeks to provide a framework for mainstreaming climate change into sector functions at the national and county level; align climate change actions with the Government's development agenda, including the Big Four; Encourage participation of the private sector, civil society, and vulnerable groups within society, including women, older members of society, persons with disabilities, children, youth, and members of minority or marginalized communities; and provide the framework to deliver Kenya's Nationally Determined Contribution (NDC) for the five-year period 2018-2022 The plan proposes Climate proofing of infrastructure through use of climate information in infrastructure planning
National Policy on Occupational Safety and Health, 2012	<ul style="list-style-type: none"> Affirmative action for addressing workplace gender biases in occupational safety and health Develop and implement workplace code of practice on HIV and AIDS at work Develop guidelines for provision of facilities for persons with disabilities and other special needs in workplaces Prevention of environmental pollution
National HIV Policy (GoK, 1997)	Ensuring that new development projects especially in the rural areas encourage preventive and responsible behaviour both for the workers involved in such projects and also the local people within which projects are taking place as a goal towards curtailing the spread of the disease
National Gender and Development Policy, 2000	<p>Considering the needs and aspirations of all Kenyan men, women, boys and girls across economic, social and cultural lines</p> <p>Ensuring the empowerment of women</p>
National Solid Waste Management Strategy, NEMA, 2014	The Strategy establishes a common platform for action between stakeholders to systematically improve waste management. It introduces a new approach for improved waste management in Kenya to create wealth, employment and reduce pollution of the environment

5.3. Kenyan laws and regulations

The Table below summarises the Kenyan laws and regulations relevant to this project.

Table 5-2 Summary of applicable Kenyan Legislation

Legal Instrument	Requirements
The Environment Management and Co-ordination Act, 1999	<ul style="list-style-type: none"> Provides for protection and conservation of the environment, Provides for the carrying out of an environmental impact assessment of a proposed project with issuance of an EIA License Provides for environmental auditing and monitoring during implementation/operation of a project
Environmental Management and Coordination (Amendment) Act 2015 (<i>legal Notice No 5 of 2015</i>) Legal Notice No 150 of 2016 on the EMCA Legal Notice No 31 of April 2019 on the EMCA	<ul style="list-style-type: none"> Provides for an EIA of a proposed development project before implementation; Categorises infrastructure projects including water abstraction works, water supply and distribution infrastructure as Medium Risk projects for which an intermediate level of assessment shall be undertaken;

Legal Instrument	Requirements																														
Environmental Impact Assessment Guidelines and administrative procedures, 2002	<ul style="list-style-type: none"> • The guidelines provide the steps in implementation of an EIA, Monitoring and Environmental Audit • Provides for screening of the proposed development activity and preparation of a Project Report • Provides for carrying out of an EIA Study where a Project will have significant environmental impacts and the Project Report does not disclose adequate mitigation measures • Provides for scoping studies and preparation of ToRs where an EIA study is to be carried out • Provides for the contents/format of an EIA Study Report 																														
Environmental (Impact Assessment and Audit) Regulations 2003 (<i>Legal Notice No. 101 of 2003</i>) <i>Legal Notice No 32 of April 2019 – Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019</i>	<ul style="list-style-type: none"> • Provides that a project for which an EIA is required shall not be implemented unless the EIA has been concluded and approved • Provides that the EIA shall be conducted in accordance with the general EIA guidelines developed • Provides that an EIA study shall: <ul style="list-style-type: none"> - identify anticipated impacts of the project and scale of impacts - Identify and analyse alternatives to the project - Propose mitigation measures to be taken during and after implementation of the project - Develop an environmental management plan with mechanisms for monitoring and evaluating the compliance and environmental performance. It shall include the cost of mitigation measures and timeframe of implementation • Provides for integration of climate change vulnerability assessment and relevant adaptation and mitigation actions 																														
Environmental Management and Coordination (Water Quality) Regulations, 2006 (<i>Legal Notice No. 120 of 2006</i>)	<ul style="list-style-type: none"> • Provides for protection of sources of water through prevention of water pollution • Provides that an EIA shall be carried out and license obtained to abstract water or carry out activities that may have adverse impacts on the quantity or quality of water in lakes, rivers, streams, springs and wells • Provides the water quality standards for sources of domestic water. <table border="1"> <thead> <tr> <th>Parameter</th><th>Guide Value (Max. allowable)</th></tr> </thead> <tbody> <tr> <td>pH</td><td>6.5 – 8.5</td></tr> <tr> <td>Suspended solids</td><td>30 (mg/l)</td></tr> <tr> <td>Nitrate – NO₃</td><td>10 (mg/l)</td></tr> <tr> <td>Ammonia – NH₃</td><td>0.5 (mg/l)</td></tr> <tr> <td>Nitrite – NO₂</td><td>3 (mg/l)</td></tr> <tr> <td>Total dissolved solids</td><td>1200 (mg/l)</td></tr> <tr> <td><i>E. coli</i></td><td>Nil/100ml</td></tr> <tr> <td>Fluoride</td><td>1.5 (mg/l)</td></tr> <tr> <td>Phenols</td><td>Nil (mg/l)</td></tr> <tr> <td>Arsenic</td><td>0.01 (mg/l)</td></tr> <tr> <td>Cadmium</td><td>0.01 (mg/l)</td></tr> <tr> <td>Lead</td><td>0.05 (mg/l)</td></tr> <tr> <td>Selenium</td><td>0.01 (mg/l)</td></tr> <tr> <td>Copper</td><td>0.05 (mg/l)</td></tr> </tbody> </table> 	Parameter	Guide Value (Max. allowable)	pH	6.5 – 8.5	Suspended solids	30 (mg/l)	Nitrate – NO ₃	10 (mg/l)	Ammonia – NH ₃	0.5 (mg/l)	Nitrite – NO ₂	3 (mg/l)	Total dissolved solids	1200 (mg/l)	<i>E. coli</i>	Nil/100ml	Fluoride	1.5 (mg/l)	Phenols	Nil (mg/l)	Arsenic	0.01 (mg/l)	Cadmium	0.01 (mg/l)	Lead	0.05 (mg/l)	Selenium	0.01 (mg/l)	Copper	0.05 (mg/l)
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Legal Instrument	Requirements	
	n-Hexane extracts (animal and vegetable fats) (mg/l)	30
	n-Hexane extracts (mineral oil) (mg/l)	5
	Oil and grease	Nil
	Organo-Phosphorus compounds (parathion, methyl parathion, methyl demeton and Ethyl parantropheryl phenylphosphorothroate, EPN only) (mg/l)	1.0
	Polychlorinated biphenyls, PCBs (mg/l)	0.003
	pH (Hydrogen ion activity----marine)	5.0-9.0
	pH (Hydrogen ion activity--non marine)	6.5-8.5
	Phenols (mg/l)	0.001
	Selenium (mg/l)	0.01
	Selenium and its compounds (mg/l)	0.1
	Hexavalent Chromium VI compounds (mg/l)	0.5
	Sulphide (mg/l)	0.1
	Simazine (mg/l)	0.03
	Total Suspended Solids, (mg/l)	30
	Tetrachloroethylene (mg/l)	0.1
	Thiobencarb (mg/l)	0.1
	Temperature (in degrees Celsius) based on ambient temperature	□ 3
	Thiram (mg/l)	0.06
	Total coliforms (counts /100 ml)	30
	Total Cyanogen (mg/l)	Nd
	Total Nickel (mg/l)	0.3
	Total Dissolved solids (mg/l)	1200
	Colour in Hazen Units (H.U)	15
	Detergents (mg/l)	Nil
	Total mercury (mg/l)	0.005
	Trichloroethylene (mg/l)	0.3
	Zinc (mg/l)	0.5
	Whole effluent toxicity	
	Total Phosphorus (mg/l)	2 Guideline value
	Total Nitrogen	2 Guideline value
Environmental Management and Coordination (Waste Management) Regulations, 2006 (<i>Legal Notice No. 121 of 2006</i>)	<ul style="list-style-type: none"> Provides for the proper handling, transportation and disposal of various types of wastes including hazardous wastes Provides that waste generators shall collect, segregate and dispose waste in an appropriate manner and implement measures to minimise waste generated Provides for application of a license to operate a waste disposal facility/site Application requires inclusion of County Planning Authority for the disposal site 	

Legal Instrument	Requirements																																																																									
Environmental Management and Coordination (Noise and Excessive vibration pollution) (Control) Regulations, 2009 (Legal Notice No. 61 of 2009)	<ul style="list-style-type: none">Prohibits the generation of unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environmentProvides for noise and excessive vibrations control for machinery, motor vehicle, construction equipment or other commercial/industrial activityProvides for noise and vibrations control during construction at night, and from demolition, mining or quarrying sitesProvides for application of a permit where a sound source is planned/installed in a manner to emit noise or vibrations at levels contravening the regulationsProvides for the maximum noise levels permissible in various environmental set ups such as residential areas, places of worship, commercial areas and mixed residential <table><tr><th colspan="2">Zone</th><th colspan="2">Sound Level Limits dB(A)</th><th colspan="2">Noise Rating Levels (NR)</th></tr><tr><th colspan="2"></th><th colspan="2">(Leq, 14h)</th><th colspan="2">(Leq, 14h)</th></tr><tr><th colspan="2"></th><th>Day</th><th>Night</th><th>Day</th><th>Night</th></tr><tr><td>A</td><td>Silent Zone</td><td>40</td><td>35</td><td>30</td><td>25</td></tr><tr><td>B</td><td>Places of worship</td><td>40</td><td>35</td><td>30</td><td>25</td></tr><tr><td rowspan="2">C</td><td>Residential: Indoor</td><td>45</td><td>35</td><td>35</td><td>25</td></tr><tr><td>Outdoor</td><td>50</td><td>35</td><td>40</td><td>25</td></tr><tr><td>D</td><td>Mixed residential (with some commercial & places of entertainment)</td><td>55</td><td>35</td><td>50</td><td>25</td></tr><tr><td>E</td><td>Commercial</td><td>60</td><td>35</td><td>55</td><td>25</td></tr></table> <ul style="list-style-type: none">Provides for the maximum noise levels permissible for construction sites <table><tr><th colspan="2">Facility</th><th colspan="2">Maximum Noise Level Permitted (Leq) in dB(A)</th></tr><tr><th colspan="2"></th><th>Day</th><th>Night</th></tr><tr><td>i</td><td>Health facilities, educational institutions, homes for disabled etc</td><td>60</td><td>35</td></tr><tr><td>ii</td><td>Residential</td><td>60</td><td>35</td></tr><tr><td>iii</td><td>Areas other than those prescribed in (i) and (ii)</td><td>75</td><td>65</td></tr></table>	Zone		Sound Level Limits dB(A)		Noise Rating Levels (NR)				(Leq, 14h)		(Leq, 14h)				Day	Night	Day	Night	A	Silent Zone	40	35	30	25	B	Places of worship	40	35	30	25	C	Residential: Indoor	45	35	35	25	Outdoor	50	35	40	25	D	Mixed residential (with some commercial & places of entertainment)	55	35	50	25	E	Commercial	60	35	55	25	Facility		Maximum Noise Level Permitted (Leq) in dB(A)				Day	Night	i	Health facilities, educational institutions, homes for disabled etc	60	35	ii	Residential	60	35	iii	Areas other than those prescribed in (i) and (ii)	75	65
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Environmental Management and Coordination (Controlled Substances) Regulations 2007 (Legal Notice No 73 of 2007)	<ul style="list-style-type: none">Provides for measures for storage, handling packaging and disposal of products with ozone-depleting substances including air conditioning and refrigeration equipment																																																																									
Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations, 2006	<ul style="list-style-type: none">Provides for emission standards for internal combustion engines including petrol-powered and diesel-powered motors																																																																									

Legal Instrument	Requirements
Environmental Management and Coordination (Air Quality) Regulations, 2014	<ul style="list-style-type: none"> • Provides for ambient air quality tolerance limits • Prohibits air pollution in a manner that exceeds specified levels • Prohibits air pollution in controlled areas including residential areas, hospitals, National Parks, reserves and sanctuaries, conservation areas and central business districts • Provides for air pollution monitoring of sites such as quarries, batching plants, etc • Provides for application of an emission license for a controlled facility • Provides for measures to prevent air pollution from stockpiles or handling of construction materials • Provides for installation of air pollution control systems where pollutants emitted exceed specified limits • Provides for the control of fugitive emissions within property boundary • Provides for the control of vehicular emissions • Provides for prevention of dispersion of visible particulate matter or dust from any material being transported
Public Health Act (Cap. 242)	<ul style="list-style-type: none"> • Provides for measures for the control of infectious diseases in buildings used for human habitation, spread of venereal diseases by employees • Provides for the prevention of the occurrence of nuisance or conditions dangerous/injurious to humans arising from erection or occupation of unhealthy dwellings/premises; or the erection of dwellings/ premises on unhealthy sites or on sites of insufficient extent, or from overcrowding • Provides for the prevention of nuisances such as wastes, accumulation of materials, dirty/untidy poorly ventilated and/or lit premises or other conditions injurious to human health
Physical Planning Act, 1996	<ul style="list-style-type: none"> • Provides for controls on the use and development of land and buildings in the interest of proper and orderly development of an area • Provides that a development application will be submitted along with an EIA Report
The Land Act, 2012	<ul style="list-style-type: none"> • Provides for methods of acquisition of title to land including compulsory acquisition where land is required for public purposes or in the public interest as related to and necessary for fulfilment of the stated public purpose • Provides for just compensation of persons whose interests in the land have been determined during compulsory acquisition • Provides for conservation of ecologically sensitive public land that has endangered or endemic species of flora and fauna, critical habitats or protected areas • Provides for the establishment of settlement programmes to provide access to land for persons displaced by development projects or other causes that may lead to movement and displacement • Provides for the creation of a public right of way • Provides for eviction of unlawful occupation of private, communal or public land giving at least three months' notice
Water Act, 2016	<ul style="list-style-type: none"> • Provides that every water resource is vested in and held by the national government in trust for the people of Kenya • Provides that a permit shall be required for any use of water from a water resource, especially where there is abstraction and use of water with the employment of works;

Legal Instrument	Requirements
	<ul style="list-style-type: none"> • Provides that a person shall not, without authority conferred under this Act throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource • Provides that a person shall not, without authorisation wilfully obstruct, interfere with, divert or obstruct water from any watercourse or any water resource, or negligently allow any such obstruction, interference, diversion or abstraction; • Provides that subject to the Land Act, 2012, land required for national public water works may be acquired in any manner provided by law for the acquisition of land for public purposes; • Provides that compensation on just terms shall be payable by the Government to the owner of the land on which any public water works are constructed. Consideration shall also be made on any benefit accruing to the land by the construction of the works and any adverse effect on the land caused by the works in assessing the amount of compensation payable
Occupational Safety and Health Act, 2007	<ul style="list-style-type: none"> • Provides for the safety, health and welfare of workers and all persons lawfully present at workplaces • Provides for the registration of workplaces • provides for maintenance of cleanliness of workplaces, adequate lighting and ventilation, provision of sanitary conveniences, • Outlines safety requirements in use of machinery to prevent accidents and injuries
The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005	<ul style="list-style-type: none"> • Rules provide for the maximum noise exposure levels for workers in places of work and for the provision of protective equipment for those exposed to high noise levels. • Provides that an occupier shall also institute noise reduction measures at the source of noise in the workplace • Provides for development of a noise prevention program where noise in a workplace exceeds the continuous equivalent of eighty-five dB(A)
The HIV and AIDS Prevention and Control Act, 2006	<ul style="list-style-type: none"> • Provides for basic information and instruction on HIV and AIDS prevention and control to employees of all Government Ministries, Departments, authorities and other agencies, and employees of private and informal sectors; • Prohibits compulsory testing for HIV as a precondition to, or for the continued enjoyment of employment • Provides that a person who is and is aware of being infected with HIV shall take all reasonable measures and precautions to prevent the transmission of HIV to others
Sexual Offences Act, 2006	<ul style="list-style-type: none"> • Identifies and prohibits sexual offences including rape, assault, indecent acts, defilement, harassment etc • Prohibits the deliberate transmission of HIV or any other life threatening sexually transmitted disease
The Energy Act 2019	<ul style="list-style-type: none"> • Provides for the preparation of a County Energy Plan outlining the County's energy requirements. The energy plans are to serve as a guide for energy infrastructure investments • Provides that National and County Governments shall facilitate the acquisition of land for energy infrastructure development in effort to promote energy investments, • Provides for the application of a license to generate, transmit and distribute electrical energy

Legal Instrument	Requirements
	<ul style="list-style-type: none"> • Provides that a person may develop energy infrastructure on, through, over, or under any public, community or private land subject to the provisions of this Act. The person shall seek the prior consent of the owner of such land, which consent shall not be unreasonably withheld • Provides that a licensee may erect, install or lay any electric supply lines, or other infrastructure in, through, upon, under, over or across any public street, road, railway, tramway, river, canal, harbour or Government property, including forests, National parks, reserves and heritage sites, in the manner and on the conditions as provided in the Act and any other relevant law for the purpose of the production, conveyance and supply of energy • Provides for the lopping of vegetation which obstructs or interferes with the construction by a licensee of any energy infrastructure, or interferes or is likely to interfere with the maintenance or working of any such infrastructure
The Climate Change Act 2016	<ul style="list-style-type: none"> • Provides for mechanisms and measures to achieve low carbon development for the sustainable development of Kenya • Provides for mainstreaming of climate change responses into development planning, decision making and implementation • Provides that a National Climate Change Action Plan shall be developed to guide private and public actors in achievement of these and other related purposes • Provides that state departments and national government public entities shall integrate the climate change action plan into sectoral strategies, action plans and other implementation projections for the assigned legislative and policy functions • The Act mandates NEMA to integrate climate risk and vulnerability assessment into all forms of assessment
Water Resource Management Rules 2007	<ul style="list-style-type: none"> • Provides for application and approval by WRA to abstract water from a river. • Provides that an application to abstract water shall be accompanied by a hydrological assessment report. • Provides for payment of Water Use charges on the basis of water abstracted; • Provides that for streams and rivers, the Reserve Quantity shall not be less than the flow value that is exceeded 95% of the time as measured by a naturalised flow duration curve at any point along the water course. This is where water resource records are available; • Where water resource records are not available or where there are significant ambiguities, the Reserve shall be guided by ecological vulnerability; vulnerability of local populations dependant on that water resource; local observations with respect to the naturalised flows or water levels of minimum values observed during periods of prolonged droughts; the to ensure perennial flow for perennial rivers; and consultations with the water resource users associations; • Provides that no person shall discharge or apply any poisonous, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit any person to dump or discharge such matter into any water resource unless the discharge of such poisonous, toxic, noxious or obstructing matter, radioactive waste or pollutant is treated to permissible standards as authorized by the Authority • Provides that No person shall: <ul style="list-style-type: none"> - Discharge effluent into a water resource without a valid discharge permit issued by the Authority. - Discharge wastewater or effluent, which does not meet the water quality requirements stipulated in the effluent discharge permit.

Legal Instrument	Requirements																																								
	<ul style="list-style-type: none"> - Generate and discharge effluent onto land or into any water resource without compliance with an approved Effluent Discharge Control Plan. • Provides for an application for water resource use with respect to an effluent discharge point • Provides for maintenance of records of all water discharged giving the date, time quality, quantity and methods of discharge • Provides Guidelines for Effluent Discharge into surface water resources <table border="1"> <thead> <tr> <th>Parameter</th><th>Max Allowable (Limits)</th></tr> </thead> <tbody> <tr> <td>Arsenic as As (mg/1)</td><td>0.1</td></tr> <tr> <td>Biochemical Oxygen Demand (BOD 5days at 20 °C) (mg/1)</td><td>30</td></tr> <tr> <td>Cadmium as Cd (mg/1)</td><td>1.0</td></tr> <tr> <td>Chemical Oxygen Demand (COD (mg/1)</td><td>100</td></tr> <tr> <td>Chromium as Cr (mg/1)</td><td>Less than 0.01</td></tr> <tr> <td>Lead as Pb (mg/1)</td><td>Less than 0.01</td></tr> <tr> <td>Oil and grease</td><td>Absent</td></tr> <tr> <td>pH (Hydrogen ion activity)</td><td>5.0-9.0</td></tr> <tr> <td>Phenols total (mg/1)</td><td>0.05</td></tr> <tr> <td>Sulphide as S (mg/1)</td><td>2.0</td></tr> <tr> <td>Total Suspended Solids (mg/1)</td><td>30</td></tr> <tr> <td>Temperature (in degrees Celsius) based on ambient temperature</td><td>± 5</td></tr> <tr> <td>Cyanides as CN (mg/1)</td><td>Less than 0.2</td></tr> <tr> <td>Nickel as Ni (mg/1)</td><td>Less than 2.0</td></tr> <tr> <td>Detergents (ABS) (mg/1)</td><td>Less than 5.0</td></tr> <tr> <td>Mercury as Hg (mg/1)</td><td>Less than 0.01</td></tr> <tr> <td>Total Phosphorus as P (mg/1)</td><td></td></tr> <tr> <td>Total Nitrogen as N (mg/l)</td><td>10</td></tr> <tr> <td>Total pesticide residues</td><td>Absent</td></tr> </tbody> </table>	Parameter	Max Allowable (Limits)	Arsenic as As (mg/1)	0.1	Biochemical Oxygen Demand (BOD 5days at 20 °C) (mg/1)	30	Cadmium as Cd (mg/1)	1.0	Chemical Oxygen Demand (COD (mg/1)	100	Chromium as Cr (mg/1)	Less than 0.01	Lead as Pb (mg/1)	Less than 0.01	Oil and grease	Absent	pH (Hydrogen ion activity)	5.0-9.0	Phenols total (mg/1)	0.05	Sulphide as S (mg/1)	2.0	Total Suspended Solids (mg/1)	30	Temperature (in degrees Celsius) based on ambient temperature	± 5	Cyanides as CN (mg/1)	Less than 0.2	Nickel as Ni (mg/1)	Less than 2.0	Detergents (ABS) (mg/1)	Less than 5.0	Mercury as Hg (mg/1)	Less than 0.01	Total Phosphorus as P (mg/1)		Total Nitrogen as N (mg/l)	10	Total pesticide residues	Absent
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The County Governments Act 2012	<ul style="list-style-type: none"> • The Act gives effect to Chapter Eleven of the Kenyan Constitution; to provide for County government's powers, functions and responsibilities to deliver services and for connected purposes. Section 113 of the Act makes public participation in County planning processes compulsory 																																								
the Children Act, 2001	<ul style="list-style-type: none"> • The Act defines a child as any human being under the age of eighteen years, and child abuse as physical, sexual, psychological and mental injury to a child. Child labour is regarded as any situation where a child provides labour in exchange for payment and includes: <ul style="list-style-type: none"> - any situation where a child provides labour as an assistant to another person and his labour is deemed to be the labour of that other person for the purposes of payment; - any situation where a child's labour is used for gain by any individual or institution whether or not the child benefits directly or indirectly; and - any situation where there is in existence a contract for services where the party providing the services is a child whether the person using the services does so directly or by agent 																																								

Legal Instrument	Requirements
	<ul style="list-style-type: none"> • Regarding child labour, the Act provides that every child shall be protected from economic exploitation and any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development • The Act provides that a child is entitled to protection from physical and psychological abuse, neglect and any other form of exploitation including sale, trafficking or abduction by any person • A child shall be protected from sexual exploitation and use in prostitution, inducement or coercion to engage in any sexual activity, and exposure to obscene materials. A child shall also be protected from use of hallucinogens, narcotics, alcohol, tobacco products or psychotropic drugs and any other drugs that may be harmful to their health
the National Construction Authority Act, 2011	<ul style="list-style-type: none"> • The Act establishes an Authority known as the National Construction Authority whose mandate is to oversee the construction industry and coordinate its development. The Authority's functions are inter alia: <ul style="list-style-type: none"> - promote and ensure quality assurance in the construction industry - accredit and register contractors and regulate their professional undertakings - accredit and certify skilled construction workers and construction site supervisors; and - develop and publish a code of conduct for the construction industry
the Work Injury Benefits Act, 2007	<ul style="list-style-type: none"> • Provides for the obtainment and maintenance by the employer, of an insurance policy, with an insurer in respect of any liability that the employer may incur under the Act to any of his employees • Outlines employees' rights to compensation in the event of an accident resulting in the employee's disablement or death, or injury while at work. The employee is also entitled to compensation in the event he/she contracts a disease that arose out of and in the course of the employee's employment • Provides for the reporting of injury or accident by the employer to the Director of Occupational Safety and Health Services in a prescribed manner. • An employer shall provide and maintain such appliances and services for the rendering of first aid to his employees in case of any accident
the Fisheries Management and Development Act, 2016	<ul style="list-style-type: none"> • Provides for the conservation, management and development of fisheries and other aquatic resources to enhance the livelihood of communities dependent on fishing, and other connected purposes. • The objective of the Act is to protect, manage, use and develop the aquatic resources in a manner which is consistent with ecologically sustainable development, to uplift the living standards of the fishing communities and to introduce fishing to traditionally non-fishing communities and to enhance food security. • Guiding principles in implementation of the Act include: <ul style="list-style-type: none"> - long-term sustainable use, conservation and management of fisheries resources and habitat, and adoption and implementation of management measures in such a manner as to ensure that the fisheries resources and habitat are not overexploited, threatened or endangered; - conservation and protection of fisheries habitats; - encouraging the participation of users of the fisheries resources, and the general community, in the management of fisheries • Provides that no person shall prepare for the introduction of, attempt to introduce or introduce into the Kenya fishery waters, directly, indirectly, deliberately, any deleterious article or substance, including articles or substances which may have toxic, hazardous or other harmful properties or

Legal Instrument	Requirements
	effects in relation to fish or the marine environment, and which may adversely affect the habitat or health of the fish
the National Museums and Heritage Act, 2006	<ul style="list-style-type: none"> • The Act establishes the National Museums of Kenya with functions to, among others, identify, protect, conserve and transmit the cultural and natural heritage of Kenya; and promote cultural resources in the context of social and economic development • The Act provides that where a person discovers a monument or object of archaeological or palaeontological interest, the person shall, within seven days, give notice thereof, indicating the precise site and circumstances of the discovery, to the National Museums, and in the case of an object, shall deliver the object to the National Museums or to the District Commissioner to keep it for any particular purpose or for any particular period • Provides that no person shall move a monument or object of archaeological or palaeontological interest from the place where it has been discovered otherwise than in such manner and to such place as may be allowed by an exploration licence, or by written permit from the Minister after consultation with the National Museums
the Employment Act, 2007	<ul style="list-style-type: none"> • The Act prohibits forced labour and provides that no person shall use or assist any other person in recruiting, trafficking or using forced labour; • Provides that an employer shall promote equal opportunity in employment and strive to eliminate discrimination in any employment policy or practice • Prohibits direct or indirect discrimination and harassment of employees and potential employees because of: <ul style="list-style-type: none"> - race, colour, sex, language, religion, political or other opinion, nationality, ethnic or social origin, disability, pregnancy, marital status or HIV status; - recruitment, training, promotion, terms and conditions of employment, termination of employment or other matters arising out of the employment • Provides for informing employees of their rights by the display of information on employee's rights in a conspicuous and accessible place • Provides that an employer shall pay the entire amount of the wages earned by or payable to an employee in respect of work done by the employee in pursuance of a contract of service directly in cash, into an account, or by cheque • The Act includes rights and duties in employment such as regulated hours of work, entitlement to annual leave, maternity leave, sick leave, wholesome water, medical attention • Provides that no person shall employ a child in any activity which constitutes worst form of child labour. • Provides that no person shall employ a child who has not attained the age of thirteen years whether gainfully or otherwise in any undertaking. • Provides that a child of between thirteen years of age and sixteen years of age may be employed to perform light work which is: <ul style="list-style-type: none"> - Not likely to be harmful to the child's health or development; and - Not such as to prejudice the child's attendance at school, his participation in vocational orientation or training programmes approved by the Cabinet Secretary or his capacity to benefit from the instructions received
the Penal Code, Cap 63	<ul style="list-style-type: none"> • Provides that any person who does an act not authorized by law or omits to discharge a legal duty and thereby causes any common injury, or danger or annoyance, or obstructs or causes inconvenience to the public in the exercise of common rights, commits the misdemeanour termed a common nuisance;

Legal Instrument	Requirements
	<ul style="list-style-type: none"> • Provides that any person who voluntarily corrupts or fouls the water of any public spring or reservoir, so as to render it less fit for the purpose for which it is ordinarily used, is guilty of a misdemeanour; • Provides that any person who voluntarily vitiates the atmosphere in any place, so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighbourhood or passing along a public way, is guilty of a misdemeanour • Condemns reckless and negligent acts that endanger human life or are likely to cause harm to any other person such as: <ul style="list-style-type: none"> - in the manner of driving of any vehicle; - acts with fire or any combustible matter, or omits to take precautions against any probable danger from any fire or any combustible matter in his possession; - acts with respect to, or omits to take proper precautions against any probable danger from, any machinery of which he is solely or partly in charge; - in the handling of poisonous substances

5.4. International guidelines

5.4.1. AfDB Operational Safeguards

AfDB has adopted a series of five Operational Safeguards which set out the Bank's overarching requirements to identify, assess, and manage the potential environmental and social risks and impacts of a project, including climate change issues. The safeguards also and set out specific requirements relating to different environmental and social issues, including gender and vulnerability issues, that are triggered if the assessment process reveals that the project may present certain risks (AfDB, 2013).

5.4.1.1. Operational Safeguard 1: Environmental and social assessment

The OS provides for conducting the environmental and social assessment (Strategic Environmental and Social Assessment, or Environmental and Social Impact Assessment) and for developing, as an integral part of project documentation, an appropriate plan for managing possible impacts. The OS requires:

- Screening of the project for environmental and social impacts including climate change impacts, potential adaptation and mitigation measures, and the vulnerability of populations and their livelihoods—to determine the specific type and level of environmental and social assessment;
- Scoping of the project's components, including delineating the project's geographic and temporal area of influence, consideration of alternatives, and assessment of cumulative impacts, where relevant. Scoping activities also determine the range of likely potential risks and impacts and also determines whether specific requirements of the Bank's OSs apply. All relevant direct and indirect environmental and social risks and impacts, including those specifically covered the other Operational Safeguards would be addressed in an integrated manner;
- Consideration of real alternatives to the project's location and/or design to avoid adverse impacts. The mitigation hierarchy to be applied includes: if avoidance is not possible, reduce and minimize potential adverse impacts; if reduction or minimization is not sufficient, mitigate and/or restore; and as a last resort compensate for and offset;
- Assessment to comply with the relevant legislation and standards applicable in the local jurisdiction, bearing in mind the equivalence of standards with those of the Bank. Assessment to also take into consideration national or regional- level programming documents that are under implementation or in preparation;
- assessment process to support and strengthen existing country systems for environmental, climate, and social risk management, including those specifically related to OSs 2-5, such as systems and institutions covering resettlement, biodiversity protection, pollution control, and labor standards;
- The assessment to be conducted according to the principles of proportionality and adaptive management. The level of assessment and management required should be proportionate to the level of risk that the

project poses as identified during categorization and scoping—and the management measures adopted should be capable of being adapted to changing circumstances during the full project cycle;

- Assessment to include the development of a comprehensive and implementable ESMP with a realistic timeframe, incorporating the necessary organizational capacity (including further training requirements) and financial resources to address and manage the environmental and social risks that may occur during the full project cycle;
- Categorization of projects following the principle of using the appropriate type and level of environmental and social assessment for the type of operation. The categories include:
 - ✓ Category 1- projects likely to induce significant and/or irreversible adverse environmental and/or social impacts, or to significantly affect environmental or social components that the Bank or the borrowing country considers sensitive
 - ✓ Category 2: Projects likely to have detrimental site-specific environmental and/or social impacts that are less adverse than those of Category 1 projects. Likely impacts are few in number, site-specific, largely reversible, and readily minimized by applying appropriate management and mitigation measures or incorporating internationally recognized design criteria and standards
 - ✓ Category 3: Projects which do not directly or indirectly affect the environment adversely and are unlikely to induce adverse social impacts. They do not require an environmental and social assessment. Beyond categorization, no action is required.
 - ✓ Category 4: Projects which involve Bank lending to financial intermediaries that on-lend or invest in subprojects that may produce adverse environmental and social impacts
- The environmental and social assessment process to systematically identify vulnerable groups on the basis of a careful screening and analysis of the social and economic context in which the project will operate. particular attention to be given to assessing the risks and potentially adverse impacts of the project on local communities, including direct and indirect impacts on their health or safety and indirect impacts on their socioeconomic conditions and livelihoods;
- Assessment to identify and qualify the tangible and intangible cultural heritage likely to be affected by the project, and appropriate measures for avoiding or mitigating these impacts;
- Free, prior and informed consultation with communities likely to be affected by environmental and social impacts, and with local stakeholders, and also for ensuring broad community support;
- maximum disclosure, enhanced access to information, and limited exceptions in the environmental and social assessment process ensuring progressive disclosure of documents at key stages during the project cycle and making documents available to the public on request;
- establishment of a credible, independent and empowered local grievance and redress mechanism to receive, facilitate and follow up on the resolution of affected people's grievances and concerns about the environmental and social performance of the project; and
- Implementation of the environmental and social mitigation measures contained in the ESMP and Resettlement Action Plan (RAP) during project implementation, and reporting to the Bank on key management or monitoring tasks set out in the ESMP and RAP

5.4.1.2. Operational Safeguard 2: Involuntary resettlement - land acquisition, population displacement and compensation

The OS relates to Bank-financed projects that cause the involuntary resettlement of people. It seeks to ensure that when people must be displaced they are treated fairly, equitably, and in a socially and culturally sensitive manner; that they receive compensation and resettlement assistance so that their standards of living, income-earning capacity, production levels and overall means of livelihood are improved; and that they share in the benefits of the project that involves their resettlement. The OS requires:

- Consideration of feasible alternative project designs, including re-siting and re-routing, to avoid or minimize physical or economic displacement, while balancing environmental, social, and financial costs and benefits;
- Open, inclusive and effective consultation with local communities entailing appropriate notice to all potentially affected persons that resettlement is being considered, advance dissemination of relevant information, and public hearings that provide affected persons and/or their legally designated representatives with opportunities to challenge the resettlement design and process;
- Consultations with the affected people about their preferences pertaining to resettlement and presentation of genuine choices among technically, economically, and socially feasible resettlement options

- The carrying out of a comprehensive socioeconomic survey in line with international standards for social and economic baseline studies as agreed to in the environmental and social assessment process, including a population census and an inventory of assets (including natural assets upon which the affected people may depend for a portion of their livelihoods);
- Conformance to any relevant host government procedures;
- Establishment of a grievance and redress mechanism to resolve, in an impartial and timely manner, any disputes arising from the resettlement process and compensation procedures;
- Preparation of a Full Resettlement Action Plan (FRAP) for (i) any project that involves 200 or more persons or (ii) any project that is likely to have adverse effects on vulnerable groups. An Abbreviated Resettlement Action Plan (ARAP) is to be prepared for any project in which the number of people to be displaced is fewer than 200 people and land acquisition and potential displacement and disruption of livelihoods are less significant;
- Consultation with those to be displaced to decide on the units that are entitled to compensation (e.g., family, household, and individual);
- That affected people are compensated for all their losses at full replacement costs before their actual move; before land and related assets are taken; and, if the project is implemented in phases, before project activities begin for each particular phase;
- That the criteria for assessing the value of land, housing and other property are standardized and transparent, and the benefits of the resettlement are clearly established;
- A detailed analysis of host communities to identify potential problems associated with receiving displaced people, and to address these problems so that adverse impacts on host communities are minimized and the host communities are able to share in the development opportunities provided through the resettlement process;
- The protection of the physical, social and economic integrity of vulnerable groups and paying particular attention to health needs, particularly for women, including access to female health care providers and to such services as reproductive health care and appropriate counselling for sexual and other abuses;
- The implementation, monitoring and evaluation of the activities set out in the Resettlement Action Plan. Monitoring activities include a review of the grievance and redress mechanism and of the physical progress and impact of the Resettlement Action Plan; and
- The carrying out of an independent ex-post evaluation to examine the effectiveness of the mitigation measures recommended and implemented and to derive lessons learned to inform similar types of projects in the future

5.4.1.3. Operational Safeguard 3: Biodiversity, renewable resources and ecosystem services

The OS provides for (i) identification and implementation of opportunities to conserve and sustainably use biodiversity and natural habitats, and (ii) observing, implementing, and responding to requirements for the conservation and sustainable management of priority ecosystem services. The OS requires:

- Identification and assessment during the environmental and social assessment, the potential opportunities for, risks to, and impacts on biological diversity and ecosystem services, including direct, indirect, cumulative and pre-mitigation impacts;
- That attention be given to the major threats to biodiversity and ecosystem services, such as pollution and contamination, land conversion, habitat fragmentation, natural habitat loss, deforestation, over-exploitation of natural areas and resources, invasive alien species, migration barriers, the capturing of wild animals, the harvesting of endemic species and indigenous ornamental flora and fauna, and wildlife poaching;
- That if projects are to be developed in natural habitats, or are to have potential adverse downstream impacts on natural habitats, they should include mitigation measures to achieve either net benefit or no net loss of biodiversity;
- That any proposed development should be consistent with the protected area/internationally recognized area's management plan or, in the absence of a management plan, with the objectives determined by the responsible natural resource, protected area, or wildlife agency;
- Taking precautions to avoid introducing any potentially invasive alien species (that is, species not currently established in the country or region of the project unless such an introduction is in accordance with any existing applicable regulatory framework or the introduction is subject to a risk assessment, which may be part of the environmental assessment, to determine the potential for invasive behavior;

- That for projects that affect water resources, altering flow regimes in ways that prevent water resources from fulfilling their functions for important upstream and downstream ecosystems and their services to local communities should be avoided;
- The assessment and management of environmental flows for the conservation and sustainable use of biodiversity and ecosystem services;
- The maintenance of flows so that they are optimally managed to allow for the multipurpose use of water, including water's ecological functions, and the integrity of river systems and wetlands;
- That the environmental and social assessment uses appropriate methodologies to address the issue of environmental flows according to best practice, including the recommendations of the World Commission on Dams;
- Environmental flow analysis and management are carried out to the extent feasible in the context of river basin planning, so that the basin's entire water balance, now and in the future, is the framework in which environmental flows are determined;
- The development and implementation of a sustainable resources procurement policy, procedures, and action plan to ensure that only resources of a legal and sustainable origin are purchased, and that the resources do not originate from legally protected areas or internationally recognized areas of high conservation value; and
- Performing an ecosystem services review to identify the risks where it is determined that the project may affect important ecosystem services

5.4.1.4. Operational Safeguard 4: Pollution prevention and control, hazardous materials and resource efficiency

The OS provides for the main pollution prevention and control requirements to achieve high quality environmental performance, and efficient and sustainable use of natural resources, over the life of a project. The OS requires:

- The application of pollution prevention and control measures consistent with national legislation and standards, applicable international conventions, and internationally recognized standards and good practice, particularly the World Bank Group Environmental Health and Safety (EHS) Guidelines;
- The inclusion of resource-efficiency and pollution prevention principles as part of the project policy, in accordance with the principles of cleaner production;
- The avoidance or, where avoidance is not possible, the control and reduction in the generation of pollutants at their source;
- The prevention of discharge of pollutants into the air, surface water and groundwater, land and soil during planned activities as well as unplanned events or emergencies that may result in local, regional, and transboundary impacts. If total prevention is not feasible, specific actions to reduce or minimize the effluents or volume of discharges should be taken;
- The avoidance or, where avoidance is not possible, control and reduction of the generation of hazardous and non-hazardous waste at source, in compliance with applicable international conventions;
- That any chemicals that are banned or subject to phase-out by international treaties, including ozone-depleting substances and persistent organic pollutants shall not be manufactured, traded, donated or used;
- A determination of whether the project poses any operational risk of accident or emergency events, and an assessment of the options for responding to such situations. If appropriate, an emergency response plan proportionate to the risk should be developed, to respond to accidents or emergency events that may pose risks to human health and the environment; and
- An evaluation and, if appropriate, implementation of financially feasible and cost-effective measures for improving efficiency in the project's consumption of resources such as energy, water, raw materials, and other resources

5.4.1.5. Operational Safeguard 5: Labour conditions, health and safety

The OS provides for the protection of the rights of workers and meeting their basic needs. The OS requires:

- The development and implementation of a human resources policy and procedures appropriate to the nature and size of the project, with the scale of the workforce in alignment with this OS and with applicable national laws;

- That employees be provided with documents that contain information on their employment terms, conditions and rights, including national employment law;
- The provision of reasonable working conditions and terms of employment that, at a minimum, comply with national law and are otherwise consistent with this OS;
- The provision of all basic services including water and sanitation and medical care where residential or temporary accommodation is provided to workers;
- That employment decisions will not be made on the basis of personal characteristics unrelated to inherent job requirements, including race, gender, nationality, religion or belief, disability, age, sexual orientation, or ethnic, social and indigenous origin;
- That special measures be taken to address harassment, intimidation, and/or exploitation, especially in relation to women. In addition, measures shall also be taken to prevent social exclusion of or employment inequalities to women and workers with family responsibilities;
- That a workforce grievance mechanism be permanently available to workers (including workers supplied by third parties) and their organizations to raise reasonable workplace concerns in a transparent manner without fear of retribution;
- That children shall not be employed in any manner that is economically exploitative, or is likely to be hazardous or to interfere with the child's education or to be harmful to the child's health or physical, mental, spiritual, moral, or social development as stipulated in national laws in compliance with the provisions of ILO Convention C138 and C182;
- That no forced labour will be employed, that is, any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty;
- That workers be provided with a safe and healthy work environment, taking into account risks inherent in the particular sector and specific classes of hazards in the work areas, including physical, chemical, biological, and radiological hazards;
- The implementation of a health, safety and environmental programme that includes plans or procedures to prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work; and
- Compliance with all local and national environmental, health and safety laws and regulations

5.4.2. Other international guidelines

The table below summarises the provisions of the International Finance Corporation (IFC) Performance Standards. The provisions are similar and comparable to AfDB's Operational Safeguards 1 – 5.

Table 5-3 Other international guidelines

Standard/Guideline	Provision
International Finance Corporation (IFC) Performance Standard (PS) 1 on Assessment and Management of Environmental and Social Risks and Impacts	<ul style="list-style-type: none"> • Provides for identification and evaluation of environmental and social risks and impacts of a project; • Provides for the adoption of a mitigation hierarchy to anticipate and avoid, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, affected communities, and the environment. • Provides for improvement in environmental and social performance through the effective use of management systems; • Provides for mechanisms to ensure that grievances from affected communities and external communications from other stakeholders are responded to and managed appropriately; • Provides for mechanisms for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them; • Provides for measures to ensure that relevant environmental and social information is disclosed and disseminated
IFC PS 2 on Labour and Working Conditions	<ul style="list-style-type: none"> • Provides for measures to promote the fair treatment, non-discrimination, and equal opportunity of workers; • Provides for measures to establish, maintain, and improve the worker-management relationship;

Standard/Guideline	Provision
	<ul style="list-style-type: none"> • Provides for measures to promote compliance with national employment and labor laws; • Provides for measures to protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in an organization's supply chain; • Provides for mechanisms to promote safe and healthy working conditions, and the health of workers; and • Provides for measures to avoid the use of forced labor.
IFC PS 3 on Resource efficiency and Pollution Prevention	<ul style="list-style-type: none"> • Provides for measures to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. • Provides for measures to promote more sustainable use of resources, including energy and water. • Provides for measures to reduce project-related GHG emissions.
IFC PS 4 on Community Health, Safety and Security	<ul style="list-style-type: none"> • Provides for mechanisms to anticipate and avoid adverse impacts on the health and safety of the affected community during the project life from both routine and non-routine circumstances; and • Provides for measures to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the affected communities.
IFC PS 5 on Land Acquisition and Involuntary Resettlement	<ul style="list-style-type: none"> • Provides for measures to ensure the avoidance, and when avoidance is not possible, minimization of displacement by exploring alternative project designs; • Provides for measures to ensure the avoidance of forced eviction; • Provides for measures to ensure the anticipation, avoidance or minimization of adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected; • Provides for measures to ensure the improvement or restoration of the livelihoods and standards of living of displaced persons; and • Provides measures to ensure the improvement of living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.
IFC PS 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources	<ul style="list-style-type: none"> • Provides for measures to ensure the protection and conservation of biodiversity; • Provides for measures to ensure the maintenance of benefits from ecosystem services; and • Provides for measures to promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.
IFC PS 7 on Indigenous Peoples	<ul style="list-style-type: none"> • Provides for measures to ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples; • Provides for measures to ensure the anticipation and avoidance of adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts;

Standard/Guideline	Provision
	<ul style="list-style-type: none"> • Provides for measures to promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner; • Provides for measures to establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle; and • Provides for measures to respect and preserve the culture, knowledge, and practices of Indigenous Peoples.
IFC PS 8 on Cultural Heritage	<ul style="list-style-type: none"> • Provides for measures to protect cultural heritage from the adverse impacts of project activities and support its preservation; • Provides for measures to promote the equitable sharing of benefits from the use of cultural heritage; and • Provide for measures to address impacts on physical cultural resources in projects proposed for Bank financing, as an integral part of the environmental assessment (EA) process.

5.5. Multilateral environmental agreements

Table 5-4 Relevant obligations in international agreements

MEA	Relevant environmental obligations
East African Community (EAC) Protocol on Environment and Natural Resources (EAC, 1999), Amendment 2006	Article 13- Management of water resources requires that Partner States shall utilize water resources sustainably
EAC Climate Change Policy (EACCCP) (EAC, 2011)	Section 3.1.3 Climate change adaptation Relevant sectorial obligations: c) Infrastructure (i) Promoting climate change integration in all planning and design of infrastructure
The 1992 United Nations Framework Convention on Climate Change (UNFCCC)	States to establish methods to minimize global warming and the emission of the greenhouse gases
The Paris Agreement, 2015	The Agreement provides the framework to address climate change for a safer and sustainable future. Prevention of a global temperature increase above 1.5 degrees Celsius relative to pre-industrial levels by reduction of Greenhouse gas emissions
Vienna Convention on the Protection of the Ozone Layer	Phasing out ozone depleting substances to protect the Ozone Layer; Intergovernmental cooperation on research, systematic observation of the ozone layer, monitoring of CFC production, and the exchange of information
United Nations Convention on Biological Diversity (UNCBD)	Conservation and sustainable use of biodiversity
United Nations Convention to Combat Desertification (UNCCD)	Requires partners to address the problem of the degradation of land by desertification and the impact of drought
Convention on Biological Diversity (CBD Secretariat, 1992)	<ul style="list-style-type: none"> • Conservation and sustainable of biodiversity (Article 1) • International cooperation in biodiversity conservation (Article 5) • In-situ conservation protected areas (Article 8a) • Prevention of alien species (Article 8h) • Ex-situ conservation (Article 9)
Convention on Migratory Species – Bonn Convention	• Conserving migratory species and protecting their habitats (Article 2.1)

MEA	Relevant environmental obligations
	<ul style="list-style-type: none"> • Engagement in regional and international agreements on conservation of migratory species in Appendix 1 & II (Article 5) • Prevention of alien species (Article 5.5e) • Establishment of new wildlife habitats for migratory species (Article 5.5g) • Removing threats to migratory corridors and migratory species (Articles 5.5h & i)
Convention Concerning the Protection of the World Cultural & Natural Heritage (United Nations Educational, Scientific & Cultural Organisation, 1972)	<ul style="list-style-type: none"> • Identifying, protecting and conserving natural heritage (Article 4) • Cooperation between countries and involvement of local communities (Articles 6 & 7)

5.6. Institutional framework

5.6.1. The water sector

5.6.1.1. Ministry of water & sanitation and Irrigation

This is the key institution responsible for the water sector in Kenya. The Ministry's mandate is development and management of water resources, transboundary waters, water harvesting and storage, water services and sanitation regulation, dams and sanitation management. The Ministry is concerned with the issues on: Water Resources Management Policy; Water Catchment Area Conservation, Control and Protection; Water and Sewerage Services Management Policy; Waste Water Treatment and Disposal Policy; Water Quality and Pollution Control; Sanitation Management; Management of Public Water Schemes and Community Water Projects; Water Harvesting and Storage for Domestic and Industrial Use; Flood Control Management; and Transboundary Water policy

The following institutions have also been established by the Water Act 2016 and their roles and responsibilities are discussed below:

The Water Services Regulatory Board whose principal object is to protect the interests and rights of consumers in the provision of water services. The Board determines and prescribes national standards for the provision of water services and asset development for water services providers. It also approves tariffs, issues licenses to Water Service Providers and makes recommendations on how to provide basic water services to marginalised areas.

Water Resources Authority whose functions include inter alia, the formulation and enforcement of standards, procedures and Regulations for the management and use of water resources and flood mitigation; and regulation of the management and use of water resources

National Water Harvesting and Storage Authority whose functions include the development of national public water works for water resources storage and flood control; maintenance and management of national public water works infrastructure for water resources storage; and the development of a water harvesting policy and enforcement of water harvesting strategies

Water Works Development Agencies whose functions include the development, maintenance and management of the national public water works within their area of jurisdiction and provision of technical services and capacity building to relevant county governments and water services providers within jurisdictions as necessary.

For the proposed Bomet Water Supply, the relevant WWDA is Lake Victoria South WWDA.

Water Resource User Associations (WRUAs) which are community-based associations for collective management of water resources and resolution of conflicts concerning the use of water resources. The relevant WRUA in this project is Nyangores WRUA.

Water Services Providers (WSPs) are responsible for provision of water services within the area specified in their licenses and development of county assets. Bomet Water Company Limited is the WSP in the project area and which manages nine (9) water supply schemes including Itare, Sotik, Bomet, Longisa, Sigor, Chepalungu (Olbutyo), Kamureito, Ndanai and Sergutiet water schemes.

Water Sector Trust Fund whose objective is to provide conditional and unconditional grants to counties, in addition to the Equalisation Fund and to assist in financing the development and management of water services in marginalized areas or any area which is considered by the Board of Trustees to be underserved.

5.6.2. The environment sector

There are 21 institutions, which deal with environmental issues in Kenya. Some of the key institutions include National Environmental Management Authority (NEMA), the Department of Resource Surveys and Remote sensing (DRSRS), the Water Resources Authority (WRA), The Kenya Forest Service (KFS), the Kenya Wildlife Service (KWS) the Kenya Forestry Research Institute (KEFRI), the National Museums of Kenya (NMK), the Kenya Marine and Fisheries Research Institute (KEMFRI), the Kenya Agricultural and Livestock Research Organization (KALRO) among others. There are also local and international NGOs involved in environmental issues in the country. The Figure below shows the institutional framework for the EMCA, 1999 which is the umbrella framework within which all the environmental issues concerning the proposed project will be implemented.

5.6.2.1. National Environmental Management Authority (NEMA)

The object and purpose for which NEMA was established is to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. Director General appointed by the president heads NEMA. The Authority's mandate includes inter alia:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programmes and projects with a view of ensuring the proper management and rational utilization of the environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya;
- Examine land use patterns to determine their impact on the quality and quantity of the natural resources.
- Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under EMCA;
- Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur;
- Monitor and assess activities, including activities being carried out by relevant lead agencies in order to ensure that the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impending environmental emergencies is given;
- Publish and disseminate manuals, codes or guidelines relating to environmental management and prevention or abatement of environmental degradation;

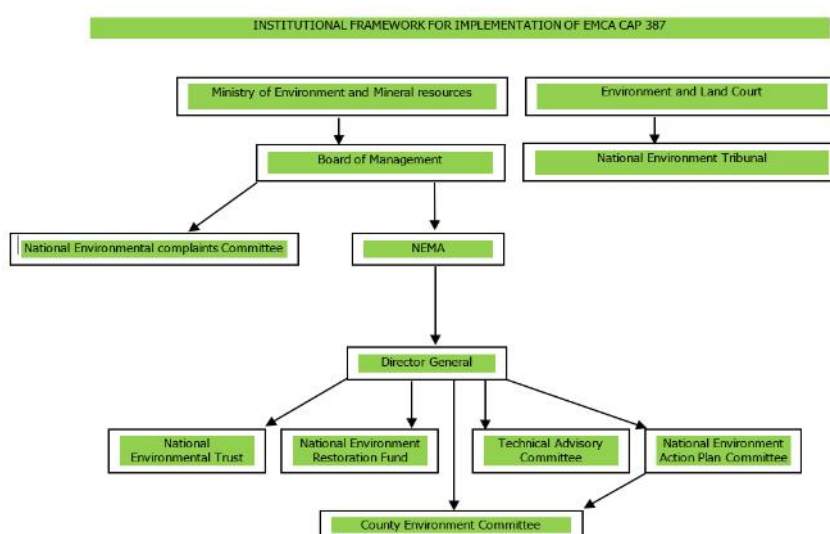


Figure 5-1: Institutional framework for the Environmental Management and Coordination Act

However, NEMA mandate is designated to the following committees and other entities:

5.6.2.1.1. County Environment Committee

A County Environment Committee is responsible for the proper management of the environment within the County for which it is appointed. It should also perform such additional functions as prescribed by the Act or as may, from time to time be assigned by the Governor by notice in the gazette. The decisions of these committees are legal, and it is an offence not to implement them. For this project, the comments of the County Environment Committee in Bomet will be very crucial in the decision-making process. The comments of the NEMA County Environment Director in Bomet will also be very useful in decision making process of the project.

5.6.2.1.2. National Environmental Complaints Committee

The National Environmental Complaints Committee performs the following functions:

- Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the Council;
- Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3); and
- Undertake public interest litigation on behalf of the citizens in environmental matters.

5.6.2.1.3. National Environment Action Plan Committee

The Authority is responsible for the development of a 6-year National Environment Action plan and shall ensure that it has undertaken public participation before the adoption of the plan. The National Environment Action Plan shall:

- Contain analysis of the natural resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time.
- Contain analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity.
- Recommend appropriate legal and fiscal incentives that may be used to encourage the business community to incorporate environmental requirements into their planning and operational processes.
- Recommend methods for building national awareness through environmental education on the importance of sustainable use of the environment and natural resources for national development.
- Set out operational guidelines for the planning and management of the environment and natural resources.
- Identify actual or likely problems that may affect the natural resources and the broader environment context in which they exist.
- Identify and appraise trends in the development of urban and rural settlements, their impact on the environment, and strategies for the amelioration of their negative impacts.
- Propose guidelines for the integration of standards of environmental protection into development planning and management.
- Identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general diverse impacts on the environment.
- Prioritize areas of environmental research and outline methods of using such research findings.
- Without prejudice to the foregoing, be reviewed and modified from time to time to incorporate emerging knowledge and realities and;
- Be binding on all persons and all government departments, agencies, States Corporation or other organ of government upon adoption by the national assembly.

5.6.2.1.4. National Environmental Tribunal

This tribunal guides the handling of cases related to environmental offences in the Republic of Kenya. If disputes related to environmental matters arise during the implementation of the project, the matter should be presented for hearing and legal direction to the tribunal.

5.6.2.1.5. Offences and penalties for non-compliance with provisions under Environmental Legislation

The Table below highlights the offences and penalties for non-compliance with provisions under environmental legislation in Kenya.

Table 5-5 Offences and penalties for non-compliance with environmental legislation

Item	Offences	Penalties for an offence
General offence	<ul style="list-style-type: none"> • Offence against a provision of the Act, where no penalty is specifically provided for. 	<ul style="list-style-type: none"> • Fine of not more than KES 350,000. • Imprisonment for not more than 18 months. • Or both such fine and imprisonment.
Inspection	<ul style="list-style-type: none"> • Offences in respect of inspection, including: • Hindering or obstructing an environmental inspector in his duties; 	<ul style="list-style-type: none"> • Fine of not more than KES 500,000. • Imprisonment for not more than 2 years. • Or both such fine and imprisonment.
Environmental Impact Assessment	<ul style="list-style-type: none"> • Failure to submit project report contrary to the requirements of Section 58 of the Act. • Failure to prepare an EIA in accordance with the requirements of the Act. • Knowingly give false information in an EIA report. 	<ul style="list-style-type: none"> • Fine of not more than KES 2,000,000. • Imprisonment for not more than 2 years. • Or both such fine and imprisonment.
Records	<ul style="list-style-type: none"> • Failure to keep records required under the Act. • Fraudulently or knowingly altering records. • Fraudulently or knowingly making false statements in any records required under the Act. 	<ul style="list-style-type: none"> • Fine of not more than KES 500,000. • Imprisonment for not more than 18 months. • Or both such fine and imprisonment.
Standards	<ul style="list-style-type: none"> • Violation of any environmental standard established under the Act; • Contravenes any measure prescribed under the Act; • Uses the environment or natural resources in a wasteful and destructive manner contrary to measures prescribed under the Act. 	<ul style="list-style-type: none"> • Fine of not more than KES 500,000. • Imprisonment for not more than 2 years. • Or both such fine and imprisonment.

6. Public consultation and participation

6.1. Introduction

This Chapter describes the process and activities in public consultation that were undertaken to ensure that the relevant stakeholders and the public are informed about the project and are involved in the identification of key issues and impacts of the proposed Bomet Mulot Water Supply Project.

Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively.

Stakeholder engagement and public consultation are an integral aspect of successful decision making in the ESIA process and implementation of projects, plans and programmes. It is central to all other aspects of environmental and social performance. It is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts (IFC, 2012). The key focus of meaningful consultations is equity and inclusivity, i.e. ensuring that all groups (including those that are disadvantaged or vulnerable) are embraced within the consultation process on equal terms, and that all groups are given the capacity to express their views with the knowledge that these views will be properly considered (AfDB, 2013).

Poor stakeholder relations present risks to the successful implementation of projects, while constructive engagements offer benefits of improved risk management and better outcomes on the ground.

The process of engagement presupposes that the relevant stakeholders and interested public have access to timely and accurate information on the environment and the proposed development and are therefore able to offer informed views on the proposals.

Public consultation also forms a useful component for gathering, understanding and establishing likely impacts of projects, determining community and individual preferences and selecting alternatives.

The stakeholder engagement strategy should be scaled relative to the risks and impacts a project is likely to create. For the proposed Bomet Mulot water supply Project, stakeholder engagement mainly focused on project information disclosure, communication on project construction and operation impacts and mitigation measures, and collection of stakeholder's comments and recommendations.

6.2. The legal context of public participation

6.2.1. The National Policy and Legal Framework

The following sections outline the Kenyan Policy and legal requirements on public consultation and participation, and stakeholder's engagement:

6.2.1.1. The constitution of Kenya, 2010.

Article 10 outlines the national values and principles of governance which include democracy and participation of the people, human dignity, equity, inclusiveness, social justice and human rights including non-discrimination and protection of the marginalized.

Article 33 guarantees the freedom of expression including the freedom to seek, receive or impart information or ideas. Hence, every person should feel constitutionally empowered to share information and ideas during public participation processes.

Article 35 provides for every citizen's right of access to information held by the state, and information held by another person and which is required for the exercise or protection of any right or fundamental freedom. This includes information required for effective public participation to take place.

Article 69 1(d) encourages public participation, in the management protection and conservation of the environment. Under guiding values and principles of the Land Act, every public officer must ensure democracy, inclusiveness and participation of the people in matters related to Land. Also, people should participate in determining critical land matters for instance determining the economic viability of minimum and maximum acreages in respect of private land for various land zones in the country.

Article 174(c) provides that one of the objects of the devolution of government is to give powers of self-governance to the people and enhance the participation of the people in the exercise of the powers of the State and in making decisions affecting them.

6.2.1.2. The County Government Act

The legislation is based on Chapter Eleven of the constitution. It provides for the powers, functions and responsibilities of County governments. Section 87 of the Act provides for citizens' participation based on timely access to information, data, documents, and other information relevant or related to policy formulation and implementation.

6.2.1.3. The Environmental Management and Coordination Act, 1999

The EMCA, 1999 provides that every person in Kenya is entitled to a clean and healthy environment in accordance with the Constitution. The Act also acknowledges that public participation is important in the development of sustainable policies, plans and processes for the management of the environment. Anyone alleging the denial, infringement, violation or threat to their right to a clean and healthy environment is empowered to seek redress in the Land and Environment Court. The Court may make certain orders to stop the offence and would be guided by the principle of public participation among other sustainable development principles.

6.3. Benefits of stakeholder engagement

Proactive, meaningful and extended engagement helps the project proponent to progressively build social capital and license to operate based on trust, mutual respect and understanding.

Early engagement enables the management of expectations and reduces anxiety among interested and affected parties. It also provides a valuable opportunity to influence public perception and set a positive tone with stakeholders early on.

6.3.1. Benefits to the developer

- A project proponent is likely to benefit from local knowledge;
- Costs may be saved as key issues are identified by the public and studies are focused on the key issues as opposed to a broad range of issues;
- Measures to mitigate adverse impacts and enhance benefits can be identified with early consensus among the stakeholders;
- Relations with the communities in the vicinity of the development are likely to be improved, and the likelihood of opposition to the project reduces as the project's social license is enhanced and gains broad community support;
- Delays in decision making may be reduced because of good participation early in the process; and
- The developer's image and reputation is likely to be enhanced.

6.3.2. Benefits to the public

- Capacity is built through people playing an active role during the process. The skills learnt can be used in other community projects;
- Public rights are exercised and protected in participating; and
- Their inputs are likely to influence the form and nature of the development, taking their needs into consideration

6.3.3. Benefits to decision makers

- Public participation is likely to improve decisions since there is access to broader range of perspectives and opinion on the proposed project; and
- The development is likely to be more sustainable as it takes people's needs and views into account;

6.4. Stakeholder engagement for the project

The stakeholder engagement process for the project begun at the conceptual stage to define the scope of the project and eliminate any overlaps with other existing or proposed water projects. This initial engagement involved stakeholders such as the Kenya Forest Service, County Government of Bomet, Nyangores Water Resource Users Association (WRUA), National Environment Management Authority (NEMA), and the National Government. Under the County Government of Bomet were representatives from the County Assembly and the

water service provider BOMWASCO, while the national government was represented by the County Commissioner.

After the scope was firmed up by the project sponsors, further stakeholder mapping and engagement was carried out to identify and consult with other stakeholders mainly comprising the community living in the project area. The aim of consultations with these other stakeholders was to inform them about the proposed project, collect their views and concerns on the project, and gather local knowledge about the project area.

6.4.1.1. The stakeholders' identification process

The following questions guided the mapping of the stakeholders:

- Who will be adversely affected by the potential environmental and social impacts in the water project in its area of influence (AOI)?
- Who are the most vulnerable among the potentially impacted, and is special engagement necessary?
- At which stage of the project will the stakeholders be mostly affected (i.e. construction, operation, decommissioning)?
- Which stakeholders might help enhance the project design?
- Who strongly supports or opposes the changes that the project will bring?
- Who is critical to engage with first and why?
- What is the optimal sequence of engagement?

6.4.2. Categories of identified stakeholders

The following categories of stakeholders were identified in the stakeholder mapping:

6.4.2.1. The local community in the project's AOI

The community includes the residents in the target supply areas in Nyangores, Merigi, Sigor, Kiprerres, Longisa, Ndaraweta, Kembu, Singorwet and Silibwet Township Wards in Bomet County, and Ilmotiok and Mara Wards in Narok County. The communities are mainly comprised of farmers who cultivate tea as a cash crop in the higher altitude areas neighbouring Mau Forest, and maize and bean crop for subsistence and trade, in the lower altitude areas.

6.4.2.2. Institutional stakeholders

These are government agencies and community associations whose main role is to regulate/safeguard the utilisation of natural resources or develop and maintain relevant infrastructure. They include:

- Nyangores River Water Resource Users Association (WRUA)
- Masese Community Forest Association (CFA);
- Kenya Forest Service (KFS);
- Water Resources Authority (WRA);
- Kenya Water Towers Agency (KWTa);
- Kenya National Highways Authority (KeNHA); and
- Kenya Rural Roads Authority (KeRRA)

6.4.2.3. National and County Government Stakeholders

These include:

- Ministry of Water and Irrigation;
- Ministry of Interior and Coordination of National Government represented by the Bomet County Commissioner, Deputy County Commissioners, Assistant County Commissioners Chiefs and Assistant Chiefs in the Project's target area;
- County Government of Bomet (Governor's Office County Executive Committee Members, MCAs, sub-County and Ward Administrators); and
- Bomet Water Supply and Sanitation Company (BOMWASCO).

6.4.3. Methods of stakeholder engagement

Methods deployed during the stakeholder engagement process included:

6.4.3.1. Workshops

These were organised with the institutional and government stakeholders in project conceptualization and design stages. The workshops provided an opportunity for these stakeholders to provide feedback and inputs in the concept and preliminary designs of the project.

A total of 3 workshops were held to discuss project alternatives and agree on the project's concept designs. Minutes of the deliberations are attached in **Appendix C** of this Report.

6.4.3.2. Public meetings

These meetings were organised with the purpose of disclosing project information to communities and seeking their views and concerns in implementing the project. Five public meetings were held at various location along the pipeline route. These were at Mulot, Ndarawetta, Cheboin, Longisa, Sigor, and Mugango areas. A cumulative total of 432 people attended the meetings.

Table 6-1 Public meeting dates and venues

Meeting date	Location of the meeting	No of attendees
11/11/2019	Mulot	76
12/11/2019	Ndarawetta	94
12/11/2019	Cheboin	42
13/11/2019	Longisa	71
13/11/2019	Sigor	76
07/01/2020	Mugango	73



Figure 6-1 Public meeting in Mulot



Figure 6-2 Public meeting in Ndarawetta



Figure 6-3 Public meeting in Cheboin



Figure 6-4 Public meeting in Longisa



Figure 6-5 Public meeting in Sigor



Figure 6-6 Public meeting in Mugango

The following is a summary of the issues raised at the public meetings:

Table 6-2 Summary of issues raised at the public meetings

Stakeholders	Concerns/comments/proposals
Mulot Town	<p>The community wants assurance that water will be distributed to households;</p> <p>Locals should be given first consideration in employment opportunities arising from project implementation;</p> <p>The Project proponent should come up with a CSR programme that will benefit the community besides the water project;</p> <p>There may be moral decadence with the influx of migrant workers looking for job opportunities;</p> <p>There is potential for increase in sexually transmitted infections (STIs) such as HIV/AIDS as the project is implemented;</p> <p>Measures should be taken during construction to minimize pollution e.g. oil spillages and dust, and environmental degradation from loss of vegetation; and</p> <p>There is need for adequate maintenance of the pipelines to prevent failures that would result in environmental damage</p>
Ndarawetta	<p>Locals should be given priority in employment opportunities. The community has highly educated youth and should be employed according to their qualification;</p> <p>The land along the pipeline alignment is utilised by farmers in planting of trees and irrigated farming along Nyangores River;</p> <p>The community is concerned about how people without title deeds will be compensated considering that most land title holders have since died, and the land has been subdivided multiple times among siblings, without title deeds</p> <p>There is expectation that valuation of affected land and assets will be undertaken in their presence to ensure that the trees and crops along the corridor are properly documented.</p> <p>There is concern about compensation rates and the process of valuation;</p> <p>The Project proponent should identify and implement a suitable CSR activity that will benefit the community. The Ndarawetta community would like to have tree planting activities in schools;</p> <p>Influx of foreigners seeking employment opportunities may cause conflicts with the locals;</p> <p>There is likelihood of the rise in social ills such as early pregnancies and HIV/AIDS infections from interactions with project workers</p> <p>There is likelihood of destruction of the forest during construction of the pipelines causing loss of indigenous trees.</p>

	<p>Dry weather flows of Nyangores River may reduce significantly when the project is implemented</p> <p>Construction activities may also cause pollution of the river e.g. spillage of oils and other hazardous chemicals</p> <p>The project needs to ensure that water is supplied to the area and that the community gets enough supplies of water</p>
Cheboin	<p>The community hopes/expects that the project will resolve the water shortage problem of the area</p> <p>There is expectation that the community – particularly the youth, will benefit from jobs created</p> <p>Where private land is required for the project, compensation will be necessary. There is also need for a clear process to identify and compensate the land and crop owners</p> <p>The proponent should identify other corporate social responsibility (CSR) activities to implement for the community's benefit</p> <p>Tiroto and Merigi areas need to be supplied with water as a priority</p> <p>There is likelihood of influx of people seeking employment, and this would cause a rise in insecurity in the area. Additionally, the contractor should employ adequate security around project sites during construction</p> <p>There is potential for environmental damage from construction activities, and adequate mitigation measures are necessary to avoid or minimise the damage</p>
Longisa	<p>The local community should be given priority in any employment opportunities created by the project</p> <p>Adequate compensation is necessary where private land is acquired for the project. Compensation should be at market value of the affected property/assets or economic activity on the land</p> <p>There is also need to compensate those without land ownership documents</p> <p>Institutions in the area should be supplied with water by the project</p> <p>Influx of foreigners will cause conflicts with the local community lead to spread of HIV/AIDS among other moral problems</p> <p>Project components such as water pipelines need to be properly maintained</p>
Sigor	<p>The local community should be given priority for casual jobs during construction.</p> <p>Prompt compensation should be made for private land acquired for the project</p> <p>There is likelihood for increase in moral decadence with the influx of people into the area due to project activities</p> <p>The proponent should distribute water to schools as a CSR activity</p> <p>The downstream community is dependent on Nyangores River for irrigated farming and the project would cause reduced flows in the river and cause resource-use conflicts</p>
Mugango	<p>There is scarcity of water in the area and the project should ensure adequate supplies to the area</p> <p>The community should benefit from the employment opportunities created by the project</p> <p>The proponent should participate in some of the activities being undertaken by the community forest association (CFA)</p> <p>Crops, tea bushes and trees would be lost along the pipeline alignment during construction.</p> <p>Use of the land on top of the pipeline would also be limited after construction activities are complete</p> <p>Compensation for losses should be made before construction commences</p>

Restoration by planting trees along riparian areas should be carried out when construction is complete

6.4.3.3. Key Informant Interviews (KII)

One-on-one interviews were conducted with individuals with specific knowledge on aspects of the project area to obtain their expert opinion. Below is a summary of the interviews with various Key Informants:

Table 6-3 Summary from the KII

Name	Institution	Comments
Geoffrey Amoding	The County Commissioner, Bomet	<p>The project will be beneficial to the community;</p> <p>Expressed concern that flows in Nyangores River have reduced significantly due to destruction of Mau Forest;</p> <p>Prefers smaller projects with lesser impacts as opposed to mega projects such as the proposed Bosto Dam project;</p> <p>Project team should ensure extensive consultations with the relevant bodies responsible over natural resources such as Nyangores River and Mau Forest</p>
Micah Koech	CEC - Public Health, County Government of Bomet	<p>Sufficient supplies of clean water will ensure that the community is safe from waterborne diseases such as typhoid, and diarrhoea;</p> <p>The vulnerability of some areas such as Sigor to health and sanitation problems is high and this is because of lack of clean water</p> <p>The community needs to be properly sensitised on the importance of using clean water use to improve sanitation</p>
Paul Milgo	Public Health Officer, County Government of Bomet	<p>The community should be sensitised on HIV/AIDS continually throughout the project phases.</p> <p>The department can offer support to the team in sensitization if needed</p>
Mr Paul Rono	Nyangores WRUA	<p>The community needs to be informed appropriately about the project.</p> <p>Abstraction of water from Nyangores River will reduce the downstream water flow. There are also several other projects abstracting water from Nyangores River, meaning that the impact will be enhanced</p> <p>The project should have a catchment conservation component in order to reduce adverse impacts on the river regime</p>
Joseph Kemei	Kenya Forest Service	<p>The project is worthwhile and will bring benefits to the community</p> <p>The project team should ensure consultations are held with the community in Masese- Mugango adjacent to the forest</p> <p>Authorisation to enter and develop project components in the forest must be obtained from the Headquarters.</p>
Community Forest Association (CFA) committee	CFA Nyangores	<p>The project should ensure that Masese area also benefits from water supply</p> <p>The local community should be given priority in available employment opportunities</p>

6.4.3.4. Questionnaire administration

Questionnaires were also used to obtain personal views from residents in Masese, Ndarawetta, Cheboin, Sigor, Longisa and Mulot Locations on the proposed Project. A structured questionnaire was administered to a total of 130 households which sought to establish the respondents' socio-economic characteristics, their views on the impacts that are likely to arise from the project, their concerns and recommendations for mitigation of potential adverse impacts.

As part of enhancing community participation, qualified data collection assistants were engaged from local communities for the questionnaire administration exercise. Sample questionnaires are attached in Appendix C of this Report.

6.4.3.5. Summary findings from questionnaire administration

From the study the following impacts were identified during construction and operation phases of the project:

6.4.3.5.1. Perceived project impacts during construction phase

Table 6-4 Perceived project impacts during construction phase

Positive impacts	Negative impacts
<ul style="list-style-type: none"> • Creation of employment opportunities for workers, and business opportunities for traders 	<ul style="list-style-type: none"> • Loss of vegetation in site clearance • Disturbance of the environment through excavation • Environmental pollution from dust and oil spills • Degradation of roads due to heavy moving vehicles • Likely occurrence of accidents involving the workforce and/or the community • Potential increase in insecurity in the project area

6.4.3.5.2. Perceived project impacts during operation phase

Table 6-5 Perceived project impacts during operation phase

Positive impacts	Negative impacts
<ul style="list-style-type: none"> • Improved access to clean and piped water • Socioeconomic growth as the community focuses on other needs apart from water 	<ul style="list-style-type: none"> • Poor maintenance of the project by the county may lead to losses • Low flows of water downstream from the intake site • There may arise conflicts initiated by those who will not have access to the piped water

6.4.4. Conclusion

The community in the project area is receptive to the water project since they currently suffer water shortages and waterborne diseases. They have high expectations about employment opportunities during construction works, and it would be advisable for the appointed contractor to employ as many locals as possible. Their key concerns are on potential physical and/or economic displacement that would result from uptake of private land, some of which may not have proper land ownership documents. A Resettlement Action Plan is recommended that accounts for all affected land and assets irrespective of ownership status, to address community concerns. Potential environmental degradation from pollution incidences and loss of vegetation is also a significant community concern, which will be addressed through the Project's Environmental and Social Management Plan (ESMP).

6.4.4.1. Proposals for engagement going forward

During project operation and maintenance, the Project Operator (PO) should appoint a community liaison officer to regularly engage the community and other stakeholders on project performance. An engagement and communication strategy should be developed that addresses:

Information: This is where the goal is to inform or educate the stakeholders and can take the form of continuous issuance of bulletins/letters/brochures, speeches/public presentations or advertisements.

Consultation: Where the goal is to gain information and feedback from stakeholders to inform them of decisions made internally. This could entail surveys, focus groups, one-to-one meetings, public meetings and

workshops. Consultation of these types offers stakeholders opportunities to reflect on issues, mobilize and respond more critically than when brought directly to workshops.

Involvement: Where the goal is to work directly with stakeholders to ensure that their concerns are fully understood and considered in decision making. This can be achieved through multi-stakeholder forums, advisory panels, consensus building processes and participatory decision-making processes.

Social and Environmental Safeguards Office: Where the PO engages the services of a competent officer to coordinate engagement with stakeholders ensuring that the communication strategy is followed through and to ensure that all social and environmental safeguards proposed in the ESIA are adhered to and that stakeholders have opportunities to be properly represented in any environmental audits in the future during operation and maintenance.

A key element in the success of the engagement process is the development and implementation of a grievance mechanism. The grievance mechanism should be scaled to fit the level of risks and impacts of the project and should follow the PO's broader process of stakeholder engagement and business integrity principles and integrate the various approaches of engagement.

Grievance procedures should be established by the PO and agreed with the stakeholders. The procedures would enable the stakeholders and (especially the community) to lodge complaints or concerns, without cost, and with the assurance of a timely and satisfactory resolution of the issue(s). The procedures would be in place from the beginning of the social and environmental assessment process and exist throughout construction and operations through to the end of project life. The Grievance procedures would not replace the existing legal process but would seek to resolve issues quickly without resulting to expensive and time-consuming legal actions.

A Stakeholder Engagement Plan has been developed for the project which outlines the structure of community engagement and the proposed grievance redress mechanism. The SEP is included in Appendix E of this Report.

7. Prediction and evaluation of environmental and social impacts

7.1. Introduction

This Chapter discusses the environmental and social aspects and potential impacts that could arise from the construction, operation, decommissioning and abandonment of the proposed water supply project. It also discusses the proposed mitigation measures that could be applied to avoid, reduce or offset the potential adverse impacts.

7.1.1. Identification of environmental and social aspects

Environmental and social aspects of the project have been identified for all activities associated with construction and operation of the water project and associated facilities. The activities have been broadly discussed in Section 2.5 of this Report.

To identify project aspects, all proposed activities, have been considered in terms of their direct or indirect potential to:

- Breach relevant policy, legal and administrative provisions including national legislation, standards and guidelines;
- Interact with the existing natural environment including its physical and biological elements; and
- Interact with the existing socio-economic environment.

Activities assessed during site preparation, construction, restoration, operation and decommissioning include:

- Planned routine activities;
- Planned but non-routine activities; and
- Unplanned or accidental events.

7.1.2. Impact assessment methodology

This section outlines the methodology used to assess the impact significance. For this study, an impact is defined as “*Any change -potential or actual, adverse or beneficial, to the physical, natural, or cultural environment, or to the surrounding community and workers, resulting wholly or partially from a project developer’s activities or products*”. An impact is defined where an interaction occurs between a project activity and an environmental receptor.

The ESIA process ranked impacts according to their significance determined by considering project activity **event magnitude** and **receptor sensitivity**.

Determination of event magnitude entailed the identification and quantification (as far as practical) of the sources of potential environmental and socio-economic effects from routine and non-routine project activities.

The approach to evaluating the significance of potential environmental and socio-economic impacts is outlined below.

7.1.2.1. Environmental impacts

7.1.2.1.1. Method for determining event magnitude

Event magnitude was determined based on the following parameters, which were equally weighted and assigned a rating of 1, 2, or 3.

Extent/Scale

Events range from those where the effect extends across an area:

- 1 – Near to the source (in the range of tens to hundreds of metres);
- 2 – At intermediate distance from the source (in the range of hundreds to thousands of metres); and
- 3 – At far distance from the source (in the range thousands of metres and above).

Frequency

Events range from those occurring:

- 1 – Once or twice; to
- 2 - Repeatedly but intermittently; to
- 3 – Frequently and persistently.

Duration

Events range from those where effects occur over:

- 1 – Instantaneous/short term (i.e. hours to days); to
- 2 - Medium term (between a week and 3 months); to
- 3 - Long term (more than 3 months to permanent).

Intensity

Concentration of an emission or discharge with respect to standards of acceptability that include applicable legislation and international guidance, its toxicity or potential for bioaccumulation, and its likely persistence in the environment. And degree/permanence of disturbance or physical impact (e.g. disturbance to species, loss of habitat or damage to cultural heritage). Ranges from:

- 1 - A low intensity event; to
- 2 - A moderate intensity event; to
- 3 - A high intensity event.

Overall, event magnitude was scored from low (1) to high (12) by adding the individual parameter scores:



Resulting individual ratings were summed to give the overall event magnitude ranking. The Table below presents the score ranges for magnitude rankings of Low, Medium and High.

Table 7-1 Event Magnitude Rankings

Event Magnitude	Score (Summed Parameter Rankings)
Low	1 - 4
Medium	5 - 8
High	9 - 12

7.1.2.1.2. Method for determining receptor sensitivity

Receptor sensitivity considered the type of receptor (namely, biological/ecological, human and physical receptor/feature); and was determined based on the following parameters, which are equally weighted and are each assigned a rating of 1, 2, or 3:

Biological/ Ecological Receptors

Presence ranges from:

- 3 – Internationally threatened species/protected area within the area impacted by the project activities during period of high sensitivity and during routine or reliably predictable peak presence; to
- 2 - Internationally threatened species/protected area within the area impacted by the project activities outside of period of high sensitivity or during routine or reliably predictable peak presence.
Internationally near threatened species within the area impacted by the project activities during period of high sensitivity and/or during routine or reliably predictable peak presence.
Nationally protected species and/or species which are of importance to the local and regional ecosystem within the area impacted by the project activities.
- 1 - Presence of species which is none of the above.

Resilience (to the identified stressor) ranges from:

- 3 - Species and/or population which has little or no capacity to absorb or adapt to change (i.e. little or no capacity to move away from or adapt to the project impact), leading to potential for substantial change of character and/or loss of ecological functionality.
- 2 - Species and/or population which has moderate capacity to absorb or adapt to change (i.e. has capacity to move away from or adapt to the project impact), leading to potential temporary but sustainable effect which does not substantially alter character or result in significant loss of ecological functionality.
- 1 - Species and/or population has high capacity to absorb or adapt to change (i.e. has capacity to move away from or adapt to the project impact) and is potentially unaffected or marginally affected.

Human Receptors

Presence ranges from:

- 3 - People being permanently present (e.g. residential property) in the geographical area of anticipated impact; to
- 2 - People being present some of the time (e.g. commercial property); to
- 1 - People being uncommon in the geographical area of anticipated impact.

Resilience (to the identified stressor) ranges from:

- 3 - Most vulnerable groups (i.e. ambient conditions such as air quality are at or above adopted standards); to
- 2 - People being vulnerable to change or disturbance (i.e. ambient conditions such as air quality are below adopted standards); to
- 1 - People being least vulnerable to change or disturbance (i.e. ambient conditions such as air quality are well below applicable legislation and international guidance).

Physical Receptors/Features:

Presence (to the identified stressor) ranges from:

- 3 - Presence of feature which has, in reverse order, national or international value (e.g. state protected monument); to
- 2 - Feature with local or regional value and is *sensitive* to disturbance; to
- 1 - Feature which is none of the above.

Resilience (to the identified stressor) ranges from:

- 3 - Highly vulnerable (i.e. potential for substantial damage or loss of physical integrity);
- 2 - Undergoes moderate but sustainable change which stabilises under constant presence of impact source, with physical integrity maintained; and
- 1 - Feature/receptor is unaffected or marginally affected (i.e. resilient to change).

Overall, receptor sensitivity was then be scored on a scale from low (1) to high (6) by adding the individual parameter scores:



The Table below presents the score ranges for sensitivity rankings of Low, Medium and High

Table 7-2 Receptor sensitivity ranking

Receptor Sensitivity	Score (Summed Parameter Rankings)
Low	1 - 2
Medium	3 - 4
High	5 - 6

7.1.2.2. Socio-economic impacts

The socio-economic impact assessment used a semi-qualitative assessment approach to describe and evaluate potential impacts based on the event magnitude and receptor sensitivity rankings set out in the tables above. Indirect socio-economic impacts (i.e. induced effects) was also assessed using a similar approach.

Table 7-3 Event Magnitude Rankings

Magnitude	Criteria
Low	<p>Changes in social, economic or cultural dynamics with slight and temporary effect on any given sector performance and/ or population wellbeing. These impacts are unlikely to result in concerns being raised by governmental bodies or stakeholders.</p> <p>Events may include:</p> <ul style="list-style-type: none"> • Minor disruption to livelihoods or living conditions resulting in a localized, reversible and temporary nuisance; • Temporary disruption to businesses that does not result in a loss of revenue or any reputational damage; • No change in the health status of local communities; and • Temporary disruption to public infrastructure (such as a road closure) that results in minor inconveniences to affected communities.
Medium	<p>Changes in social, economic or cultural dynamics with moderate and noticeable adverse effect on any given sector performance and/or population wellbeing. Such impact may result in concerns being raised by governmental bodies or stakeholders.</p> <p>Events may include:</p> <ul style="list-style-type: none"> • Negative change in livelihood status, household assets/income or living conditions; • Temporary disruption to businesses resulting in a small drop in business revenue; • Increased risk to public health that can be controlled using detailed mitigation measures; and • Disruption to public infrastructure that results in an inconvenience to other users.
High	<p>Changes in social, economic or cultural dynamics with major adverse effect on any given sector performance and/or population wellbeing. Such impacts may result in immediate intervention by governmental bodies and stakeholders.</p> <p>Events may include:</p> <ul style="list-style-type: none"> • Negative change in livelihood status, household income/assets or living conditions affecting a high proportion of people resulting in economic loss and protests against the project; • Reputational damage and/or drop in business revenue that threatens the future viability of the economic activity; • Increased risk to public health leading to a fatality or injury to a member of a community; and • Damage to public infrastructure leading to environmental or socio-economic impacts to other users.

Table 7-4 Receptor sensitivity ranking

Sensitivity	Criteria
Low	<p>Receptor sensitivity will be considered low when there is a moderate to high capacity and means to adapt to a given change and maintain / improve quality of life.</p> <p>Receptors of low sensitivity may include:</p> <ul style="list-style-type: none"> • Individuals who are able to quickly adapt to temporary disruption in their living conditions, livelihood status or a change in the status of public infrastructure (such as a road closure); and • Businesses with a robust economic model that are able to adapt easily to any restrictions placed upon their activities, or who are able to gain economically from such changes.
Medium	<p>Receptor sensitivity will be considered medium when there is limited capacity and means to adapt to a given change and maintain / improve quality of life.</p>

Sensitivity	Criteria
	<p>Receptors of medium sensitivity may include:</p> <ul style="list-style-type: none"> • Individuals who rely heavily on their livelihood to maintain their socio-economic status and have a limited ability to adapt to change; and • Businesses that have a limited ability to adapt to change and are sensitive to any reduction in economic revenue or reputation.
High	<p>Receptor sensitivity will be considered high in the case of vulnerable receptors, who have little capacity and means to adapt to a given change and maintain / improve quality of life (e.g. homeless people, Internally Displaced Persons community in temporary accommodation, people with low access to recourse (e.g. no land titles), people with no or low representation (e.g. migrants, seasonal herders with no permanent assets in the area).</p> <p>Receptors of high sensitivity may include:</p> <ul style="list-style-type: none"> • Individuals with a marginal livelihood, low socio-economic income or poor-quality living conditions; • Individuals who are vulnerable due to their age, disability or other reason and who may require special assistance during engagement activities; and • Businesses with a marginal economic existence which are not able to easily adapt to change.

7.1.2.3. Environmental and socioeconomic impact significance

For both environmental and socioeconomic impacts, **impact significance**, as a function of **event magnitude** and **receptor sensitivity**, was ranked as **Negligible**, **Minor**, **Moderate** or **Major** as presented in the table below.

Table 7-5 Impact significance

		Receptor Sensitivity		
		Low	Medium	High
Event Magnitude	Low	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	High	Moderate	Major	Major

Any impact classified as Major was considered to be significant and, where the impact was negative, required additional mitigation. Impacts of Negligible, Minor or Moderate significance were considered as being mitigated as far as practicable and necessary, and therefore, would not require further mitigation.

8. Potential impacts and mitigation measures

This Section identifies the potential risks and impacts, and defines a set of environmental and social mitigation and management measures that can be taken during the implementation of the project to avoid, minimize, or compensate/offset for risks and adverse environmental and social impacts

8.1. Impacts on air quality

8.1.1. Construction phase impacts

Construction activities are likely to generate air pollutants which will have potential to adversely affect the local air quality, and thereby affect human and vegetation health. The air pollutants include:

8.1.1.1. Dust

The project area is mainly rural, and most local roads are of earth or gravel standard. The edges of most of these roads are covered by vegetation such as grass, shrubs and trees. Dust levels along these roads are ordinarily low, with an appreciable increase during the dry season. Construction activities such as site clearance (both at the treatment works and along the pipeline alignment), vegetation removal and grading, excavations/earthworks, stockpiling of materials and spoils, and vehicular movements in the project area will generate additional dust and affect the local air quality.

Once airborne, dust will generally travel downwind before resettling. The distance travelled depends primarily on wind speed and particle size. For example, smaller particles and strong winds result in greater dilution effects but mean that the dust is deposited over a larger area.

The potential impacts are nuisance and adverse health effects on workers and people in the surrounding area, coverage of crops (possibly leading to reduced yields) and deposition on natural vegetation especially during the dry season.

The long-term impact of nuisance dust will decline as disturbed areas of land re-vegetate. Due to the temporary nature of construction, dust emissions are not anticipated to have a long-term impact on local air quality.

8.1.1.2. Exhaust emissions

Construction vehicles and machinery are likely to emit oxides of carbon, nitrogen, and sulphur. Emission levels will depend on the state of maintenance of the vehicles and machinery, and the type of fuel used. Exhaust gases will be quickly diffused in light wind conditions and would most probably only affect receptors in close proximity to the point source.

8.1.1.3. Open-burning emissions

Disposal of waste (vegetation and other combustible materials) by burning -though highly discouraged at project sites, might be undertaken, and will cause local air pollution in the emission of gases and particulate matter. There is the additional risk of spread of fire to unintended areas with potential to cause damage/destruction of property and vegetation.

8.1.1.4. Impact significance

Due to the nature of the construction process, emissions will not be constant and will fluctuate according to the operating periods for each item of plant and the combination of combustion-engine machinery being used at any one time. The emissions are likely to be of low to medium significance due to the localized nature. The location of emission sources will also change as the construction spread progresses especially along the pipeline route. Potential receptors, such as residents in local villages and flora and fauna will not, therefore, be continually exposed to construction emissions for extended periods. Other mitigating aspects include a high diffusion potential from favourable meteorological conditions that enhance dispersion.

Pollution from exhaust emissions is also dependent on the maintenance conditions of the engines.

Table 8-1 Nuisance and health effects on humans

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	2	2	1	6	Medium

Human Receptors		Receptor Sensitivity	Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience			
2	2	4	Medium	Moderate

Table 8-2 Adverse impacts on natural vegetation

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	2	2	1	6	Medium
Biological Receptors		Receptor Sensitivity	Receptor Sensitivity Ranking	Impact Significance	
Presence	Resilience				
1	3	4	Medium	Moderate	

8.1.1.5. Air quality management

In order to control point source and fugitive emissions that may occur during construction of project components, the following measures should be implemented:

- Maintenance of equipment and machinery to manufacturers' specifications by regular servicing to maintain efficiency in combustion and reduce carbon emissions;
- Use environmentally friendly fuels such as low sulphur diesel;
- Minimize idling of machinery;
- Ensure no burning of waste on sites/non-designated areas;
- Regular sprinkling of all active construction areas;
- Control of construction vehicle speeds by imposition and enforcement of speed limits especially along access roads;
- Rehabilitation of disturbed areas once completed;
- Use of tarpaulins to cover trucks carting away spoil using public roads. Additionally, the trucks should maintain at least two feet of freeboard;
- Proper planning of transportation of spoil to ensure that the number of trips and/or the number of vehicles used is minimized;
- Provision of appropriate Personnel Protective Equipment (PPE) such as dust masks to site workers; and
- Monitoring of local air quality at selected construction sites and accesses especially where settlements are in close proximity

8.1.2. Operation phase impacts

Project operations are unlikely to have any significant impact on the local air quality. The likely source of impact is project vehicle movements along earth roads in the project area during normal operations. The number of vehicles and the use of vehicles on earth roads, and hence disturbance to the ground surface during operation, will be very low (negligible).

Dust mitigation measures, including appropriate driving speeds and the use of designated accesses will, however, still be implemented.

8.2. Impacts on ambient noise and vibrations levels

8.2.1. Construction phase impacts

The predominantly rural nature of the project area means that significant point sources of noise are absent, except in the towns and trading centres, and along the main highway. Noise sources in the urban areas are from various commercial and industrial activities, and vehicular traffic which blend into a din typically exceeding the WHO² and NEMA³ guideline values of 55dB. Elevated background noise levels along the highway are attributable to roadway noise and increase with higher vehicle speeds.

² Guidelines for Community Noise, World Health Organization (WHO), 1999

³ The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

Construction works (mainly excavations and breaking of rock), carting away of spoil and the use of machinery/equipment will introduce new sources of noise and vibrations at construction sites and the immediate surroundings, resulting in elevated noise levels.

8.2.1.1. Impact significance

Elevated noise and vibrations levels during construction of the treatment works and pipeline may be of some nuisance to the neighbouring public to the construction sites. The increase in traffic movements on minor roads may cause a noticeable increase in daytime noise levels through the settled areas. This effect will be localized and temporary, and will, for the most part, be restricted to the construction phase of the project. In addition, due to the nature of the construction process, noise levels will fluctuate in line with operating periods and the combination of machinery being used at any one time. Noise levels will also vary depending on time, and distance as the construction spread progresses especially along the pipeline route.

Local residents will not, therefore, be continually exposed to elevated noise levels for extended periods.

Table 8-3 Vibrations and noise nuisance

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	2	2	1	6	Medium
Human Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
3	1	4		Medium	Moderate

8.2.1.2. Noise management

The significance of noise impacts depends on whether the construction activities will increase noise levels above the existing ambient levels by introducing new sources of noise. Noise impacts would be considered significant if the activities would result in the following:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the applicable standards for noise;
- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels;
- A substantial permanent increase in ambient noise levels (more than 3dBA) in the project vicinity above levels existing before the project; and
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing before the project.

The following noise-suppression techniques should be employed to minimize the impact of temporary construction noise at project sites.

- Portable hoods should be installed to shield compressors and other small stationary equipment where necessary;
- Pumps, generators and other mobile equipment should be sited as far as practicable from residential homes and other noise sensitive locations;
- The contractor should endeavour to use equipment installed with noise abatement devices as much as practicable;
- Idling time on trucks and other noisy equipment should be limited to a minimum. Drivers should be encouraged to turn off vehicle engines when not in use, and avoid unnecessary hooting or revving of engines;
- Personal protective equipment such as noise-cancelling ear muffs should be provided to workers at the sites as necessary; and
- Monitoring of the grievance mechanism register for noise-related grievances from stakeholders

Noise monitoring is also proposed especially at noise-sensitive receptor locations (such as homesteads) proximal to construction sites and accesses.

8.2.2. Operation phase impacts

Noise and vibrations are not expected to increase considerably during the operation phase of the water supply project. The likely sources of noise are the installed pumps (centrifugal pumps and compressors/air blowers) at the Water Treatment Plant and booster stations along the pipelines at Cheboin and Longisa. These pumps will generate some noise in normal filter backwash operations and in uplift of water to storage tanks at Tiroto hill and the existing Longisa water treatment works.

Pump noise will not be significant and is unlikely to be audible well beyond the WTP or booster station boundary. Regular servicing of the pumps and installation of some acoustic shielding/noise attenuation features within the pump room can generally reduce noise to tolerable levels. The significance of this impact during operations is assessed as **Minor**.

8.3. Visual and landscape impacts

There are two recognized types of visual impact: intrusion and obstruction. Visual intrusion occurs when a pre-existing view of the landscape is encroached upon adversely by a new element which is of a poorer visual quality. Conversely, visual obstruction results from such a feature blocking and preventing visibility of any pre-existing view. Visual impact is brought about by one or a combination of three factors:

- Elements which contrast in terms of form, height, mass, colour thereby creating incongruity in the landscape;
- Perceived negative association with industrial processes, dereliction and disturbance
- Long-term and therefore perceived permanent duration.

The factors are affected by:

- Meteorological conditions: such as rain, strong sunlight, cloud cover;
- Topographic position of facilities/infrastructure in relation to surrounding relief;
- Observer characteristics – psychology, age, reason for presence;
- Viewpoint characteristics – nature, sensitivity and distance;
- Geology – affects slope angle, and method of working;
- Method of working – affects processing, progressive restoration, transportation

8.3.1. Construction phase impacts

The aspects of the project that will impact on the landscape and visual integrity of the area are the clearance of natural and planted vegetation for permanent components such as the intake works, treatment works, pipelines, access roads, and the temporary use of land for construction (the pipeline ROW, construction camps and materials storage yards).

8.3.1.1. Impact significance

During construction, the visual integrity of the landscape will be reduced since the pipeline ROW, and the temporary facilities will be visible from the time of vegetation or topsoil removal until restoration is complete and vegetation has re-established fully. The pipeline and pumping stations construction works will be highly visible since these will be along road reserves (for pipelines) and adjacent plots (for the pumping stations). On the other hand, the intake works will be located inside the forest while the WTP will be located on a river valley, and there will be few vantage points along public roads that would offer views to these sites during construction activities.

In all areas of construction activities, items such as large machinery/equipment, earthworks, pipe sections and other vehicles will be visible throughout construction. This is a temporary impact, the duration of which will be minimized by the prompt removal of vehicles, plant and materials on completion of the works.

It is expected that all arable land disturbed during construction will recover soon after restoration. However, natural and semi-natural habitats with slow growing plants may take longer to recover.

Table 8-4 Visual disturbance effects on humans

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	2	2	1	6	Medium
Human Receptors		Receptor Sensitivity	Receptor Sensitivity Ranking		Impact Significance
Presence	Resilience				
2	1	3	Medium		Moderate

Table 8-5 Adverse impacts on natural vegetation

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	2	2	1	6	Medium
Biological Receptors		Receptor Sensitivity	Receptor Sensitivity Ranking		Impact Significance
Presence	Resilience				
1	2	3	Medium		Moderate

8.3.1.2. Visual and landscape impact management

All disturbed areas should be restored in accordance with the project's restoration specification. The Contractor should prepare a Restoration Plan for the project based on the specifications. The main objective of restoration of the sites should be to return the visual integrity of the landscape as closely as possible to its previous condition.

Wherever possible, the removal of existing mature trees which form important visual focal points should be avoided. Provided that the integrity of the pipelines is not jeopardized, any removed trees should be replaced during the restoration phase using indigenous species, preferably of local provenance. It will be necessary to protect newly planted trees from browsing animals.

8.3.2. Operation phase impacts

Once the temporary working areas have been restored, much of the landscape will return to its former condition. However, the permanent works such as intake works, WTP, pumping stations and storage tanks are permanent and visible features of the project. The pipelines will be buried with the only visible components being valve chambers and marker posts. The pipelines will therefore have **negligible** visual impacts during their operational life.

The WTP, storage tanks and pumping stations will be the most prominent project features, mostly contrasting in form, height, and colour with the surrounding landscape. The visual impact is expected to range from **minor** to **moderate** depending on location of each facility.

To minimize the visual impact of the facilities, the roof and walls of the buildings can be painted with a shade of green color to blend with the surrounding vegetation. Alternatively, planting and maintenance of vegetation around the facilities will enhance the visual integrity of the sites.

8.4. Impacts on water resources, ecology and biodiversity

8.4.1. Construction phase impacts

8.4.1.1. Water quality degradation

8.4.1.1.1. Spillage of contaminants

Various risks to water quality could arise from sources of pollution during construction including spillage of fuels, lubricants and other toxic materials at construction sites, discharge of silt laden runoff from sites, and the inadequate treatment and disposal of waste and wastewater from worker facilities.

Materials such as oil, diesel fuel, concrete additives, and solvents are likely to be stored and used on construction sites and lay down areas and in construction vehicles and equipment. Storage and handling of these materials could lead to spills on site, along roads and in surrounding areas.

Contaminated run-off from spill sites could adversely affect soils and vegetation and if it reaches the river, would have an adverse impact on water quality. The extent of impact would depend on the size, frequency and timing of spills in relation to flow conditions in the receiving waters and the nature of the materials involved including their toxicity and likelihood for bio-magnification or bio-accumulation.

Table 8-6 Contamination of water resources by spillages

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
2	1	1	1	5	Medium
Physical Receptors		Receptor Sensitivity	Receptor Sensitivity Ranking		Impact Significance
Presence	Resilience				
2	2	4	Medium		Moderate

The risk of water pollution from these sources can be reduced by adopting protective measures to prevent spills and establishing suitable spill response plans to be implemented in the event of accidents occurring.

Suitable measures to collect, treat and dispose of chemical wastes will also be required. With good construction site practices, the risk of water pollution from spills and waste could be downgraded to **Minor**.

8.4.1.1.2. Erosion and sedimentation

Erosion and sedimentation levels in the upper reaches of Nyangores River are low, but these increase with movement downstream due to increased agricultural activities in riparian areas.

Soil disturbance is likely to occur at a number of locations, including around intake works site quarries/borrow pits, workers' camp, along the pipeline route and WTP location. Significant disturbance will arise from excavation of soil and rock for foundations, trenching, and grading. Access roads to these sites will also be created to enable construction vehicle movement.

Loosening of soils and compaction in other areas by construction traffic has potential to cause soil erosion and pollution of the river with silt. The increased sediment load is likely to affect water quality with consequent effects on river habitats and species.

Cleaning and hydro-testing of the pipeline will also be carried out prior to commissioning, and this may require significant volumes of water depending on the length of pipe being tested at a time. The principal hazard introduced by hydro-testing is in the event of a failure of the line under test, resulting in the unplanned discharge of water. This could result in local erosion, particularly in poorly consolidated soils and pollution of water resources with silt.

The significance of the impact of soil erosion on water resources during construction is considered to be **Major**.

Table 8-7 Siltation of Nyangores River by construction activities

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
3	2	2	3	10	High
Physical Receptors		Receptor Sensitivity	Receptor Sensitivity Ranking		Impact Significance
Presence	Resilience				
2	2	4	Medium		Major

The risks of soil erosion and degradation can be significantly reduced by adoption of good construction site management practices, such as establishment of vegetative buffer zones, slope stabilization, protection of soil storage areas, controlled site drainage and use of sediment traps. With suitable mitigation, the impact of sediments on water quality is likely to be **Moderate to Minor**.

8.4.1.1.3. Direct discharge of waste into the river

Facilities and/or activities will generate liquid wastes such as sewage, concrete wash water and/or other wastewater which if not appropriately managed, could result in direct flows into Nyangores River.

Inappropriate disposal of waste and wastewater from the construction camp and sites would have negative effects on local water quality causing loss of aquatic organisms. The extent of impact will depend on the location of discharge points and the dilution potential of receiving waters.

Table 8-8 Contamination of water resources by direct discharges

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
2	2	1	2	7	Medium
Physical Receptors		Receptor Sensitivity	Receptor Sensitivity Ranking		Impact Significance
Presence	Resilience				
2	2	4	Medium		

Impacts on water quality could include reduction in dissolved oxygen levels, nutrient loading causing increased algal growth, and the spread of pathogenic disease vectors. Uncontrolled discharge of waste would have a **Moderate** adverse effect on water quality, but this could be mitigated by provisions for on-site waste and wastewater management during construction. This would reduce the magnitude of these impacts to **Minor**.

8.4.1.2. Increased water demand

Significant quantities of water are likely to be needed during the construction process. Much of the water required will be drawn directly from the river. The water will be required in mortar and concrete works, for drinking and cleaning purposes.

8.4.1.2.1. Impact significance

Although Nyangores is a perennial river, the flow dwindles during the dry season. The volumes of water abstracted for construction may therefore have a significant impact on the overall river flow, especially during the driest periods of the year. This may have a negative impact especially on those dependent on the river for domestic uses. It is opined that standard good construction site management practices would mitigate this effect, and therefore the significance of the effect is viewed as **Moderate**.

Table 8-9 Increased water demand

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
2	2	2	1	7	Medium
Physical Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
3	1	4		medium	Moderate

8.4.1.3. Management of construction phase impacts

To avoid and/or reduce impacts on water resources, the following measures are proposed:

- Establishment of a comprehensive spill control/response plan including:
 - Installation of secondary containment measures in areas where fuels, oils, lubricants etc. are stored and loaded or unloaded, including filling points;
 - Delivery of updated training to construction workers on safe and proper storage, handling, use, clean-up, and disposal of oils, fuels and other chemicals;
- Implementation of soil erosion control measures including:
 - Installation and maintenance of sediment traps in surface drains around construction areas;
 - Construction of the weir in the dry season when flows are low to limit the amount of sediment transported downstream;
 - Maintain as much riverine vegetation at the weir site as possible and maintain vegetative buffer zones alongside river and drainage channels during construction;
 - Minimize soil disturbance and excavation during wet season;
 - Discharge of hydro-test water in a manner to avoid erosion and deposition of sediments into watercourses
- The appropriate consents should be obtained for any abstractions from, and discharges to watercourses during the construction period;
- Provision of appropriate sanitary facilities at construction camp and sites, worker compounds and other construction facilities;

8.4.2. Operation phase impacts

8.4.2.1. Impacts of an in-channel barrier

A 5m-high weir will be constructed across Nyangores River to enable diversion of flow into the intake works. The presence of an in-channel barrier has two main impacts on a river ecosystem: it disrupts longitudinal connectivity, fragmenting the river; and alters the in-channel environment and thus physical habitat.

The disruption of the longitudinal continuum caused by a weir hinders the natural downstream movement of sediment, particulate organic matter, nutrients, aquatic species, and plant propagules. The upstream and downstream movement of fish is also affected, preventing access to spawning or feeding grounds and threatening life-cycle completion.

A weir also alters the nature of the physical habitat. The raised water levels upstream of the weir reduces flow variability, velocity and turbulence and induces fine sediment deposition creating a lentic environment in the weir pond. The lentic environment created exhibits lower biodiversity and distinctly different populations of benthic algae and macrophytes, macroinvertebrates, riparian vegetation and fish relative to un-impounded reaches.

In contrast, the higher velocity, more turbulent and sediment-deprived flows downstream of the weir erodes bed sediment, creating scour holes, bank undercutting and downstream bar formation, although this is localised around the base of the weir (Anderson, Moggridge, Warren, & Shucksmith, 2014). Some studies have

suggested that the increase in habitat diversity downstream of weirs may be beneficial, providing spawning areas for fish and key habitats for macrophytes and invertebrates.

Table 8-10 Impacts of an in-channel barrier on Nyangores River

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
2	2	3	1	8	Medium
Physical Receptors		Receptor Sensitivity	Receptor Sensitivity Ranking		Impact Significance
Presence	Resilience				
2	2	4	Medium		Moderate

8.4.2.2. Impacts of water abstraction/flow depletion

River discharge controls the diversity and availability of habitats, such as riffles, runs, pools, backwaters and floodplains. Low flows reduce volume, area and depth of aquatic habitat and change the instantaneous velocity of rivers (Benejam, et al., 2016). Abstraction for consumptive use permanently reduces the normal flows in the river downstream of the abstraction point. Nyangores River forms part of the headwaters for the Mara River which is a lifeline of the Masai Mara – Serengeti ecosystem supporting wildlife, livestock grazing and small-scale irrigated agriculture. The increasing abstractions from the Mara basin will, in the future, severely degrade the riverine ecosystem and even impinge upon the most basic water needs of people living along the river (Tamataamah, 2015).

A hydrological assessment of Nyangores River was carried out to assess its capacity to meet the Project's water demand of 18,000m³/d. The assessment established that the river could not meet this demand in the months of January, February and March, which are the driest months of the year. The largest deficit would be in the month of March where the river would only meet about half of the project's demand. Abstraction at full demand during the dry season would reduce environmental flows (Q95), and this could cause an alteration of the physical habitat with consequences for organisms and ecosystem functions, and habitat connectivity. The impacts of abstraction are comparable to those of diversion for a small hydropower scheme. Studies of the effects of diversion of water for small hydropower plants have shown that impacted reaches have significant lower presence of total refuges for fish, poorer structure of habitat, lower frequency of riffles but higher of pools, shallower water levels and lower presence of macrophytes (Benejam, et al., 2016).

8.4.2.2.1. Impacts on riverine habitat

Depleting flows as a result of abstraction potentially reduces lotic habitat downstream. Flow depletion also generally causes changes in habitat availability and water chemistry and reduced in-stream habitat complexity.

The reduction of habitat confines biota and may increase competition for food and space, potentially increasing dispersal to more suitable habitats downstream. Stretches affected by flow depletion have been found to exhibit altered riparian vegetation (often with reduced proportions of riparian species), macroinvertebrate and fish communities.

8.4.2.2.2. Impacts on connectivity

The disruption of longitudinal connectivity from in-channel barriers is exacerbated by reduced flows passing over the barrier. Potadromous⁴ fish species may be prevented from migrating downstream by the weir (particularly where there is no suitable bypass), as the reduced flow over the weir crest may discourage downstream passage. Abstraction may also hinder upstream migration through the creation of unsuitable habitat in depleted stretches and reduction in the required hydraulic conditions for weir passage. This exacerbation of a barrier's 'bottle neck' effect may increase predation risk (including overfishing) and thus population isolation and loss.

Various fish species of the genus *Barbus* sp., *Labeo* sp., *Clarias* sp. *Mormyrus* sp., *Bagrus* sp., *Chiloglanis* sp., *Haplochromis* sp., *Oreochromis* sp., and *Tilapia* sp. have been recorded from Mara River and its tributaries. In one fish study, *Clarias liocephalus* was the only species recorded on Nyangores River near the Kipng'eno Village Bridge (Tamataamah, 2015). The species belongs to the potamonic communities and is abundant in high mountain streams and torrents covered by rocky substrate. The species is highly sensitive to flow and largely absent in water having temperatures higher than 18°C. A possible cause of the low fish diversity at the sampling location was the Tenwek dam/weir and waterfall immediately downstream which is thought to curtail upstream fish migration.

⁴ Fish that are born in upstream freshwater habitats, then migrate downstream (still in freshwater) as juveniles to grow into adults before migrating back upstream to spawn

Table 8-11 Impact of flow depletion on river habitat and connectivity

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
2	3	3	2	10	High
Physical Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	
Presence	Resilience			Impact Significance	
2	3	5		High	
Major					

The fish study on Nyangores River made some recommendations on the reserve for various flows in order to preserve the flow-sensitive species *Clarias liocephalus* common in the river as presented in the Tables below.

Table 8-12 Recommended flows for the dry season low flows for drought years

Average Velocity (m/s)	Average Depth (m)	Discharge (m³/s)	Motivation	Consequences of not providing this flow
0.18	0.219	0.8	<p>The low flows during the driest month of a drought year are required to:</p> <ul style="list-style-type: none"> • Maintain hydrological connectivity in the system (upstream-downstream) • Maintain inundation of critical habitats (e.g., riffles) and maintain low water temperature necessary for survival of the moderately flow-sensitive species found at this site 	<ul style="list-style-type: none"> • Could have catastrophic effect on the survival of the species. • The species does not tolerate water temperatures above 18°C

Table 8-13 Recommended flows for the dry season low flows for maintenance years

Max Velocity (m/s)	Max Depth (m)	Discharge (m³/s)	Motivation	Consequences of not providing this flow
0.28	0.33	2.00	<p>These flows are required to:</p> <ul style="list-style-type: none"> • Inundate more riffle sections to increase habitat and fish species diversity • Maintain active channel flows to inundate benches and sustain emergent vegetation that fish need for shelter/cover • Flush out pools to improve water quality necessary to maintain the species. 	Will curtail optimal growth rate of <i>C. liocephalus</i> .

Table 8-14 Recommended flows for the wet season low flows for drought years

Max Velocity (m/s)	Max Depth (m)	Discharge (m³/s)	Motivation	Consequences of not providing this flow
0.28	0.33	2.00	<ul style="list-style-type: none"> • Inundate more riffle sections to increase habitat diversity for the species • Maintain active channel flows to inundate benches and sustain emergent vegetation used as shelter for fish and insects used as food for fish. 	<ul style="list-style-type: none"> • Limit available fish habitats resulting in low fish (and macroinvertebrate = fish food) standing biomass in that reach of the river.

Table 8-15 Recommended flows for the wet season low flows for maintenance years

Max Velocity (m/s)	Max Depth (m)	Discharge (m³/s)	Motivation	Consequences of not providing this flow
0.39	0.45	4.00	<ul style="list-style-type: none"> • Inundate vast areas of the channel (including lower bank aquatic vegetation – sedges and riffles) and increase habitat diversity • Increased habitat diversity would provide ample resources (shelter and food) enabling the species to attain good body condition index, fast growth rates and accumulate enough energy for successful spawning in the coming season 	<ul style="list-style-type: none"> • Will curtail optimal growth rate for all fish species in the river reach and result in stunted growth and low fish standing biomass • Will affect successful recruitment in the next spawning season.

- Adult fish which are poorly fed during resting period would have poor spawning and therefore poor recruitment success.

Table 8-16 Recommended flows for the wet season floods in a drought year

Max Velocity (m/s)	Max Depth (m)	Discharge (m ³ /s)	Motivation	Consequences of not providing this flow
0.56	0.63	8.00	<ul style="list-style-type: none"> • Prevent sediment build-up on river bed, thus increasing habitat variability for fish and invertebrates (fish food). • Sediment build-up could choke riffles which are critical for survival of the species; Maintain active channel features, flush out organic matter, thus improving water quality 	Curtail optimal growth rates of fish in terms of less living habitats and poor water quality

Table 8-17 Recommended flows for the wet season floods in a maintenance year

Max Velocity (m/s)	Max Depth (m)	Discharge (m ³ /s)	Motivation	Consequences of not providing this flow
0.71	0.78	13.00	<ul style="list-style-type: none"> • Maintain macro channel features and provide diversity of physical habitats for the species • Scour and flush the bed of sediment deposits to expose riffles which were clogged with sediments. Riffles are preferred habitats the species • Inundate and recharge larger higher banks, allowing for nutrient transfer into the main river channel (increase primary and secondary productivity). The species is predominantly an insectivore. 	Failure in recruitment success of the resident fish species. Less physical habitat due to sediment deposition on the river channel bed

8.4.2.2.3. Management of the catchment area

Watersheds provide water supply projects with essential ecosystem services including regulation of hydrologic regimes, and regulation of stream sediment loads. Poor environmental management of catchment areas by third parties, such as deforestation or unsustainable agricultural practices, can cause excessive sedimentation leading to higher Operation and Maintenance (O&M) costs, or a reduced/unreliable water resource.

8.4.2.3. Management of operation phase impacts

The following measures are proposed to mitigate the adverse impacts identified above:

- Adopt a dynamic abstraction regime to maintain the environmental flow requirements (Q95), including the flow requirements for *Clarias liocephalus* fish species;
- Undertake regular (preferably continuous) flow monitoring downstream;
- Seek an abstraction license from WRA and adhere to the conditions of the license;
- Cooperate with WRA in implementing the catchment abstraction management strategy to allow for adjustments/variation in licensing conditions which may be necessary following resource assessments. From time to time, WRA may reassess how much water may be abstracted and when. WRA through its monitoring network continually assesses the current and past water and ecological situation, gathering information on rainfall, river level and flows, groundwater levels and ecology. The information obtained may underpin licensing conditions, and thus the need for all abstractors to cooperate; and
- Collaborate with private and public-sector institutions (such as KFS), as well as catchment area landowners, in the development of watershed management programs that aim to reduce soil erosion and sedimentation rates of the river.

8.5. Impacts on soil resources

8.5.1. Construction phase impacts

Project construction will require earthworks involving site clearance, grading, topsoil removal, excavation for foundations and trenching for the pipelines. New accesses will also be created, graded and surfaced with suitable material. There will be significant cutting and grading with the carting away of soil at these locations.

The establishment of permanent works such as access roads will result in the permanent loss of soil from these sites. Along the pipelines, excavated soil from trenching will be stockpiled and re-used in backfilling and restoration after laying of pipes.

Compaction of soils during construction may occur where the bearing strength is exceeded by the weight of construction vehicles. This is most likely to occur along the pipeline ROW and unsurfaced access roads, which will be subject to repeated vehicle movements.

Construction activities will also entail use/handling of hazardous materials and generation of hazardous wastes with the likelihood of spillages or loss of containment. The hazardous materials include oils, fuel, grease, paints, solvents, curing compounds, adhesives, acids, soil stabilizers and binders etc. These materials require careful handling and storage to prevent spillage.

8.5.1.1. Impact significance

Soil compaction alters drainage characteristics and decreases the ability of vegetation to re-establish. Topsoil stripping at the various construction sites also breaks up the soil structure, and this may lead to an increase in erosion (from the topsoil and subsoil piles).

Hazardous materials spillage at construction sites and camp is likely to cause soil contamination and/or eventual surface/groundwater contamination. Vehicle, plant and machinery maintenance on site can also lead to soil pollution in the event of spillage of hydrocarbons (such as oil and fuel).

Impacts of soil erosion and contamination on the water environment have also been discussed in Section 8.4.

Table 8-18 Soil loss resulting from erosion and carting to spoil

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	2	2	2	7	Medium
Physical Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
2	3	5		High	Major

Table 8-19 Soil contamination from pollution incidences

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	2	2	2	7	Medium
Physical Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
2	3	5		High	Major

8.5.1.2. Soil resources management

To avoid compaction impacts outside construction sites, deviation from established access roads and paths should be restricted. During restoration of the pipeline ROW, the trench back-fill material should be compacted to a similar value to the original surrounding soils to avoid subsidence as a result of rain water channelling.

Adequate restoration following construction will help the subsequent re-establishment of vegetation and thereby reduce the risk of soil erosion. A project specific Restoration Plan should be prepared and should include mitigation for impacts to soils based on the following:

- Recreation of a stable landform that mirrors the pre-disturbed condition (e.g. contours, shape, level of compaction) as this will minimize the risk of preferential erosion and therefore facilitate natural revegetation;
- Ensuring protection of topsoil through separation from subsoil and storage in a manner that, as far as possible, retains the soil structure and seed bank and minimizes the risk of topsoil loss. Backfilling should start with subsoil, followed by topsoil; and

- Development of a bio-restoration methodology that enables the re-establishment of the pre-construction vegetation cover particularly the variety and distribution pattern of plant species, and establishment of sufficient vegetation cover to minimize erosion at disturbed sites.

Effort should be made to ensure that for both temporary and permanent restoration, disturbed sites exhibit no more than a moderate level of erosion potential. The Restoration works should be undertaken in a manner that achieves the following minimum standards:

- Very low risk of the depth of cover above the pipeline being reduced;
- Very low risk of off-site pollution and sedimentation;
- Low risk of damage to bio-restoration by washing-out of seeds and plants

To facilitate natural revegetation of the pipeline ROW (especially above the pipeline) and other disturbed areas, the separately stockpiled topsoil and vegetation debris should be spread over the surface of the ROW following completion of grading. Once the topsoil has been replaced, it should be stone picked to remove large stones, which are not in keeping with the surrounding soil texture. It should then be tined and cultivated as necessary to ensure effective re-vegetation.

To minimize any potential impact following hydrostatic testing of the pipeline, the release of hydrotest water should be undertaken in a controlled manner in order to avoid soil erosion or scour.

To prevent soil contamination and possible surface/ground water contamination, spillage prevention and control measures should be instituted where hazardous materials are stored in pallets and where possible under cover in secondary containment. Ample supplies of clean-up materials should be kept and be readily accessible.

The Contractor should review spill response requirements at all applicable work sites and train workers on spill prevention and clean-up. Clean-up requirements should include the following:

- Immediately clean up leaks and spills;
- Use absorbent materials for large spills;
- Avoid hosing down or burying dry material spills; and
- Properly dispose of materials used to clean up hazardous materials.

Vehicle and equipment maintenance activities should be done as much as possible away from construction sites while a designated area away from drainage courses should be identified to carry out necessary onsite repair or maintenance activities. Drip pans and absorbent materials should be availed at these designated areas to manage spillages.

8.5.2. Operation phase impacts

Once the project is in operation, impacts on soil resources are likely to be from compaction by maintenance vehicle movements along unpaved access roads and tracks, and from erosion following unplanned events such as pipe failure. In summary, impact significance on soils during operations is assessed as **Minor**.

8.6. Impacts on energy resources

8.6.1. Construction phase impacts

Fossil fuels (mainly diesel) will be used in the running of vehicles and other motors at the construction sites. Fossil energy is non-renewable, and its use emits greenhouse gases and other air pollutants.

8.6.1.1. Impact significance

Construction activities for the project will not require significant volumes of fossil fuels. At the local scale, depletion of the resource is of little significance and is best analyzed/quantified at a national/global scale.

Table 8-20 Depletion of fossil fuel resources

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	1	1	1	4	Low
Physical Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
1	2	3		medium	Minor

8.6.1.2. Energy resource management

Despite the low impact on energy resources, it is prudent to institute measures to conserve fossil fuel since these also impact on local air and noise pollution levels. Proposed measures include:

- Minimize idling of machinery;
- Avoid overloading of trucks and machinery; and
- Regularly service vehicles, plant and machinery.

8.6.2. Operation phase impacts

The proposed treatment works will be connected to grid energy supply to meet the energy requirements of backwash pumps and lighting within the treatment works and the staff housing. Electricity will also be required to run the pumps at the pumping stations supplying the storage tanks at Tiroto and Longisa. Although there will be an increase in energy demand necessitating installation of pole-mounted transformers at the treatment works site and pumping stations, the demand is not expected to be significant. The significance of this impact is assessed as **Minor**.

8.6.2.1. Energy management

To ensure efficient energy consumption at the treatment works and pumping stations, energy saving technologies (mainly applied in the choice of electrical appliances) and management strategies should be applied. Staff at the treatment works and staff housing should be encouraged to adopt energy conservation measures such as the use of energy efficient appliances and switching off lights when not in use.

Energy use should be monitored during the project lifetime. Energy consumption meters should be installed with the involvement of the power distribution company, Kenya Power. Alternative sources of energy such as solar lighting should also be sought and exploited.

8.7. Impacts of generated waste

8.7.1. Construction phase impacts

Construction activities will generate inert, non-hazardous and hazardous wastes over the construction period. Wastes likely to be generated during construction include spoils (soil and rock from excavations), vegetation (felled trees, shrubs, stumps and their root systems) packaging materials used for packing cement, plastics, reject materials including damaged bricks/blocks, and leftovers/excesses, wastewater (concrete washout and hydrostatic test water) etc.

The Construction camp will need to dispose of ordinary waste (from the kitchen, offices and other areas) sanitary waste (sewerage and wash water), and maintenance wastes (from maintenance of plant and machinery at the camp). Although the location of the construction camp is yet to be determined, it is unlikely that there will be a suitable waste disposal site proximal to the camp location. The Contractor will be required to device acceptable means of disposal of the generated waste.

8.7.1.1. Impact significance

Improper waste management at construction sites and camp will interfere with the aesthetic status of the surrounding while creating health and safety hazards. Improper disposal of the wastes off-site could also cause nuisance, health and safety hazards, and create breeding grounds for vermin.

Table 8-21 Pollution and health & safety hazards from poor management of wastes during construction

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
2	2	2	2	8	Medium
Human Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
3	2	5		High	Major

8.7.1.2. Construction phase waste management

The following measures are proposed to manage wastes generated at the sites:

- Land-fill spoils as much as possible within the sites or identified fill areas;
- Felled trees, shrubs and stumps can be isolated for collection by locals as firewood;
- Organic wastes can be composted on site;

- Provide pit latrines at the camp and construction sites for use by workers. The pit latrines should be backfilled upon project completion;
- Vehicle maintenance should as much as possible be done off-site (at the construction camp's garage/workshop or commercial garage) and wastes (used oil, oily rags, cans and used parts) disposed in a designated area. Where maintenance must be carried out on site, wastes generated should be carted away from site for disposal in designated area(s). Disposal in this case should be by burying in a deep pit;
- The Contractor should ensure that construction materials left over at the end of construction are used elsewhere rather than be disposed of; and
- The Contractor should put in place measures to ensure that construction material requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal. Additional measures for minimization of solid waste during construction of the proposed Project could include the use of durable, long-lasting materials that will not need to be replaced often, thereby reducing the amount of construction waste generated over the project lifetime.

8.7.1.2.1. Concrete waste management

Concrete will be used in establishment of foundations, construction of intake works, treatment works facilities, pumping stations etc, and there will be wastes arising from its use. The following measures are proposed for concrete waste management

- The Contractor should avoid mixing of excess concrete if possible, and should discard excess concrete in a designated area away from water courses;
- Washing of concrete coated vehicles or equipment should be done off-site or in a designated wash area a minimum of 50 feet away from drainage channels. The runoff from the on-site concrete wash area should be contained in a temporary pit where the concrete can set; and
- The temporary pit should be lined with plastic or clay to prevent seepage of the wash water into the ground. The wash water should be allowed to evaporate or collected along with all concrete debris in a concrete washout system bin.

8.7.1.2.2. Hydrotest water disposal

Hydrostatic testing of the pipelines will be done to verify pipeline integrity i.e. ensure that field joints are watertight. A pipeline should be as hydraulically efficient as practical to conserve available head, and structurally safe to prevent failure. The pipelines will be tested in sections.

To the extent possible, hydrotest water should be discharged into the next section of the pipeline to be tested. If necessary, additional water can be added to make-up any losses or differences in lengths of test section. If less is required, the surplus water should be discharged in a manner that prevents erosion e.g. by discharge on vegetated ground.

8.7.2. Operation phase impacts

The water treatment process will generate waste from coagulation/flocculation, sedimentation and filtration processes. The wastes are expected to emanate from sedimentation basins and filter backwashes and will contain solids derived from suspended and dissolved solids in the raw water, the addition of chemicals, and chemical reactions. The sludge generated, if not properly disposed, has potential to contaminate the underlying soil, surface and ground water resources.

Sludge production is entirely dependent on the raw water quality, the method of treatment, and efficiencies of the treatment process, and therefore varies in characteristics and quantities from time to time. The categories of waste expected from the WTP include:

8.7.2.1. Coagulant sludge

The sludge will be generated from use of aluminum sulfate (alum) as a coagulant to remove turbidity. Alum coagulation sludge will contain aluminum hydroxide, clay and sand, colloidal matter, microorganisms including algae and planktons, and other organic and inorganic matter present in the raw water.

8.7.2.2. Filter backwash wastewater

The wastewater will be produced during the filter washing operation. The filters will be washed daily and this will generate a large volume of wash water (about 5% of the water filtered) with low solids content. The

composition of backwash wastewater will be similar to that of coagulant sludge, but with much finer particles. The wastewater will contain hydroxides of aluminum and iron, fine clay particles, added chemicals and reaction products which did not settle in the sedimentation tank, and a small portion of filter media.

8.7.2.3. Domestic waste

Staff houses at the WTP and pumping stations will also generate domestic waste and sewerage which will require proper disposal to prevent environmental pollution.

8.7.2.4. Impact significance

Poor management of these wastes will cause environmental pollution and health and safety hazards to the local community.

Table 8-22 Pollution and health & safety hazards from poor management of wastes during operations

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	3	3	1	8	Medium
Physical Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
2	2	4		Medium	Moderate

8.7.2.5. Management of generated wastes

8.7.2.5.1. Management of sludge

Management of sludge could include minimizing sludge production, sludge treatment, land application, or disposal into an existing sewer system such as the Bomet Town sewerage system.

Sludge generation can be minimized by the removal of water to reduce the sludge volume, reduction of the solids content present in the sludge, or a combination of both. Sludge production could also be minimized through a reduction of chemical dosage (alum), direct filtration of the water, recycling of filter wash water, substitution of coagulant, or chemical recovery.

Sludge treatment could be achieved through:

- **Co-treatment** – the treatment of alum sludge with the sludge from a wastewater treatment plant. Alum sludge can be discharged into the existing Bomet town wastewater treatment plant where it can be thickened and mixed with the wastewater sludge, followed by dewatering at a proper pH. The alum sludge can serve as a useful wastewater sludge conditioner, rather than a nuisance.
- **Pre-Treatment** – This includes flow equalization, solids separation, and solids concentration or sludge thickening. One of these methods or a combination of the three can be used in pre-treatment.
- **Dewatering of sludge:** Sludge can be dewatered through non-mechanical methods such as lagooning, drying on sand beds, or chemical conditioning

Ultimate disposal of the WTP sludges could involve incineration, disposal into the existing sewer system for Bomet town, composting, spreading on land as soil conditioner or fertilizer, or landfilling.

8.7.2.5.2. Management of backwash water

The backwash wastewater from filter washing operations will be recycled into the system. Recycling of this wastewater has the advantage that less raw water from the river is required (than when the waste water is discharged into the river), and that the water has less solid content thus lighter requirements in treatment.

8.7.2.5.3. Management of domestic waste and sewerage

Domestic waste generated at the treatment works staff housing should be segregated to enable composting of organic waste, recycling of paper and plastics and incineration of the incinerable waste. Efforts should also be made to minimize waste generation.

Sewerage generated should be disposed in a septic tank with a soak pit. The septic tank should be properly maintained to forestall any malfunction.

8.8. Geology and geo-hazards

8.8.1. Construction phase impacts

Impacts on local geology will be limited as no blasting is expected to be necessary in the project. However, the risk of localised landslides, debris flows, and rock falls exists during construction of the pipelines in hilly areas such as Kyogong, Tiroto, Mulot, Sigor and Longisa. These incidences can be triggered by human activity, including ground disturbance during construction of the pipelines and tank sites on hilly topography.

8.8.1.1. Impact significance

The risk of the geohazards is likely to increase especially if construction works (trenching activities) are carried out on steep slopes during the rainy season, and where slope stabilization is not carried out.

Table 8-23 Landslides and debris flow

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	1	1	1	4	Low
Physical Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
1	2	3		Medium	Minor

8.8.1.2. Management of geo-hazards

- Work on steep sections should be scheduled to avoid the rainy season, thus minimizing the risk of debris flow;
- Every effort should be made to stabilize cut-slopes and other loose ground following excavations to minimize the potential for landslides and debris flow;
- Discharge of hydrotest water during testing of pipes should also be carefully carried out to prevent dislodging of loose rocks and debris on steep slopes.

8.8.2. Operation phase impacts

In the event of pipeline failure and significant or extended leakage of water, the potential for landslide exists albeit at a Minor and localized scale especially where the topography is very hilly. This impact can be mitigated by the prompt shutting of supply and repair of the pipeline, and regular inspections and maintenance.

8.9. Impacts on occupational health and safety

8.9.1. Construction phase impacts

The construction works inevitably expose workers to health and safety risks. Some of the likely hazards include accidents on site (involving workers and machinery, or the public and construction works such as trenches and pits) or along accesses to the sites (involving construction vehicles and the public), or exposure to dust leading to pneumatic illnesses. Accidental fall into the Nyangores River and drowning are possible occupational risks that can occur during intake works construction.

The lack of provision of potable water for sanitation during construction can also lead to health hazards affecting construction workers at the compounds.

8.9.1.1. Impact significance

Whereas some incidences/accidents can be minor resulting in minor bruises/injuries, others can be serious to fatal resulting in both loss of life and destruction of property.

Table 8-24 Exposure of workers to health and safety hazards

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	3	2	2	8	Medium
Human Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
3	2	5		High	Major

8.9.1.2. Occupational health and safety management

To reduce accidents and hazards involving/ posed to workers, the contractor should develop and implement Site Health and Safety rules and regulations. Other health and safety measures should also include:

- Provision of all workers on site with the necessary Personal Protective Equipment (PPE), and ensuring a safe and healthy environment for the construction workers;
- Workers accidents during construction can be mitigated by enforcing adherence to safety procedures and preparing contingency plans for accident response. In addition, regular and frequent safety education and training should be emphasized;
- The Contractor should have qualified first aid personnel among the workers and maintain fully stocked first aid kits at the sites;
- The Contractor should ensure that workers are provided potable drinking water, and that all workers, including females, have access to appropriate and separate sanitary facilities at the sites and are provided with basic water, sanitation and hygiene training;
- The Contractor should develop and implement detailed and site-specific Occupational Health and Safety Management Plan and Emergency Preparedness and Response Plan;

8.9.2. Operation phase impacts

Once the project is operational, health and safety impacts will mainly be limited to activities at the intake works WTP and pumping stations. At the intake works site, and around sedimentation and filtration tanks, there is the risk of staff falling and drowning.

Energized equipment such as pumps electrical panels and other electrical equipment can pose electrical hazards for workers.

The use of chemicals such as alum and chlorine at the WTP also poses health and safety hazards to workers.

8.9.2.1. Impact significance

Table 8-25 Exposure of Staff to health and safety hazards during operations

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
1	3	3	1	8	Medium
Human Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
3	1	4		Medium	Moderate

These health and safety hazards can be mitigated through formulation and implementation of a health and safety policy and operation procedures that address the health and safety aspects of activities at project sites. Safety measures such as protection guard rails should be installed and maintained at all locations where there is a fall and drowning hazard.

Electrical equipment should be properly insulated, guarded and grounded in addition to provision of circuit protection devices (such as fuses and circuit breakers).

8.10. Impacts on community health, safety and security

8.10.1. Construction phase impacts

Poor construction management practices by the Contractor have potential to cause direct adverse effects on the safety, human health and wellbeing of the surrounding community. Such include inadequate management of air emissions, wastes generated, traffic and other safety hazards posed by construction sites or construction activities.

Any incident that harms a person has potential to diminish the quality of life for that person, negatively impacting them or their household livelihood, and potentially creating tension between the local community and project teams.

Indirect impacts on the community can be the introduction of new communicable diseases such as HIV/AIDS due to in-migration, poverty and prostitution. The extent of disease transmission between the communities and in-migrants would depend on the level of interaction between the two, the workforce size and health status of the workforce and casual migrants, and their susceptibility to disease infection. In addition, the living conditions, access to healthcare and workforce management would determine the significance of disease transmissions.

8.10.1.1. Temporary health and safety impacts during construction

During construction, works such as excavation, movement of materials and spoils, and the general increase in vehicular traffic is likely to increase dust and noise pollution in the project area. Consequently, it is likely that respiratory infections, eye infections (e.g. trachoma), hearing impairment, malaria, work-related accidents, and traffic accidents could increase in incidence.

8.10.1.1.1. Increased respiratory health incidence and eye infections

Dust emissions can irritate the eyes causing trachoma and respiratory problems. Although these problems are reversible, the long-term exposure to dust will have a serious impact on the health status of those close to construction areas. In addition, it is expected that the project transportation activities will increase the level of dust created in the local environment, especially in dry weather. Dust emissions from passing traffic will irritate the eyes and lead to an exacerbation of respiratory illnesses for those near key transport routes. Without mitigation, the significance of the impact is likely to be **Moderate**.

The impacts are likely to be most severe on the construction workforce. However, it is expected that the work force would be adequately protected with PPE, and therefore the significance can be downgraded to **Minor**.

8.10.1.1.2. Increased hearing impairment

In addition to the dust produced, noise levels are likely to significantly increase, especially from construction vehicles and machinery. Although intermittent, the noise levels during the peak construction period may cause hearing impairment, sleep disturbance, behavioural change or anxiety. The significance of the impacts would be **Moderate** but could be downgraded to **Minor** if these will only affect construction workers.

8.10.1.1.3. Increased incidence of accidents

The likelihood of a third-party accident occurring (for example a young child falling into an excavation area/trench) exists, especially because construction activities will take place near settlements. Based on the level of construction activities taking place and the level of public access to construction areas, the significance of the impact is likely to be **Moderate**.

8.10.1.1.4. Traffic nuisance and traffic accidents

The communities residing in the project area have settled along main transport routes and are most likely to be impacted by increased traffic. Likely impacts of increased construction traffic include nuisance from obstruction and slow movement of construction vehicles especially along the pipeline route and to facilities such as the WTP and construction camp, or traffic accidents.

Construction works and construction traffic are likely interrupt or inconvenience both vehicular and pedestrian traffic flow along the pipeline route and at road crossings. Minor road crossings will be accomplished by open trenching of one-half of the road at a time, maintaining one lane of through traffic at all times. Smaller rural roads may be closed to through traffic, following consultation with local officials and residents. It is important to maintain appropriate signs, barricades, and other traffic management measures to minimize road user inconvenience and promote safety during temporary closure of roads.

The overall significance of the impact is judged to be **Moderate** but this may reduce depending on mitigation and management measures in place, the severity of any accidents and availability of emergency health care to deal with such accidents.

Table 8-26 Nuisance and increased safety hazards to other road users

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
2	2	2	1	7	Medium
Human Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact significance
Presence	Resilience				
2	2	4		Medium	Moderate

8.10.1.2. Long term health and safety impacts during construction and operation

8.10.1.2.1. Introduction of new communicable diseases such as HIV/AIDS due to in-migration, poverty and prostitution

The extent of disease transmission between the communities and in-migrants would depend on the level of interaction between the two, the workforce size and health status of the workforce and casual migrants, and

their susceptibility to disease infection. In addition, the living conditions, access to healthcare and workforce management will determine the significance of disease transmissions.

The impact due to Acute Respiratory Infections (ARIs) is expected to be **Minor**, as the symptoms are easily treated, assuming diagnosis early on and access to healthcare is sufficient. However, the significance of the impact of acute communicable diseases such as HIV/AIDS or TB – which require immediate or complex treatment, are life threatening and/or are irreversible, is considered **Major**.

8.10.1.3. Management of impacts on community health, safety and security

8.10.1.3.1. Construction phase management measures

Implementation of specific management plans on housekeeping, waste, air quality, traffic, health and safety and pollution prevention will ensure that community health, safety and security is enhanced. Measures should include but not be limited to:

- Informing local communities of major activities in advance;
- Ensuring all dangerous construction sites are fenced off;
- Endeavour to lay pipelines and backfill as soon as possible to reduce the time of hazards exposure to the public from open trenches;
- Enforcing and monitoring road safety standards;
- Implementation of measures to prevent the entry of sediment from construction areas into local waterways;
- Following best practice to prevent the creation of breeding areas for vermin;
- Spraying construction areas and roads regularly with water to suppress dust emissions;
- Ensuring that potentially disturbing construction noise is not produced outside of working hours;
- Safety training, traffic management and a high prioritization of public safety by the Contractor
- Ensuring that the workers camp and construction areas are open only to formal employees;
- Developing and enforcing a strict code of conduct for workers to regulate behavior in the local communities;
- Providing awareness training to the workforce regarding the transmission of STDs, and traffic safety awareness;
- Provision of adequate sanitation and, if warranted, lodging facilities for workers;
- Provision of the workforce with access to healthcare.

The Contractor should also appoint one or more community liaison officers to work with communities to manage issues or anxiety surrounding incidents and accidents and to advice on the risks and dangers associated with the project.

A series of support measures to mitigate social, health and economic impacts can be provided to local communities. These could include:

- A local employment and sourcing policy to discourage in-migration, entailing a ban on the employment of casual migrants to the site, and the recruitment of labor through offices located away from the site;
- Informing local communities of employment and procurement opportunities;
- Supporting local healthcare facilities i.e. training of local healthcare professionals, supply of regular medical supplies and updated equipment;
- A community health program including support to existing or new local programs such as mother and child, nutrition, community health awareness, HIV/AIDS awareness, hygiene and immunization, malaria control measures, campaigns to raise traffic awareness, and local Voluntary Counselling and Testing (VCT) programs;

8.10.1.3.2. Traffic management

Traffic Management principles should be fully utilized and implemented by the Contractor to ensure safety, and prevention of nuisance to the public. A traffic management plan that minimizes the interface whenever possible between the public and construction traffic, reduces the number of Heavy Goods Vehicles (HGV) movements

where practicable, and controlling vehicular movements on the project sites should be developed and implemented. The traffic management plan should cover:

- Planning and managing both vehicles and pedestrian routes;
- The elimination of reversing where possible;
- Safe driving and working practices;
- Protection of the public;
- Adequate vision and lines of sight;
- The provision of signs and barriers; and
- Adequate parking and offloading areas.

Appropriate signs, barricades, and other traffic management measures, should be used to minimize road user inconvenience and promote safety during temporary closure of roads.

8.10.2. Operation phase impacts

During project operations, impacts on community health and safety could arise from traffic accidents involving the Project Operator's vehicles and the public, or geohazards created by pipeline failure. The potential impacts and mitigation measures for these impacts are alluded to in preceding sections of this Report. With proper measures, chances of occurrence of an incident are likely to be very rare.

8.11. Impacts on other natural resources

8.11.1. Construction phase impacts

Construction materials that will be used include masonry stones/bricks, aggregate, sand, cement, iron bars, steel pipes etc. These materials will be obtained from quarries, hardware shops and sand harvesters who extract such materials from natural resource banks such as river banks and land.

8.11.1.1. Impact significance

Unsustainable extraction of these resources can cause serious environmental degradation in the source areas.

Table 8-27 Environmental degradation at materials sites

Extent/Scale	Frequency	Duration	Intensity	Score	Event Magnitude
3	1	3	1	8	Medium
Physical Receptors		Receptor Sensitivity		Receptor Sensitivity Ranking	Impact Significance
Presence	Resilience				
2	2	4		Medium	Moderate

8.11.1.2. Raw materials management

The Contractor should source construction materials such as sand, aggregate and masonry stones from approved quarries and mining sites which have undergone satisfactory environmental impact assessment and are licensed according to the regulations. Since the approved quarries/mining sites are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated.

The Contractor should implement stringent inventory management mechanisms and only order for materials after an accurate estimation of actual construction requirements.

Where possible, building elements should be manufactured off-site and delivered to site, to maximize benefits of off-site manufacture including minimizing waste, maximizing recycling (because manufacture is in one location), high quality elements, better occupational health and safety management, less noise and dust.

8.11.1.3. Material delivery, storage, and use

The Contractor should provide appropriate training of workers on proper material delivery and storage practices and procedures. He should designate on-site materials delivery and storage areas and these should be located near construction entrances and away from watercourses. Earth berms or other containment measures should surround storage areas.

The Contractor should maintain accurate and up to date records of materials delivered and stored on site and should at all instances endeavor to minimize site inventory.

Materials safety data sheets (MSDS) should be maintained for all chemicals and other hazardous substances in use at the site. Hazardous chemicals should be well labelled and stored in their original containers. The Contractor should however minimize the handling of hazardous materials on site. Workers with emergency spill clean-up training should be present during unloading of dangerous materials or liquid chemicals.

Materials should be stored under cover during the rainy season, while chemicals, drum and bagged materials should be stored on pallets and where possible, under cover in secondary containment.

Stockpiles should be located a minimum of 50 feet away from concentrated runoff. If necessary, physical diversions should be provided to protect the stockpiles from concentrated runoff. These measures will reduce the potential of storm water pollution originating from stockpiles of construction materials.

Any significant residual materials remaining on the ground after the completion of construction works should be removed and properly disposed. If the residual materials contaminate the soil, then the contaminated soil should also be removed and properly disposed.

8.12. Land take, resettlement and livelihoods disruption

8.12.1. Temporary and permanent land take

The water supply project components will occupy both private and public land on a permanent basis, while construction activities may also occupy additional private and/or public land on a temporary basis.

Project designs have proposed the acquisition of private and public land for permanent features including:

- Intake works - 0.37 acres of public/forest land
- Raw Water Mains - 9.88 acres of public/forest land
- Water Treatment Plant - 3.66 acres of private land
- Pumping Stations – 0.63 acres of private land
- Transmission pipelines – 0.03 acres of private land and 59 acres of public land comprised of road reserves and riparian land;
- Storage tanks – 0.84 acres of private land and 0.21 acres of public land

During construction, land will be occupied temporarily for the construction camp, contractor lay-down areas, and working width along the pipeline route. The sites for the construction camp and laydown areas will be determined by the contractor and are not known at this stage.

Additional land may be occupied by informal migration of people into the area stimulated by the construction activities. The extent and duration of impact will be determined by policies implemented to manage these population movements.

About 10 acres of Mau Forest land is required to establish project components. The land is under natural vegetation cover and there are no human inhabitants on it. The Kenya Forest Service has jurisdiction over this land, and the mandate to ensure its conservation for maintenance of ecosystem services and functions. With adequate measures to ensure minimal clearance vegetation during construction of intake works and laying of the raw water pipeline, minimal impacts on conservation efforts are expected.

Most of the private land to be acquired is either undeveloped or under crop cover. The proposed treatment works site, booster pump site at Cheboin, storage tank sites at Tiroto hill, Kyogong hill, Longisa, Mulot hill, and Sigor hill are all undeveloped although privately owned. The proposed Longisa booster pump and Kipkimolwa storage tank sites are under seasonal crop cover (maize and beans) and a few indigenous and exotic tree species.

About 11kms of the transmission pipeline from the WTP will be laid on riparian land in the upper sections of the project area. These areas are also the tea-growing zones of Bomet County. The riparian areas are however majorly occupied by seasonal crops such as maize and beans, napier grass, banana stems and farm trees – both indigenous and exotic, as opposed to tea bushes. For the affected households, the most affected assets along the proposed pipeline alignment are indigenous trees and exotic trees comprised of *Eucalyptus* sp. and *Cupressus* sp. Along this riparian, the land requirement from each farm is an 8m strip (2m for the trench and 6m as working width). Vegetation on this strip will be cleared to allow construction activities to progress, after which 6m of the 8m strip will be available for cultivation by the farmers.

The other 106kms of transmission pipelines will be laid entirely on road reserves which are not occupied.

Other assets that will be affected include wooden and barbed wire fences, a few beehives (only requiring relocation) and one make-shift structure at Keronjo Market along the pipeline to Tiroto hill.

8.12.2. Impact significance

The impact of land-take on people and livelihoods is expected to be **Moderate** since the affected communities are primarily agricultural and depend on small-scale agriculture for sustenance. No land owner is expected to lose his/her entire parcel, or the larger portion of land to the project. There will also not be significant loss of vegetation (trees and crops) on each farm to impoverish the owners.

Table 8-28 Loss of land and livelihoods for affected people

Magnitude	Receptor Sensitivity	Impact Significance
Medium	Medium	Moderate

8.12.3. Mitigation of land take impacts

The Water Act 2016 provides that “...subject to the Land Act, 2012, land required for national public water works may be acquired in any manner provided by law for the acquisition of land for public purposes”. The Act further provides that “...compensation on just terms shall be payable by the Government to the owner of the land on which any such works are constructed, but in assessing the amount of compensation payable, the Cabinet Secretary shall take into consideration any benefit accruing to the land by the construction of the works and any adverse effect on the land caused by the works, as the case may be”. The proponent is thus bound to follow the existing law to acquire land for project components.

To mitigate the impacts of land take, there should be prompt and adequate compensation for persons who lose part of their land and crops to the project. The following measures should be taken to mitigate land take impacts:

- Determine the market value of the land being acquired in calculating compensation;
- Compensation money must be made available before the actual takeover so that the affected households can use the money to overcome or minimize the hurdles of the economic loss.

The table below summarizes the potential impacts and mitigation/management measures proposed for land acquisition and livelihoods impacts.

Table 8-29 Potential impacts & mitigation measures for land acquisition and livelihood impacts

Issue/impact	Mitigation/management measures
Construction phase	
Permanent expropriation of land and related income	Cash compensation based on market value of land or provide with option of replacement land within the village if available and of equivalent size and quality.
Interruption of land use along the pipeline ROW by the construction process for the duration of the construction period	Cash compensation should be provided for lost agricultural productivity during the construction period. Restoration of land to a least the condition it was in prior to construction.
Loss/damage to crops, trees, fences along the pipeline construction corridor	Compensation for property damage and loss of amenities within the designated construction corridor; and Adequate notice to be given to farmers before commencement of construction so that the farmers do not unnecessarily lose crops.
Potential damage to property outside the pipeline ROW and approved construction areas through activities such as: clearing land beyond the project working areas for which compensation has been paid; vehicles or people straying outside working areas and causing damage to land and crops; adverse effects of dust on crops	Construction activities to be carried out in predetermined working areas. Any damage by construction works outside the boundaries to be appropriately compensated by the contractor; Requirement to keep within the working area to be enforced and emphasized to the workers during induction and toolbox talks; and Working areas to be determined prior to construction and demarcated as necessary using fencing, marker posts or signs.

Operation phase	
Following completion of construction, there will be restrictions on land use especially along the pipeline ROW precluding building or the planting of trees on top of the pipeline	Compensation for restrictions to land use be provided to land owners as set out in the Resettlement Action Plan.

As part of the social impact assessment, the community was informed about the nature of the project, the need for land acquisition, and their rights and obligations with respect to the acquisition process. A Resettlement Action Plan has been prepared identifying the exact number of households to be affected, including the value of affected assets to establish an estimate of the compensation payable to affected land owners and users.

In summary, A total of 192 Project Affected Persons (PAPs) along the pipeline ROW mainly in riparian areas will be affected. Additionally, 11No individuals and institutions holding a total of 15.62 acres of private and public land earmarked for the intake works, WTP, pumping stations and storage tanks will be affected. The total compensation budget for the affected land and assets is KES 42 Million.

8.13. Impact on indigenous peoples

The Ogiek have traditionally inhabited Mau Forest in central rift valley. They were a hunter and gatherer community but have over-time embraced agriculture with the Kenya Government's ban on hunting. Although they speak a Kalenjin dialect, depending on who they border, as their first language, the Ogiek do not consider themselves to belong to either Tugen, Nandi or Kipsigis by virtue of speaking the language. They maintain that they are one people in origin but who separated sometime in the past and now live in different high forest areas (RNFS, 2000).

Initially, the Ogiek are thought to have covered virtually all the central highland zones of the country, but have slowly been squeezed out by invading tribes, the colonial settlers and other settling communities. The Ogiek also lost their land through declaration of their ancestral land as forest reserves.

Ironically, the Ogiek were never taken to be a tribal and distinct cultural entity and were thus marginalised and discriminated against socially, politically and economically, including dispossession of their land. They are therefore recognised as indigenous people.

The Ogiek are reported to reside in several sections of the Mau Forest. The Eastern Mau hosts approximately 600 Ogiek households; most of the households are located at Marishoni while about 80 are at Kiptunga, the source of the Mara River. Other Ogiek households are found in Likia, Logman and Nessuit (LVBCS, 2011).

There are no Ogiek inhabiting the project area (near the intake works, raw water transmission line and WTP) within or abutting the Trans-Mara Forest Block. The Project, therefore, has no foreseeable impact on indigenous people found in other areas of the Mau Forest Complex.

8.14. Impacts on cultural heritage of the project area

Project activities that could impact on archaeological resources and cultural property include the removal of topsoil and subsoil during earthworks such as trenching and opening up of new accesses. These activities may damage/destroy any existing archaeological monument(s) or cultural property whether marked/recorded or new discoveries.

No cultural heritage sites have been identified in the immediate project area that could be impacted by project activities. There are also no known archaeological/cultural assets existing in the immediate project area. There is however the possibility of encountering marked or unmarked graves within the farmlands affected by project components. A minor risk of damage to an unmarked grave exists during earthworks. The overall risk to archaeological and cultural heritage in the project area is assessed as Minor.

Once the project is operational, there will be no further impact on archaeology or cultural heritage of the project area.

8.14.1. Management of impacts on archaeology and cultural heritage

The established laws regarding discovery of a monument or object of archaeological or palaeontological interest is for the notification of the National Museums of Kenya (NMK) on the discovery within seven days. Notice should be given indicating the precise site and circumstances of the discovery, and in the case of an object, should be delivered to the NMK.

If areas of archaeological and/or cultural significance are revealed at any of the project sites, a Chance Find Procedure should be applied in consultation with the land owner and the NMK. The procedure should include the following:

- Action to stop construction activities in the area of the chance find;
- Delineation of the discovered site or area;
- Securing the site to prevent any damage or loss of removable objects;
- Notification of the construction manager and the NMK;
- Implementation of additional site protection and preservation measures as directed by the NMK

Where graves are identified, consultations with the land owners should be carried out to relocate the graves to suitable locations in a culturally appropriate manner. For Major Finds, options such as avoidance or emergency excavation should be evaluated to safeguard/rescue the find.

Avoidance of the find would ensure minimal impact to the site and would be the preferred option from a heritage resource management perspective. It may also be the less costly and/or feasible option from a construction perspective.

The find would require site protection measures, such as erecting fencing or barricades. Alternatively, the exposed find could be stabilised, and the site refilled or capped. The suitable site protection method would be selected in consultation with the NMK.

Emergency excavation would be carried out where avoidance is not feasible due to design, financial and/or time constraints. It would entail removal of the find with an excavator and conveying it from the immediate site to a suitable location for later processing. Due to the potential for the irreversible degradation of the asset's value in the act of rescue, emergency excavation would not be the preferred option for a Major Find.

For any encounters along the pipeline route, considerations should be made to alter the alignment of the pipeline to avoid damage to the feature. Where the pipeline cannot be sensibly moved, significant sites may need to be excavated and recorded prior to construction activities continuing in the area.

8.15. Impacts on labour, working conditions, community livelihoods and local economy

8.15.1. Construction phase

8.15.1.1. Employment and business opportunities

Several new direct employment opportunities will be created during the construction period. The detailed labor requirements for the project will not be known until the appointment of the construction contractor. It is however expected that construction activities will require engineers, project managers/foremen, workers, and specific equipment operators, among others.

The project will provide direct business opportunities for companies and individuals supplying goods and services such as construction materials, consumables, cleaning services etc. There will also be indirect employment opportunities on the supply side as the suppliers increase their resource capacity to meet project demands.

With the creation of employment and business opportunities, taxes will be remitted to the exchequer from the purchase of materials and other consumables, and payment for services offered by various parties in the construction process.

The in-migration of workers into the surrounding area has potential to provide a stimulus to the local economy since they will provide a larger market for local traders and farmers to whom to sell their goods. Others may also find opportunities to supply materials to the Project. This impact is judged to be **Moderate**, and positive if it is managed and monitored, and it will last for the duration of the construction phase of the project. It will continue until the construction-related opportunities cease.

Table 8-30 Increased employment and business opportunities

Magnitude	Receptor Sensitivity	Impact Significance
Medium	Medium	Moderate

Generally, unemployment rates in the project area are high, and the project will have short-term impacts on the workers (including their families) employed during construction. There may arise complaints and dissatisfaction

among the communities affected by the project if recruitment of workers is perceived to be biased and without local representation.

To mitigate the local representation concerns, the Contractor should establish local employment targets to maximize local employment. Unemployed and able workers among the affected communities in each locality should be given first priority in recruitment of casual laborers.

The Contractor should have a credible procedure to identify and verify the areas in which the potential workers live, as well as information on experience and skills. It may be necessary to enlist the help of the local administration (chiefs, assistant chiefs and village elders) in vetting the workers.

8.15.1.2. Working conditions

Due to the high unemployment rates in the project area, those seeking employment in the project may out of desperation be willing to work under various forms of exploitation. These may include forced labor, threats, poor wages, working beyond normal time, limited freedom of association, or working in unsafe conditions. Exploitation may also include employment of underage workers, sexual exploitation, as well as unequal opportunities and treatment among the workforce.

To mitigate against such social injustice, the Contractor will be required to develop an employment policy in line with International Labor Standards and the local labor administration requirements. The Project Proponent will also vet the Contractor's employment policy and carry out random inspections to ensure compliance with the relevant standards.

Ensuring proper working conditions will also entail maintaining high occupational health and safety standards for the wellbeing of the workforce.

8.15.2. Operation phase

8.15.2.1. Depression of local economy and out migration of workers

Construction-related work opportunities from project components will last a limited period, after which the workers would need to be laid off as the project moves into operational phase. The reduction in the workforce would result in the out-migration of workers as they leave to seek job opportunities elsewhere. This may result in the depression of the local economy as the market for local goods and services declines. The significance of this impact is viewed as **Moderate**.

8.15.2.2. Socioeconomic development of the area

The Project will increase clean water supplies to the area with the likelihood of an increase in water supply connections for households. Due to the provision of the much-needed constant and reliable drinking water, the Project will improve the quality of life of many people especially those who are the primary targeted population to receive the supply of water. This impact is assessed as a **Major** positive.

Table 8-31 Socioeconomic development of the project area

Magnitude	Receptor Sensitivity	Impact Significance
High	Medium	Major

8.16. Impacts of climate change

8.16.1. Climate change and variability in the global and local context

It is generally understood that the climate is changing, and average global temperature has been shown to have increased by 0.85 °C (0.65 to 1.06) over the period between 1880–2012. Surface temperatures across Africa have increased by 0.5- 2°C over the past 100 years, and since 1950, climate change has altered the magnitude and frequency of extreme weather events (GoK, 2018). The frequency of cold days, cold nights and frost has decreased, while the frequency of hot days, hot nights and heat waves has increased.

Temperature increase has been observed across all seasons, but particularly from March to May. Rainfall patterns have also changed, with the long rainy season becoming shorter and drier, while the short rainy season has become longer and wetter. However, the overall annual rainfall remains low. The long rains have been declining continuously in recent decades, and droughts have become longer and more intense and tend to continue across rainy seasons.

The frequency of rainfall events causing floods has increased in East Africa from an average of less than three events per year in the 1980s to over seven events per year in the 1990s and 10 events per year from 2000 to

2006, with a particular increase in floods. Droughts and heavy rainfall have become more frequent in the last 30 years.

The current trend of rising annual temperatures is expected to continue in Kenya in all seasons, with models suggesting that warming of about 1°C will occur by the 2020s, and 4°C by 2100. Precipitation projections are more uncertain and suggest that by the end of the 21st century East Africa will have a wetter climate with more intense wet seasons and less severe droughts. The proportion of rainfall that occurs in heavy events is also expected to increase. Some models also project a general decrease in mean annual precipitation, but with wetter conditions during the short rains of October to December.

8.16.2. Climate risk profile of the water sector in Kenya

Kenya's water resources are periodically affected by droughts and floods, as well as by inter- and intra-annual rainfall variability. Droughts result in catchment degradation, drying up of rivers, decline in water quality from increased pollutant concentrations, increased conflicts over scarce resources, and the need to collect water from distant locations. Floods also affect water quality by increasing the concentration of chemicals such as pesticides and fertilizers washed into rivers, and cause damage to infrastructure such as water intakes and pipelines.

Although uncertainty remains regarding how precipitation patterns will change in different regions of Kenya, it may be anticipated that soil moisture, river runoff and groundwater recharge patterns will be affected both positively and negatively. For example, soil moisture is expected to decline in the ASALs and increase in moist areas. Where rainfall increases, opportunities to harvest rainwater and store clean water could expand, which in turn may reduce the occurrence of water-borne diseases. These impacts will also influence reservoir systems, water quality and water supply infrastructure (UNDP, 2012).

Higher temperatures will also lead to more rapid evaporation, which could affect access to surface water for irrigation, household use and livestock production, and by wildlife. This effect could also lead to persistence of moisture deficits for longer periods.

Changes in the pattern of Kenya's cyclical climate shocks of drought and flood could also adversely affect the availability of critical water resources. Reducing vulnerability to these and other water-related hazards would reduce risks to investments and production, and hence would contribute to poverty reduction.

8.16.2.1. Historic and future trends in Bomet County

Bomet County has a climate change vulnerability index of 0.473 which is higher than the national index of 0.431. The County is vulnerable despite its disposition as one of the regions with high agricultural potential. In the recent past, Bomet county has suffered from anomalies in weather especially droughts and delayed rainfall which have significantly reduced the productivity of major crops in the area such as tea and maize. The hydrology of rivers and streams in the County is also tied to rainfall.

Analysis of temperature trends in the county over 25 years (1981 to 2005), showed that temperatures have increased by approximately 0.5 °C for both the first (long rains) and second (short rains) seasons. Despite these increase in temperatures in both seasons, there has not been an increase in the number of heat stress days. On the other hand, analysis of average annual rainfall measured over a 35-year period (1981-2015) showed no significant change in both seasons. Rainfall has however become more variable, with an increase in extremes (both highs and lows) from year to year, which has resulted in an increase in both flood and drought risk in the first season and an increase in drought risk in the second season (MoALF, 2018).

Climate projections for the period 2021-2065 based on two representative concentration pathways (RCP2.6 and RCP8.5) indicate that under both scenarios, mean temperatures will continue to increase. This results in an increase in drought risk, with the number of consecutive drought stress days rising from a historical average of less than 60 days in each half of the year to as high as 80 consecutive dry days. Under both scenarios there is also expected to be an increase in flood risk with the maximum 5-day precipitation average rising by approximately 20-25% from the historical average.

There are existing adaptation options in Bomet County aimed at increasing households' capacity to cope with risks and adapt to climate change and variability. The department of water is encouraging water harvesting strategies particularly for public institutions where they provide water tanks to schools and health facilities. The department collaborates with other institutions to ensure water security such as the Water Service Trust Fund, UNICEF, World vision, Kenya Red Cross (KRC). To avoid contamination of water, there is improvement and protection of water sources such as the springs, through the spring box or the stand tap.

There are surface water reservoirs such as dams and water pans for livestock production across the county. Dams are found in the drier zones of Chepalungu, parts of Sotik sub-county and Longisa in Bomet East

subcounty. Households with corrugated iron roofs, public and private institutions engage in roof water harvesting and use the stock during the dry spell when they have water shortage.

8.16.2.2. Resilience/vulnerability of the water project to climate change risks

Water abstraction, treatment, and distribution infrastructure as well as water resources availability and quality are highly vulnerable to the impacts of climate change. These impacts will have consequences for the design, construction, location, and operations of water supply infrastructure. Inadequate attention to these impacts during the project concept and project preparation phases will increase the long-term costs of these investments and reduce their performance (ADB, 2017).

Climate change affects the infrastructure by changing the weather conditions in which it must operate. For a water project, the key climate-related stressors include temperature, flow volume and timing, sedimentation, drought, and flood extremes. The stressors will impact both quantity and quality of available water resources and expose the infrastructure to damage or at the very least, interruption of services. The stressors can affect different parts of the water supply chain from abstraction, treatment, transmission and distribution.

Potential impacts relevant to the Project are summarised in the Table below:

Table 8-32 Potential climate impacts relevant to the water project

Climate impacts	Impacts on water resources
Warmer temperatures	<ul style="list-style-type: none"> Changes in watershed vegetation may alter the recharge of groundwater aquifers and change the quantity and quality of runoff into surface waters; Increased evaporation in surface sources of water. Increased evaporation may also act to reduce soil moisture and exacerbate drought conditions; Increasing biological and chemical degradation of water quality; Changes in watershed vegetation and increased wildfire and pest risks in watershed areas; Changes in watershed agricultural practices and in the resulting pollution loads from agriculture; Increased frequency or intensity of drought
More Frequent and/or Intense Extreme Weather Events	<ul style="list-style-type: none"> Increased turbidity and sedimentation of surface water; Changes in nature of rainfall pattern leading to inadequate infiltration/groundwater recharge resulting in reduced flow and/or yield of water; More frequent and/or intense flash floods damaging infrastructure and disrupting services; Potential loss of reservoir/pond storage as a result of increased erosion in watershed.
Changes in Precipitation	<ul style="list-style-type: none"> Reduced replenishment rates of groundwater resulting in declining water tables where net recharge rate is exceeded
Climate impacts	Impacts on Water Supply Treatment and Infrastructure
Warmer Temperatures	<ul style="list-style-type: none"> Increased urban water demand as a result of more frequent or more intense heat waves and dry spells greater presence of existing or new microorganisms which water treatment facilities may find increasingly difficult and costly to treat to required standards
More frequent and/or Intense Extreme Weather Events	<ul style="list-style-type: none"> Increased risk of direct flood damage to treatment plant, pumping and conveyance, and outfall; Increased risk of landslide which may damage infrastructure

The above possible impacts can have significant and potentially adverse consequences for achieving Goal 6 of the Sustainable Development Goals to ensure universal access to water and sanitation. The Table below summarizes the significance of the impacts to the operational effectiveness, efficiency and ability of the project to meet the objective of supply the people of Bomet with clean water.

Table 8-33 Summary of climate stressor impact on the water resource and supply

Climate Stressor	Change	Relative effect on the water resource and supply			
		smaller decrease	bigger decrease	smaller increase	larger increase

Temperature	Increase				
	Decrease				
Flow volume and timing	Increase				
	Decrease				
Sedimentation	Increase				
	Decrease				
Drought	Increase				
	Decrease				
Flood extremes	Increase				
	Decrease				

Source: Modified from USAID (2017)

8.16.2.3. Management of climate impacts

Various climate-proofing options are available for projects in the water sector including both engineering (structural) and non-engineering options. These include

8.16.2.3.1. Water supply

- Demand-side management with a view of decreasing water demand;
- Reduction of nonrevenue water;
- Water metering and water tariffs (which can contribute to reducing water demand);
- Low water use applications;
- Diversification of water sources;
- Enhancing storage capacity;
- Water reuse;
- Relocation of flooded infrastructure;
- Impounding reservoir to store freshwater;

8.16.2.3.2. Water treatment and quality

- Protection of the water source and treatment of wastewater discharges; and
- Integrated water resources management

8.16.2.3.3. Water distribution

- Adjustment to operation below design capacity

8.17. Decommissioning phase impacts & mitigation measures

8.17.1. Post-construction decommissioning

Following completion of construction works, decommissioning of the construction camp will be necessary entailing dismantling of equipment, demolition and/or removal of all erected structures, site clearance of all materials and wastes, and site restoration.

Impacts likely to arise from decommissioning works are similar to those of construction, and therefore will require similar mitigation measures.

8.17.2. Post-operation decommissioning

The project has a design horizon of the year 2041, after which it may require decommissioning or major rehabilitation and upgrade. Rehabilitation and upgrade of the infrastructure is more probable than decommissioning. In the event that decommissioning is proposed for the project, adequate arrangements would be made to dismantle and remove all movable infrastructure.

Decommissioning of the water project may also be carried out for situations in which multiple environmental concerns are evident before the design horizon is reached. It may range from relatively simple activities such as removal of the weir at the intake works with abandonment in place of all other structures, to full obliteration, i.e. demolition of all project structures and excavation of pipelines.

8.17.3. Project decommissioning guidelines

8.17.3.1. Overview

Once the Proponent has decided to proceed with decommissioning –of the entire or some components of the Project, a Project Decommissioning Plan will be prepared and submitted to NEMA for approval. Only after NEMA's approval and after the Proponent has completed any precursor activities, and a decommissioning schedule shall the decommissioning process begin.

The following steps would be followed in the decommissioning process.

8.17.3.2. Scoping

This is a consultative process to discuss the scope of the decommissioning action for all project components, including the schedule, budget, risks and approach for performing the work.

8.17.3.3. Facility walk-down

Site personnel would perform a facility walk down to obtain the information necessary to prepare the hazard assessment and the Reconnaissance Level Characterization Report (RLCR). Safety and physical hazards at the sites would be identified as part of the initial project reconnaissance.

The safety and physical hazard assessment would help site personnel determine the possible risks to workers, the public and the environment during decommissioning.

To identify and control hazards, an Integrated Safety Management (ISM) process description and implementation plan would be followed. The ISM integrates the identification, analysis and control of hazards and provides feedback for improvement. The ISM would consist of five core safety management functions which include:

- Definition of the scope of work;
- Identification and analysis of hazards associated with the work;
- Development and implementation of hazard controls;
- Performance of the work within such controls; and
- Provision of feedback on the adequacy of the controls.
- Reconnaissance level characterization

The Reconnaissance Level Characterization produces an overall assessment of the hazards, and other conditions associated with each structure/facility to be decommissioned. The physical condition of the structures/facilities would be assessed to identify hazards, as well as physical obstacles or other conditions that could affect decommissioning activities.

The Reconnaissance Level Characterization would include a detailed review of hazards that require special work controls to complete decommissioning safely. In all cases, the team performing the RLC would check the historic information against current observed conditions.

8.17.3.4. Prepare reconnaissance level characterization report (RLCR)

Based on the Reconnaissance Level Characterization, the Proponent would prepare a report for review and approval by NEMA. The report summarizes the results of the Reconnaissance Level Characterization and provides an analysis of the risks presented by the project. The RLCR would also contain sufficient detail including analysis of analytic information to establish the basis for decommissioning activities.

The project points of contact and staff would use the RLCR to provide input to the preparation of the health and safety analysis, the determination of the engineering support requirements, and the determination of appropriate milestones.

8.17.3.5. Perform physical work of disposition operations

These activities include, for example, excavation, dismantling, demolition and removal of components. After demonstration that the structure/facility meets the established criteria, it would be demolished or excavated. The requirements and procedures set out in the ISM plans would be followed by workers performing decommissioning.

8.17.3.6. Perform and validate final characterization

At the end of the decommissioning, site personnel would confirm that their activities have achieved the standard required in the completion of disposition for structures/facilities that are demolished such that only environmental restoration activities remain.

After the structure/facility is demolished, the final characterization would occur. The demolition survey would be conducted in accordance with the site's characterization protocols and would provide sufficient data to demonstrate that the site has successfully completed decommissioning in conformance with the set regulation requirements.

The post-demolition survey may result in a loop of activity for site decommissioning personnel, because if the survey reveals insufficient decommissioning to meet the requirements of the regulations, additional action would have to be taken. Only at such time as the site agent is satisfied that the post-demolition survey shows that decommissioning is complete, would the survey be deemed final.

8.17.3.7. Environmental restoration

Environmental Restoration constitutes those activities necessary to characterize, assess and remediate contamination in soils, sediments, surface and ground water from past activities at the site. It may also entail restoration and re-vegetation of the site(s) through planting of indigenous trees and shrubs. Re-vegetation would be carried out to the extent determined by the proposed future use of the sites.

9. Environmental and social management plan

9.1. Overview

The measures presented here summarize in a matrix format, the key impacts identified, the remedial measures to be taken, the responsible person(s) for execution, and the monitoring activities to be undertaken. An indication of the timing for implementation and the cost involved is also provided.

The actions proposed in the Environmental and Social Management Plan (ESMP) are designed to ensure compliance with local legislation and adoption of best practices that apply to environmental and social management.

The outline management plans have been developed and will be further expanded (for construction and operations purposes) with documented procedures and guidelines for work practices in order to be responsive to the situations that the construction Contractor(s) and Operator will encounter.

The effectiveness of the ESMP will be monitored and assessed regularly through inspections and reporting throughout construction and during operations.

9.2. Implementation of the ESMP during the construction phase

9.2.1.1. Project organization structure

The water project will be implemented as unit pricing construction contract whereby the appointed contractor will be responsible for all construction, commissioning and handover of the project to the Operator.

Overall Project Management (PM) will be performed by the project proponent through the Owner's Engineer (OE). There will be Environmental, Social, Health & Safety (ESHS) resources in the OE team who will be responsible for achievement of E&S objectives in construction work. To strengthen his role, the Project Proponent will include in the construction contract, E&S provisions in line with local standards and good international industry practice (GIIP) to ensure that the Contractor gives full attention to the requirements.

9.2.1.2. Outline management plans

Construction phase potential impacts and mitigation measures were identified during the ESIA study. These have been carried forward to outline management plans proposed for construction phase activities. The outline plans will be further detailed in the Construction Phase Environmental & Social Management Plan (CP-ESMP) which is a practical and achievable plan of management to ensure that any environmental, social health and safety impacts during the construction phase are minimized.

The CP-ESMP contains a series of sub-plans to deal with the various aspects of the construction process/activities and the related environmental, social, health and safety risks.

Outline sub-plans have been proposed to deal with the following issues during construction of the water project:

- General site management;
- Air quality;
- Noise and vibrations;
- Aesthetics (visual and landscape);
- Ecology and biodiversity (flora and fauna);
- Soil resources;
- Energy resources;
- Water resources;
- Waste management;
- Traffic Management;
- Occupational health and safety;
- Community health and safety; and

- Displacement and disruption of livelihoods

The construction Contractor appointed for the project must develop the CP-ESMP to ensure actions and mitigation necessary to protect the environment are incorporated into all site procedures. At a minimum, the CP-ESMP must address the following:

- Policy
- Planning
- Implementation and Operation

9.2.2. Policy

The Contractor should have or develop an environmental policy that integrates E&S requirements and that includes, as a minimum, the following:

- A commitment to comply with applicable regulations and other requirements that the construction company subscribes to;
- A commitment to provide a safe work environment;
- A commitment to provide the training and equipment necessary for employees to conduct their work safely;
- A commitment to continuously improve performance and to pollution prevention; and
- A commitment to communicate the policy to all persons working for and on behalf of the company.

9.2.3. Planning

Environmental and social issues and the legal and other requirements in construction of the water project have been identified in this ESIA. The construction contractor must demonstrate within his plan that he has read and understood the ESIA Report and its provisions for environmental management and monitoring.

9.2.4. Implementation and Operation

Roles, responsibilities and authorities should be defined, documented and communicated to ensure effective environmental and social management. A specific management representative (i.e. ESHS officer) should be assigned that is responsible for ensuring that the CP-ESMP is established, implemented and maintained and is responsible for reporting performance, reviewing the Plan and making recommendations for improvement.

Documented confirmation is required that the training needs of all persons working for or on the Contractor's behalf whose work pose significant hazards to their health and safety and/or may create a significant impact on the environment has been identified. Records of all training must be maintained.

Management, supervisory, and employee responsibilities must be communicated to all employees through training, formal job descriptions, work experience, hiring practices, etc. Awareness training should be provided that include the importance of conforming to the policy and procedures, the significant environmental issues, and the roles and responsibilities of management and staff.

Records should be legible, identifiable and traceable to the activity. Records should be stored and maintained in such a way that they are retrievable and protected against damage, deterioration or loss.

The Contractor should establish, implement and maintain procedures to identify potential emergency situations and potential accidents that can have an impact on the environment, surrounding communities, the employees, and/or the public.

The Contractor should be prepared to respond to actual emergency situations and accidents and prevent or mitigate associated adverse environmental or social impacts. The CP-ESMP must also address how the Contractor will receive, document and respond to external interested parties, i.e. through a Stakeholder Engagement Plan (SEP). Additionally, the Contractor must maintain a Grievance Redress Mechanism (GRM) to attend to emerging issues/complaints during the construction stage.

A SEP and a GRM have been developed which the Contractor is expected to implement/adhere to while engaging stakeholders and complainants.

9.3. Environmental monitoring

Environmental monitoring will commence at the initiation of the construction activities for the project and will be carried out through the construction phase to commissioning. An Environmental & Social Management Monitoring Plan (ESMMP) will be employed throughout the operation phase of the infrastructure.

9.3.1. Environmental monitor

An independent Environmental Monitor will be identified and contracted to perform the following:

- Verify that all project approvals and permits are in place prior to the start of construction;
- Evaluate contractor plans (e.g., Spill Response and Waste Management Plans) and monitor implementation;
- Develop inspection checklists to ensure site inspections are focused and useful;
- Conduct environmental monitoring of construction works; the environmental monitor will ensure the protection of the environment, that mitigation measures are appropriately implemented and to facilitate communication between the Contractor, the PMT and NEMA; and
- Prepare regular written reports to the PMT, Contractor and, where need be, NEMA on an agreed to schedule.

9.4. Implementation of the ESMP during operations phase

Operation phase potential impacts and mitigation measures were also identified during the ESIA study, and these were carried forward to outline management plans for operation phase activities.

The Project will be handed over to BOMWASCO to operate upon commissioning. Part of the operator's obligations will include management of the predicted and unforeseen environmental and social impacts arising during operations, in accordance with this ESIA.

The Operations Phase Environmental & Social Management Plan (OP-ESMS) will focus on sound environmental and social management practices that will be undertaken to minimize adverse impacts on the environment through normal operation of the water project.

9.5. Outline management plans comprising the ESMP

The tables below provide the outline management plans and indicative budget to address environmental and social concerns arising during construction and operation phases of the water project.

[Outline Environmental and Social Management Plan](#)

Construction Phase Environmental and Social Management Plan												
	Aspect	Source of impact	Potential Impact	Objective	Management Strategy	Controls	Performance Indicator	Monitoring Requirements	Reporting	Responsibility	Timing	Budget (KES)
1	Water Resources	Obstruction of river flow during construction of the weir and intake works; Excavations on river bed and river bank for intake works; Release of hazardous substances into the river; abstraction of water for concrete works and other construction activities	Change in river flow downstream; Increased sediment load in the river; Deterioration of the river's water quality; Increased demand on water resources with potential to affect downstream users	Protection of water resources (quantity and quality) and aquatic organisms	Conservative use of water; Prevention of water pollution by construction activities	Construction of a suitable temporary diversion channel at weir location; Construction during low flows; Institution of spill prevention and control measures; Conservative use of water in construction works; implement a construction waste management plan; Provide appropriate sanitary facilities at construction camp and sites, worker compounds and other construction facilities; Implement soil erosion control measures; Install and regularly empty sediment traps in surface drains around construction areas; Maintain as much riverine vegetation at the weir site as possible, and maintain vegetative buffer zones alongside river and drainage channels during construction; obtain appropriate consents for any abstractions from, and discharges to watercourses; Take precaution in the discharge of hydro-test water to avoid erosion and deposition of sediments into watercourses; implement an agreed seasonal compensation flow regime during construction activities	Water consumption levels; Water pollution incidences; Housekeeping practices	Regular inspections (weekly), and measurements	Site logs of inspections and proposed corrective actions	Contractor; Environmental Monitor	Construction Phase	800,000
2	Air Quality	Exhaust emissions from construction equipment; Dust from vehicle movements and excavations; Burning of wastes on site	Degradation of local air quality by Particulate Matter, and Oxides of Carbon, Nitrogen and Sulphur; Nuisance and adverse effects on human health; Adverse effects on growth and productivity of vegetation; Uncontrolled spread of fires	Maintain air good quality by avoiding air pollution	Reduction of emissions from significant sources	Proper equipment and vehicle maintenance; use of low sulphur fuels; Regulation of construction vehicle speeds; sprinkling of dusty accesses and other dust prone areas to lay dust; provision of PPE eg dust masks to workers; Avoid open burning of waste; Recycle wastes as much as possible; Incinerate wastes where necessary in a properly designed incinerator; Landfill other wastes in designated sites; Minimize exposed areas through the schedule of construction activities to enable dust control; Maintain equipment and machinery to manufacturers' specifications by regular servicing; Minimise the period for machinery idling; Rehabilitation of disturbed areas once completed; Use of tarpaulins to cover trucks carting away spoil using public roads;	Complaints or lack of complaints; Dust deposition on surrounding vegetation and homes; Vehicle maintenance schedules; Use of PPE by workforce; Vehicle speeds on sites; Waste management practices	Weekly site inspections and observations; Air quality measurements if necessary;	Site logs of inspections; Vehicle maintenance logs; Logs of sprinkling of dusty sections	Contractor; Environmental Monitor	Construction Phase	3,000,000
3	Geo-hazards	Blasting of rocks; Disturbance of loose ground by excavation and/or vegetation clearance	Land slides, mud slides, and/or rock fall with potential to cause loss of life and/or property	Ensure that construction activities do not lead to mass wasting	Prevent mass wasting by construction practices and engineering controls	Stabilize loose ground before and after excavations; Reroute pipelines where necessary; Avoid rock blasting as much as possible; Careful discharge of hydrotest water to prevent dislodging of loose rocks and debris on steep slopes	Incidence and extent of mass wasting occasioned by construction activities	Periodic Inspections of excavations especially during wet seasons	Periodic Reports	Contractor; Environmental Monitor	Construction Phase	TBD
4	Noise levels	Noise emissions by construction equipment and activities	Nuisance to surrounding communities and wildlife	Maintain low noise levels and reduce vibrations	Prevention of noise pollution and vibrations by equipment	Use of noise abatement equipment for machinery; Limit construction activities to day time only; Switch off noisy equipment when not in use; Provide PPE such as ear muffs to workers at the site as necessary	Noise levels at point sources and receptor locations; Noise complaints entered in complaints register	Regular noise measurements at point sources and receptor locations	Noise measurement records; Entries in the complaints register	Contractor; Environmental Monitor	Construction Phase	800,000
5	Ecology and Biodiversity	Clearance of existing natural vegetation; Mobilization of sediments from soil disturbance; spillages of hazardous substances; Inappropriate disposal of wastes; Lack of knowledge on working in wildlife areas	Loss of important species of plants and animals; Potential death of aquatic organisms from pollution; Smothering and death of vegetation; Environmental degradation from pollution; Death or injury to wild animals	Conserve/protect the existing biodiversity and ecological fuctions of the river and forest	Establish measures to protect water and forest resources potentially affected by construction works	Development of a Reinstatement Plan and a landscaping/revegetation plan; Ensure minimal stripping of vegetation at work areas; Establishment of sediment traps and silt fences; Institution of containment measures for hazardous substances; Institution of a waste management plan; Training on appropriate response to wildlife encounters	Extent of vegetation clearance; Vegetation damage from pollution incidences; Number of trees replanted; Number of pollution incidences recorded and mitigated; Wildlife training records; Effectiveness of sediment traps and silt fences;	Weekly site inspections	Logs of pollution incidences (spillages and cleanups); Records of trees planted	Contractor; Environmental Monitor	Construction Phase	800,000
6	Aesthetics and visual integrity	Use of land as pipeline ROW, Construction Camp, materials storage yards; Permanent occupation of land by facilities eg WTP, access roads; Presence of construction activities, large equipment and pipe sections	Loss of natural vegetation; Visual disturbance effects on humans	Prevent/minimise occurrence of adverse visual and landscape impacts resulting from construction works	Modification of construction activities and methods to reduce potential adverse impacts	Reinstatement of disturbed sites; Avoid removal of mature trees that form important visual focal points; Replacement of removed trees where possible; Proper housekeeping at active construction sites to reduce visual nuisance	Complaints on views opened up; Extent of mature trees cleared; Visibility from critical viewpoints such as public footpaths, roads and settlements	Weekly field surveys	Periodic Inspection Reports	Contractor; Environmental Monitor	Construction Phase	800,000
7	Soil resources	Earthworks involving site clearance and excavation; Spillage of hazardous substances on the ground; Compaction of soil by vehicles and machinery; Release of hydro-test water	Loss of topsoil from soil erosion or offsite disposal of spoil; Contamination of soil resources; Soil erosion from change in drainage characteristics; Scour, soil erosion and deposition of silt in the river	Protection of soil resources at construction sites	Prevention of pollution and depletion of soil resources	Avoid offsite disposal of spoil; Salvage, stockpile and ensure re-use of native topsoil during re-vegetation activities in disturbed areas; Implementation of a site-specific reinstatement plan; Institution of spill prevention and control measures; Oils, fuels, paints and any hazardous materials to be stored in accordance with their respective MSDS's; Use of designated routes and avoid deviation from established roads; Controlled release of hydrotest water; Reuse of hydrotest water; Inspect pipelines for potential weaknesses before hydrotesting; Restoration to ensure that trench backfill material is compacted to a similar value to the surrounding soils; Limit clearance of vegetation to the plinth of proposed structures and trench line; Stabilize and maintain access roads created to access project sites to minimize erosion and dust from vehicular traffic; Stabilize construction sites and camp(s) entrances/exits to reduce the amount of sediment tracked off-site by construction vehicles;	Level of soil erosion observed at sites; Quantity of excavated soil carted away against that used on site; Housekeeping practices with an impact on erosion and pollution	Regular Inspections (Weekly)	Records of soil pollution incidences; Volumes of spoil disposed off-site	Contractor; Environmental Monitor	Construction Phase	2,000,000
8	Energy resources	Use of fossil fuels by vehicles and machinery	High demand for fossil fuels; Higher emissions of CO2	Lower the energy demand by construction equipment and activities	Adopt fuel-economy practises for vehicles and equipment	Minimize idling of machinery; Avoid overloading of trucks and machinery; Regular service of vehicles, plant and machinery; Use environmentally friendly fuels such as low sulphur diesel; Specify and procure the most energy efficient plant options fit for purpose and avoid use of plant with unnecessary and excess capacity	Energy conservation measures instituted and functional at sites; Vehicles and equipment maintenance schedules	Physical inspections	Logs of maintenance; Fuel consumption records	Contractor; Environmental Monitor	Construction Phase	No Additional Cost (NAC)
9	Wastes	Construction activities which generate wastes; Residence in construction camp which generates wastes; Poor management of wastes generated	Creation of health and safary hazards for workforce and surrounding community; Environmental pollution; Degradation of the aesthetic value of the area	Prevention of environmental pollution from wastes generated	Reduce, Reuse, Recycle and appropriately dispose generated wastes	landfill spoils as much as possible within project sites; Segregate wastes generated into inert fill materials, recyclable/reusable materials and hazardous wastes for appropriate disposal Compost organic wastes; Provide adequate sanitary facilities at construction camp and sites; Reuse of hydrotest water; Adopt best practises in concrete waste management; Isolate woody vegetation cleared and facilitate collection by neighbouring residents;	Waste management plan developed and implemented; Site status; Quantities of wastes recycled/reused; Waste disposal records	Weekly inspections of sites to establish adequacy of plans in place	Periodic Inspection Reports;	Contractor; Environmental Monitor	Construction Phase	500,000

	Aspect	Source of impact	Potential Impact	Objective	Management Strategy	Controls	Performance Indicator	Monitoring Requirements	Reporting	Responsibility	Timing	Budget (KES)
10	Cultural heritage and archaeology	Excavation of trenches for pipelines and site clearance for treatment works and tank sites	Damage/destruction of marked or undiscovered archaeological monuments or cultural property or graves	Protect archaeological and cultural assets	Develop procedures for identification and protection of cultural and archaeological assets	Implement a 'Chance Finds' Procedure in consultation with land owners and the National Museums of Kenya; Relocation of graves in a culturally appropriate manner; Induction of construction crew on the significance of archaeological and cultural heritage resources and how to identify such sites and features; Where significant features are found, modification of activities or project designs to avoid damage to the feature	Number of identified assets; Condition of identified assets	Periodic inspections by NMK staff	Logs of identified assets	Contractor; Environmental Monitor; NMK; Land Owner	Construction Phase	500,000
11	Occupational health and safety	People; Unsafe sites/conditions; Unsafe practices/acts; Unsafe tools/equipment/machinery/materials	Injury or fatality to construction workforce; Damage or destruction of property	Zero Accidents or incidents at workplaces	Mainstream safety issues in operations; Provide a safe working environment for workers; provide PPE and safety facilities for workers; Increase safety awareness among workers; Set H&S performance targets	Implement a health and safety management plan; Designate a health and safety officer to oversee health and safety matters at construction sites; Health and safety training of workforce; Comply with the OSHA, 2007 and all other relevant regulations governing health and safety at workplaces; Restrict access to construction sites; Provide appropriate signage and warnings in work areas; Provide appropriate PPE to site workers; Provide for First Aid facilities; Train workers on emergency response such as first aid skills; Provide and clearly display emergency contacts on site; Provide adequate sanitary facilities (latrines and wash water)	H&S awareness levels among workers; Housekeeping practices; construction methods; length and duration of open trenches; frequency and number of incidents/accidents	Daily inspection of work areas	Daily logs of activities, incidents/accidents; Minutes of toolbox meetings; Records of H&S training	Contractor; H&S Monitor	Construction Phase	1,000,000
12	Community health and safety	Unsafe sites; Unsafe practices/acts by construction workforce; inappropriate worker interactions with surrounding communities	Injury or fatality to members of the surrounding community; damage to community/public assets; spread of diseases	Zero Accidents or incidents involving the community; Protection of community health, safety and security	Establish mechanisms in operations that safeguard community interests	Implement a community safety management plan; establish a grievance redress mechanism for community concerns; continually engage the community on health and safety to improve their awareness; Inform local communities of major activities in advance; Ensure all dangerous construction sites are fenced off; Lay pipes and backfill as soon as possible to reduce the time of hazards exposure to the public from open trenches; Enforce and monitor road safety standards; Ensure that potentially disturbing construction noise is not produced outside of working hours; Provide safety training, traffic management and place a high priority on public safety; Restrict workers camp and construction areas only to formal employees; Enforce a strict code of conduct for workers to regulate behaviour in the local communities; Provide awareness training to the workforce regarding the transmission of STDs, and traffic safety awareness;	Number of public awareness meetings; Number and frequency of incidents/accidents involving communities	Daily inspection of work areas	Minutes of public awareness meetings; Daily logs of activities, incidents and accidents	Contractor; H&S Monitor; Sociologist	Construction Phase	4,000,000
13	Livelihoods and settlements	Temporary and permanent uptake of land by project components	loss of community livelihoods; Potential physical displacement of some members of the community in the project area	Prevent/minimise livelihoods disruption and resettlement	Redesign project components as necessary; Promptly compensate affected persons	Preparation of a Resettlement Action Plan or Livelihoods Restoration Plan; Prompt compensation of the community for damages; Rerouting/realignment of pipelines to avoid displacement wherever possible	Number of affected households recorded; Number of grievances received; Recorded incidences of private property damage	Weekly inspections of active areas	Records of community assets damages	Contractor; Sociologist	Construction Phase	42,000,000
14	Labour and working conditions	Unethical exploitation of the local community and workforce; discrimination in employment of locals; poor working conditions	Community conflicts including strikes and demonstrations; Loss of community goodwill; Delays or stalling of project implementation; Escalation of project costs	Provision of meaningful opportunities for locals	Adopt best practices in employment of casuals; Compliance with local labour laws	Sustained community engagement and resolution of grievances; Employment of locals through the local administration and through a transparent process; Abide by local labour/employment standards; Management of labour issues by a qualified human resource staff	Number of human resources cases/disputes; Existence of welfare services/facilities for workers;	Monthly inspections	Labour records including logs of labour disputes	Contractor;Sociologist	Construction Phase	TBD
Operation Phase Environmental and Social Management Plan												
	Aspect	Source of impact	Potential Impact	Objective	Management Strategy	Controls	Performance Indicator	Monitoring Requirements	Reporting	Responsibility	Timing	Budget (KES)
1	Water resources	Abstraction of water for consumptive use	Reduced flows in the river with potential to affect aquatic organisms and downstream uses	Sustainable abstraction of water	Abstract in line with the catchment management strategy; Minimise abstracted volumes	Obtain an abstraction license from WRA and adhere to conditions; Cooperate with WRA in implementing a catchment abstraction management strategy; Adopt a dynamic abstraction regime to maintain the environmental flow requirements; Recycle backwash water	Amount of backwash water recycled; Amount abstracted vis a vis the recommended limit	Periodic reviews especially during low flows	Abstraction records	BOMWASCO	Operation Phase	TBD
2	Waste management	Discharge of sludge and backwash water from the treatment works; Waste generation from residence by staff at the treatment works	Pollution of the river downstream; Environmental pollution and creation of health and safety hazards	Prevent river pollution from water treatment activities	Implement a site waste management plan	Minimise sludge production; Sludge treatment and overland application or incineration; Recycling of filter backwash water; Disposal of generated wastes by composting, landfilling and incineration; Disposal of sewage in septic tank	Manner in which waste generated is handled on site and disposed; Extent of recycling of recyclable wastes	Annual Audit of operations	Waste management records	BOMWASCO	Operation Phase	TBD
3	Air Quality	Vehicle movements along dusty accesses during maintenance and inspections	Dust nuisance and adverse health effects on communities along roads	Avoid air pollution by project activities	Implement dust control measures for project activities	Regulation of driving speeds along dusty roads; Use of designated accesses	Community complaints; Dust deposition on vegetation and buildings along project roads	Annual Audit of operations	Annual Audit Report	BOMWASCO	Operation Phase	NAC
4	Aesthetics and visual integrity	Pipeline markers and access roads; Visible facilities such as the treatment works, Intake works, storage tanks and pump houses	Visual disturbance effects on humans	Blending of facilities and operations with the surroundings	Adopt green practices; Camouflage buildings; Obscure views with vegetation	Enhancement of vegetation cover around facilities to obstruct views from vantage points; Camouflage buildings as much as possible	Extent of vegetation replanted on sites; Visual intrusion or harmony of facilities with the surroundings	Annual Audit of Facilities	Annual Audit Report	BOMWASCO	Operation Phase	TBD
5	Noise levels	Pumping of water at the treatment works and at pumping stations	Noise nuisance to neighbouring residents to the facilities	Low noise levels from project sites	Use of noise prevention/suppression equipment at noise sources	Use of acoustic shielding in pump rooms to minimize noise exposure to the public	Noise levels at receptor locations	Annual Audit of activities	Annual Audit Report	BOMWASCO	Operation Phase	Part of Project Costs
6	Biodiversity	Normal operations, maintenance and repairs of infrastructure	Disturbance of wildlife near work areas	Harmonious existence with wildlife	Biocentrism in operations	Training of staff on working in wildlife areas	Wildlife training of operations staff	Annual Audit of operations	Annual Audit Report	BOMWASCO	Operation Phase	NAC
7	Soil resources	Off-track vehicle movements during inspections and maintenance; Pipeline failure due to high gravitational and/or pumping hydraulic	Compaction of soil by vehicles leading to loss of soil structure and increased susceptibility to erosion; Soil erosion at points of failure	Soil conservation	Adoption of erosion prevention practices; Preventive maintenance of pipelines	Use designated accesses; Use pipes of appropriate pressure ratings; Provision of surge vessels at pumping stations to balance the pressures;	Erosion incidents from pipe failures; Secondary tracks created along project roads	Annual Audit of operations	Annual Audit Report	BOMWASCO	Operation Phase	Part of Project Costs
8	Energy resources	Use of energy at the treatment works and pumping stations	High energy demand	Energy conservation	Continual improvement in energy efficiency of equipment	Use of energy efficient pumps, lighting and other appliances/fixtures	Energy saving equipment installed; use of renewable sources of energy in operations	Annual Audit of Facilities	Annual Audit Report	BOMWASCO	Operation Phase	Part of Project Costs
9	Geohazards	Pipeline failure under high hydraulic pressures	Land slides or mud slides	Geohazards prevention	Preventive maintenance of infrastructure	Regular maintenance and prompt repairs of faults on the pipeline	Maintenance activities undertaken to prevent occurrence of hazards	Annual Audit of Facilities	Annual Audit Report	BOMWASCO	Operation Phase	TBD

10. Conclusion and recommendations

An environmental and social impact assessment (ESIA) has been carried out for the proposed Bomet – Mulot Water Supply Project and an ESIA Study Report prepared detailing the potential positive and adverse impacts of the project.

For the predictable and potential negative impacts identified, the study assessed their significance, and presented practical mitigation measures to eliminate or reduce the anticipated adverse effects.

The proposed project is a positive intervention because it will solve the water scarcity problem in Bomet County. This will be a positive contribution enabling the socioeconomic growth of the area as residents enjoy sufficient clean water supplies and reduced disease burden from water-borne diseases. Area residents will also benefit from employment and business opportunities created during construction work.

Adverse impacts identified include economic displacement of members of the community with potential loss of livelihoods, the potential increase in noise pollution, air pollution, soil and water resources pollution, and increased health and safety hazards during construction phase of the project. Whereas most of the adverse impacts are temporary and limited to the construction period, reduced flow downstream of the intake works and resultant change in habitat is one of the most significant long-term adverse impacts of the project.

Mitigation measures proposed during construction include implementation of a Resettlement Action Plan for the expected economic displacement to communities, institution of noise management mechanisms on machinery at the sites, dust control around construction areas and stockpiles, soil and water pollution prevention through proper management of construction wastewater, storage and use of hazardous chemicals, and implementation of occupational and community health and safety management plans.

During project operations, measures proposed include river flow monitoring, catchment protection, and cooperation with WRA in the implementation of a catchment abstraction management strategy.

From the foregoing, no adverse environmental impacts are anticipated that cannot be mitigated. An environmental audit is recommended upon the completion of construction works to corroborate the implementation of the proposed mitigation measures. Any unforeseen project impacts will be identified and addressed through annual environmental audits.

In conclusion, the Consultant proposes that project approval and an Environmental Impact Assessment license be issued by NEMA based on the environmental management measures contained in this ESIA Study Report.

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Appendices

Appendix A. Population and water demand projections for the project area

Human Population Projections for the Project area

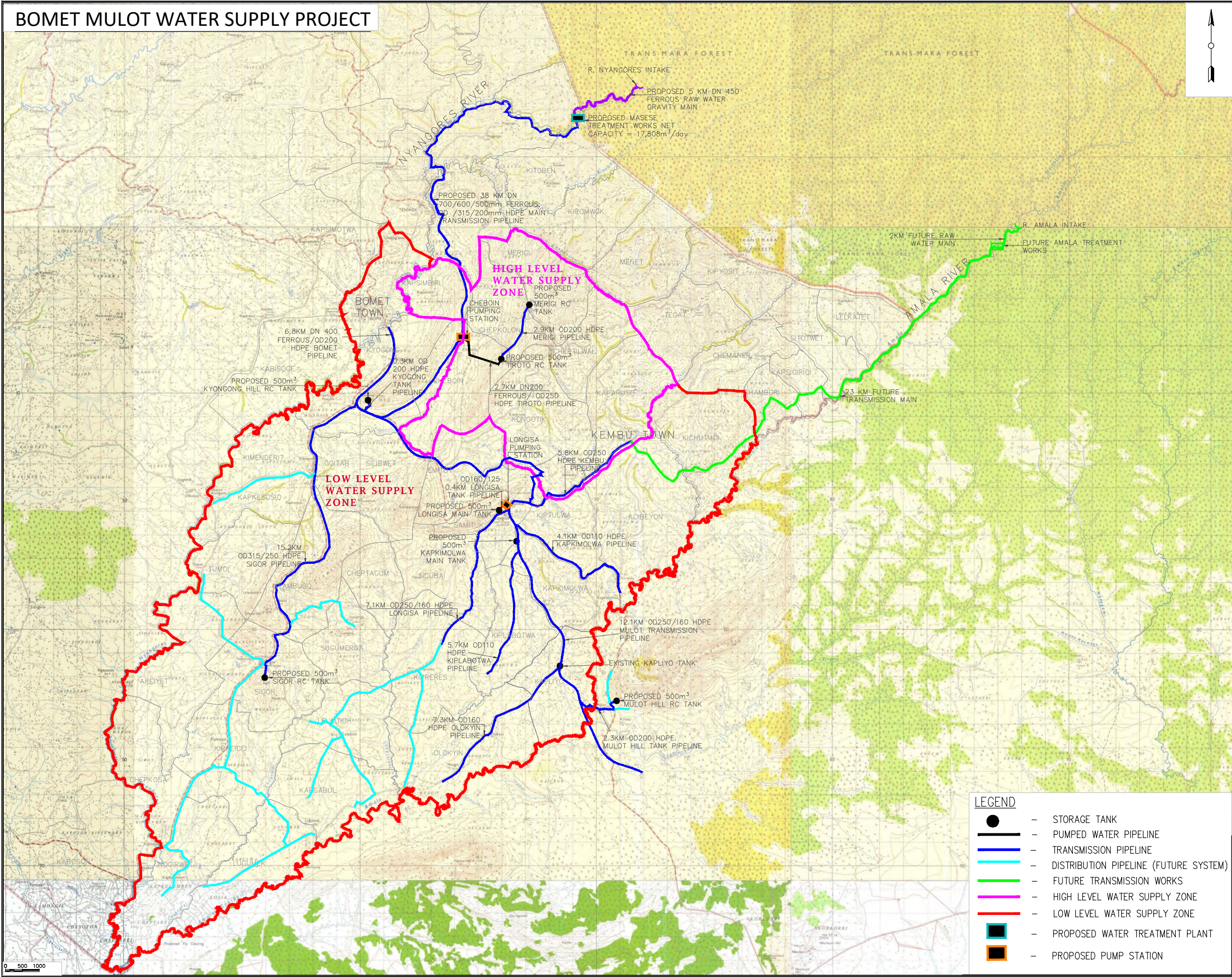
Division	Location	Sub-Location	Area (ha) 1989	Area (ha) 1999	Area (ha) 2009	Year 1999 Population Census	Year Population 2009 Census	Growth rate, r (1999-2009)	Consumer Class	Ultimate Growth rate	Initial Population 2021	Future Population 2031	Ultimate Population 2041
Longisa	Cheboin	Cheboin		1,490	1,510	3,909	5,242	3.0%	Urban	2.7%	6,968	9,007	11,756
		Emitiot		1,030	1,050	3,109	4,054	2.7%	Rural	2.7%	5,389	6,966	9,092
		Samituk		980	980	3,043	4,328	3.6%	Urban	3.7%	6,390	9,014	12,962
	Kiprerres	Kiprerres	4,000	1,790	1,790	3,877	4,960	2.5%	Rural	2.7%	6,593	8,522	11,124
		Ndubai		1,210	1,240	3,336	4,252	2.5%	Rural	2.7%	5,652	7,306	9,536
	Kapkimolwa	Kapkimolwa	5,200	1,100	1,100	3,701	4,944	2.9%	Urban	2.7%	6,572	8,495	11,088
		Kiptulwa		1,080	1,080	2,796	3,408	2.0%	Rural	1.9%	4,075	4,823	5,822
		Koibeiyon		2,200	2,210	4,924	6,389	2.6%	Rural	2.7%	8,492	10,978	14,329
	Kembu	Cheptikwal		840	840	3,882	4,953	2.5%	Rural	2.7%	6,584	8,510	11,108
		Kaporuso	1,900	1,280	1,280	4,694	5,811	2.2%	Rural	2.7%	7,724	9,984	13,033
		Kongotik	4,300	1,570	1,550	4,579	5,807	2.4%	Rural	2.7%	7,719	9,978	13,024
	Sub-Total [1]			14,570	14,630	41,850	54,148				72,157	93,581	122,874
Longisa-Mulot	Kiplabotwa	Kiplabotwa		1,090	1,090	2,456	3,350	3.2%	Urban	3.7%	4,946	6,977	10,033
		Kapliyo		1,170	1,180	3,608	5,269	3.9%	Urban	3.7%	7,779	10,973	15,781
		Olokyin	3,100	1,930	1,940	4,126	5,441	2.8%	Rural	2.7%	7,232	9,349	12,203
	Sub-Total [2]			4,190	4,210	10,190	14,060				19,957	27,299	38,017
Sigor	Kyogong	Goitab-Silibwet		1,690	1,670	4,236	5,632	2.9%	Rural	2.7%	7,486	9,677	12,631
		Kyongong	1,700	1,720	1,710	4,630	5,734	2.2%	Rural	2.7%	7,622	9,852	12,860
	Kapkesosio	Kapkesosio	2,700	750	760	1,839	2,466	3.0%	Urban	2.7%	3,278	4,237	5,531
		Kimenderit		940	930	2,381	3,010	2.4%	Rural	2.7%	4,001	5,172	6,751
		Tumoi		1,160	1,160	2,375	3,200	3.0%	Urban	3.7%	4,724	6,664	9,584
	Sugumerga	Cheptagum		670	680	2,105	2,668	2.4%	Rural	2.7%	3,546	4,584	5,984
		Nyambugo	3,400	1,710	1,690	3,585	4,369	2.0%	Rural	1.9%	5,224	6,183	7,463
		Sugumerga	1,700	1,000	1,000	2,679	3,328	2.2%	Rural	2.7%	4,424	5,718	7,464
	Lelaitich	Kapsabul		1,460	1,460	2,479	3,254	2.8%	Rural	2.7%	4,325	5,591	7,298
		Lelaitich	3,300	1,130	1,130	2,624	3,149	1.8%	Rural	1.9%	3,765	4,456	5,379
		Lugumek		1,370	1,370	2,659	3,758	3.5%	Urban	3.7%	5,548	7,826	11,255
	Sigor	Sigor		1,860	1,550	4,638	5,293	1.3%	Rural	1.9%	6,328	7,490	9,042
		Kipkeigei		1,570	1,560	3,089	3,656	1.7%	Rural	1.9%	4,371	5,174	6,245
		Areiyet		1,440	1,780	2,968	3,920	2.8%	Rural	2.7%	5,211	6,735	8,792
	Cheleget	Chepkosa		1,130	1,120	2,601	3,260	2.3%	Rural	2.7%	4,333	5,601	7,311
		Nogirwet	4,100	1,710	1,810	2,743	3,718	3.1%	Urban	3.7%	5,489	7,743	11,135
	Sub-Total [3]			21,310	21,380	47,631	60,415				79,676	102,705	134,724
Bomet Central	Township	Chepngaina		1,000	940	6,253	10,165	5.0%	Urban	5.3%	18,465	30,655	51,378
		Kapsimbiri	1,800	580	590	2,247	2,707	1.9%	Rural	1.9%	3,237	3,831	4,624
	Merigi	Chepkolon	1,900	840	890	3,476	4,258	2.0%	Rural	2.7%	5,660	7,316	9,550
		Merigi		1,140	1,110	3,930	4,491	1.3%	Rural	1.9%	5,370	6,355	7,672
Narok	Mulot	Mulot		3,750	3,530	6,097	8,351	3.2%	Urban	3.7%	12,329	17,392	25,011
	Sub-Total [4]			7,310	7,060	22,003	29,972				45,060	65,549	98,235
	Total [1]+[2]+[3]+[4]			47,380	47,280	121,674	158,595				216,850	289,134	393,849

Overall Water Demand Projections for the Project area

				Initial 2021 m³/day	Future 2031 m³/day	Ultimate 2041 m³/day
Division	Location	Sub-Location	Area (ha) 2009			
Longisa	Cheboin	Cheboin	1,510	403	600	887
		Emitiot	1,050	102	174	319
		Samituk	980	381	620	1,031
	Kipreres	Kipreres	1,790	122	210	387
		Ndubai	1,240	105	181	333
	Kapkimolwa	Kapkimolwa	1,100	376	561	831
		Kiptulwa	1,080	78	123	208
		Koibeiyon	2,210	163	277	505
	Kembu	Cheptikwal	840	115	202	378
		Kaporuso	1,280	139	241	448
		Kongotik	1,550	142	245	452
	Sub-Total [1]		14,630	2,126	3,434	5,780
Longisa- Mulot	Kiplabotwa	Kiplabotwa	1,090	290	468	470
		Kapliyo	1,180	468	761	1,265
		Olokyin	1,940	132	228	423
		Sub-Total [2]		4,210	890	1,458
Sigor	Kyogong	Goitab-Silibwet	1,670	140	240	441
		Kyongong	1,710	143	244	449
	Kapkesosio	Kapkesosio	760	190	283	259
		Kimenderit	930	75	129	236
		Tumoi	1,160	275	444	722
	Sugumerga	Cheptagum	680	65	112	207
		Nyambugo	1,690	104	162	272
		Sugumerga	1,000	83	142	261
	Lelaitich	Kapsabul	1,460	90	165	283
		Lelaitich	1,130	74	115	194
		Lugumek	1,370	323	522	848
	Sigor	Sigor	1,550	132	208	379
		Kipkeigei	1,560	89	138	229
		Areiyet	1,780	105	176	317
	Cheleget	Chepkosa	1,120	83	141	258
		Nogirwet	1,810	325	523	837
	Sub-Total [3]		21,380	2,296	3,744	6,192
Bomet Central	Township	Chepngaina	940	227	437	838
		Kapsimbiri	590	59	94	161
	Merigi	Chepkolon	890	101	176	328
		Merigi	1,110	99	158	269
Narok	Mulot	Mulot	3,530	767	1,242	2,081
	Sub-Total [4]		7,060	1,253	2,107	3,678
	Total [1]+[2]+[3]+[4]		47,280	6,564	10,742	17,808

Appendix B. Project layout drawings

BOMET MULOT WATER SUPPLY PROJECT




TO	TENDER ISSUE				
REV	DESCRIPTION	DATE	BY	TO	

REVISION SCHEDULE


Drawing Status **FIT FOR APPROVAL** Suitability **S4**

Signed: Practise Lead.....

Project Implementing Agency:
 THE CHIEF EXECUTIVE OFFICER
RIFT VALLEY WATER WORKS DEVELOPMENT AGENCY
Maji Plaza, Prisons Road,
P.O Box 2451 - 20100
Nakuru - Kenya.

Project Executing Agency:
 THE CHIEF EXECUTIVE OFFICER
LAKE VICTORIA SOUTH WATER
WORKS DEVELOPMENT AGENCY
Lavitors House, Off Ring Road Milmani,
P.O Box 3325 - 40100
Kisumu - Kenya

Project Title
BOMET-MULOT WATER SUPPLY PROJECT
Contract No.:RVWWDA/LVS/KTSWSSP/C/BOMET/2017-18

Design Review and Supervision Consultant

Member of the SNC-Lavalin Group
Muthangari Drive, off Waiyaki Way , Westlands
P.O. Box 30156-00100 Nairobi.

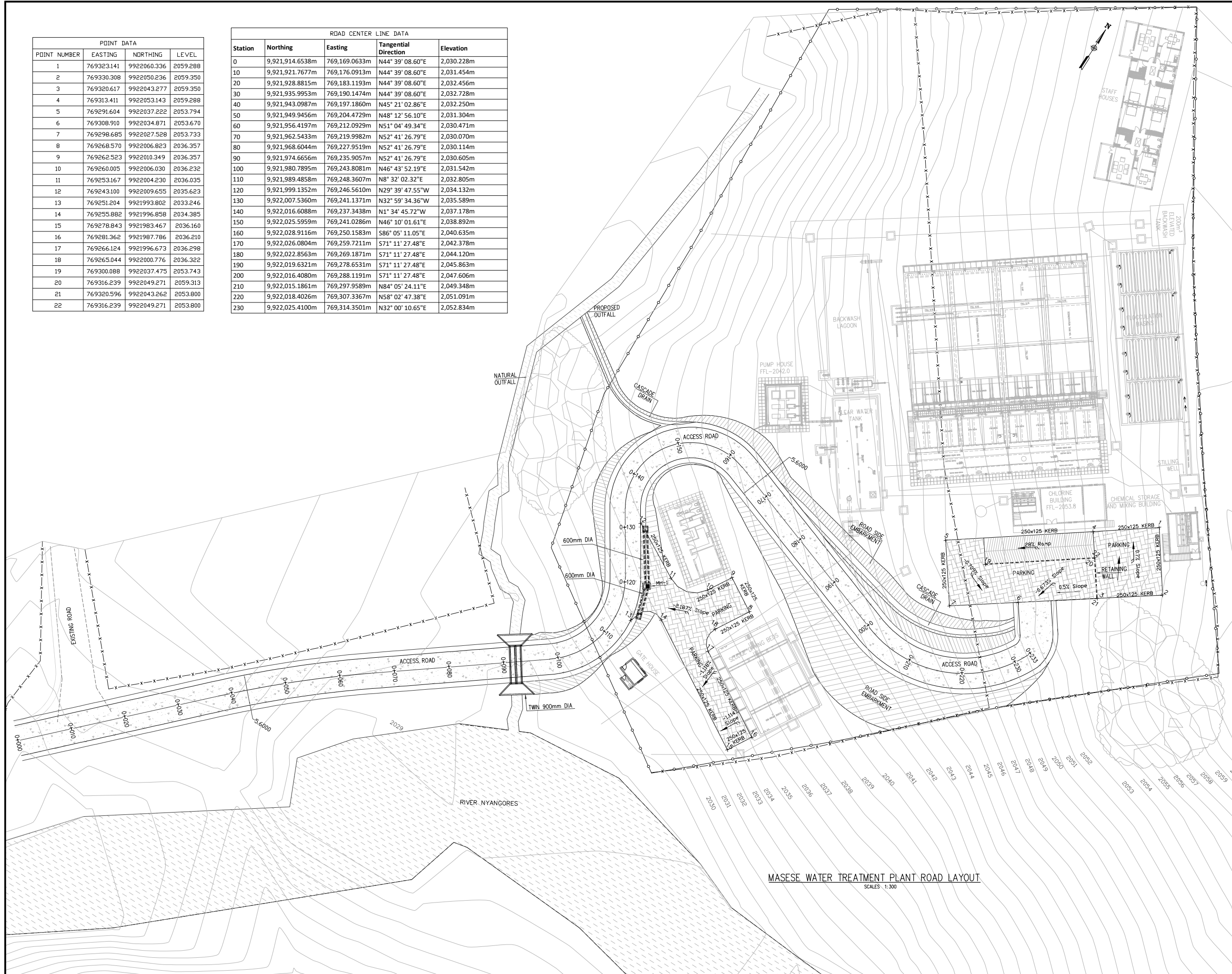
Drawing Title
PROJECT LOCATION
PROPOSED PROJECT WORKS

PROPOSED PROJECT WORKS

Scale	Designed	Drawn	Checked	Authorised
As Shown	PN	DNR	FNO	OBO
Original Size	Date	Date	Date	Date
A1	MAR-2020	MAR-2020	MAR-2020	MAR-2020
Drawing Number	5161008-ATK-GLP-PL-DR-W-0001			Revision
				T0

POINT NUMBER	POINT DATA		
	EASTING	NORTHING	ELEVATION
1	769323.141	9920260.336	2059.288
2	769330.308	9920250.236	2059.350
3	769320.617	9920243.277	2059.350
4	769313.411	9920253.143	2059.288
5	769291.604	9920237.222	2053.794
6	769308.910	9920234.871	2053.670
7	769298.665	9920275.528	2053.733
8	769268.570	992006.823	2036.357
9	769262.523	9920210.349	2036.357
10	769260.005	992006.030	2036.232
11	769253.167	9920024.230	2036.035
12	769243.100	992009.655	2035.623
13	769251.204	9921993.802	2033.246
14	769255.882	9921996.858	2034.365
15	769278.843	9921983.467	2033.181
16	769281.362	9921987.786	2036.210
17	769266.124	9921996.673	2036.298
18	769265.044	9922000.776	2036.322
19	769300.088	9922037.475	2053.743
20	769316.239	9920249.271	2059.313
21	769320.596	9920243.262	2053.800
22	769316.239	9920249.271	2053.800







ROAD CENTER LINE DATA				
Station	Northing	Easting	Tangential Direction	Elevation
0	9,921,914.6538m	769,169.0633m	N44° 39' 08.60"E	2,030.228m
10	9,921,921.7677m	769,176.0913m	N44° 39' 08.60"E	2,031.454m
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140	9,922,016.6088m	769,237.3438m	N18° 34' 45.72"W	2,037.178m
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210	9,922,015.1861m	769,297.9589m	N84° 05' 24.11"E	2,049.348m
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REFERENCE DRAWING NO:

1. 5161008-ATK-WTP-AR-DR-R-0002 FOR ACCESS ROAD PROFILE
2. 5161008-ATK-WTP-AR-DR-R-0003 FOR TYPICAL ROAD CROSS-SECTIONS
3. 5161008-ATK-WTP-AR-DR-R-0004 FOR INSPECTION CHAMBER DETAILS
4. 5161008-ATK-WTP-AR-DR-R-005 FOR 900mm PROPOSED CULVERT
5. 5161008-ATK-WTP-AR-DR-R-005 FOR 600mm PROPOSED CULVERT

LEGEND:

- | | |
|---|----------------------|
| -X-X-X- | EXISTING FENCE LINES |
|  | RIVER |
|  | PROPOSED ROAD |
|  | PROPOSED PARKING |
|  | PROPOSED FENCELINE |
|  | PROPOSED CULVERT |
|  | SLOPE |
| 0+100.00 | ROAD CHAINAGE |
| MH-1 | INSPECTION CHAMBER |

[illegible]

T0	TENDER ISSUE			
REV	DESCRIPTION	DATE	BY	TO

REVISION SCHEDULE

Drawing Status

FIT FOR APPROVAL

Suitability
S4

Signed: Practise Lead.....

Project Implementing Agency:



THE CHIEF EXECUTIVE OFFICER
RIFT VALLEY WATER WORKS DEVELOPMENT AGENCY
Maji Plaza, Prisons Road,
P.O Box 2451 - 20100
Nakuru - Kenya.

Project Executing Agency:



**THE CHIEF EXECUTIVE OFFICER
LAKE VICTORIA SOUTH WATER
WORKS DEVELOPMENT AGENCY**
Lavitors House, Off Ring Road Mlimani,
P.O Box 3325 - 40100
Kisumu - Kenya

Project Title	
---------------	--

BOMET-MULOT WATER SUPPLY PROJECT
Contract No.:RVWWDA/LVS/KTSWSSP/C/BOMET/2017-18

Design Review and Supervision Consultant

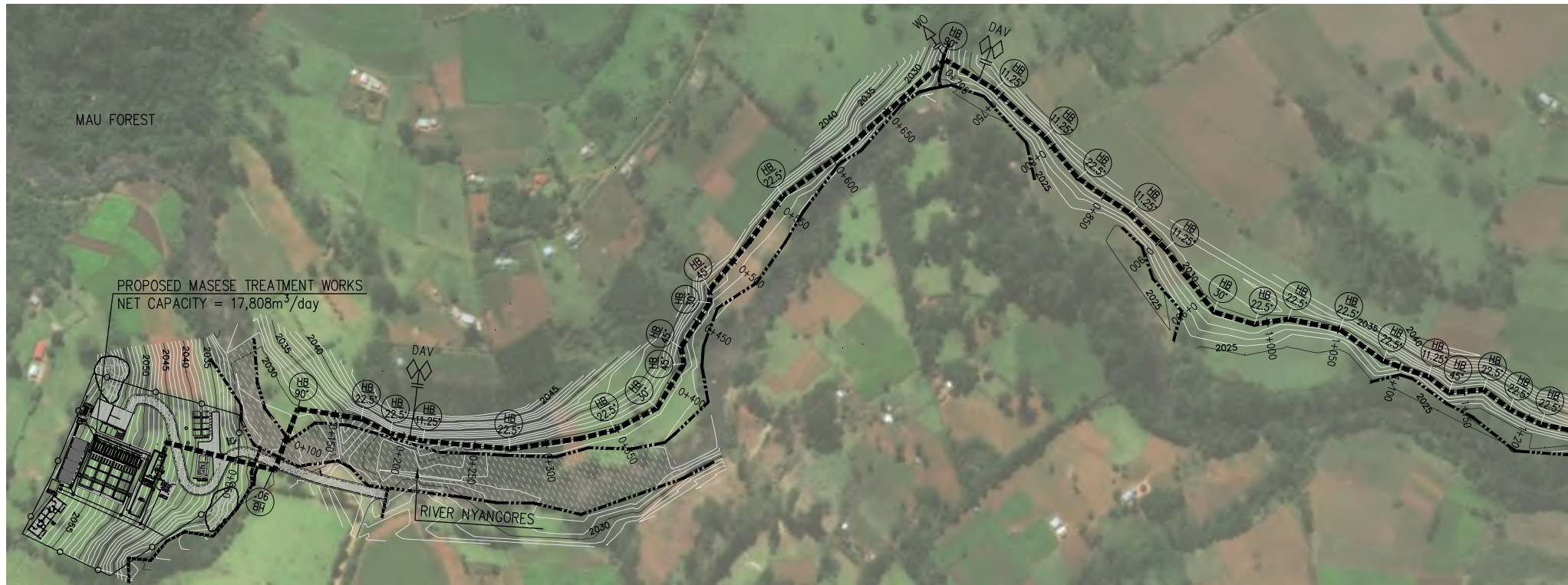


**Muthangari Drive, off Waiyaki Way , Westlands
P.O. Box 30156-00100 Nairobi.**

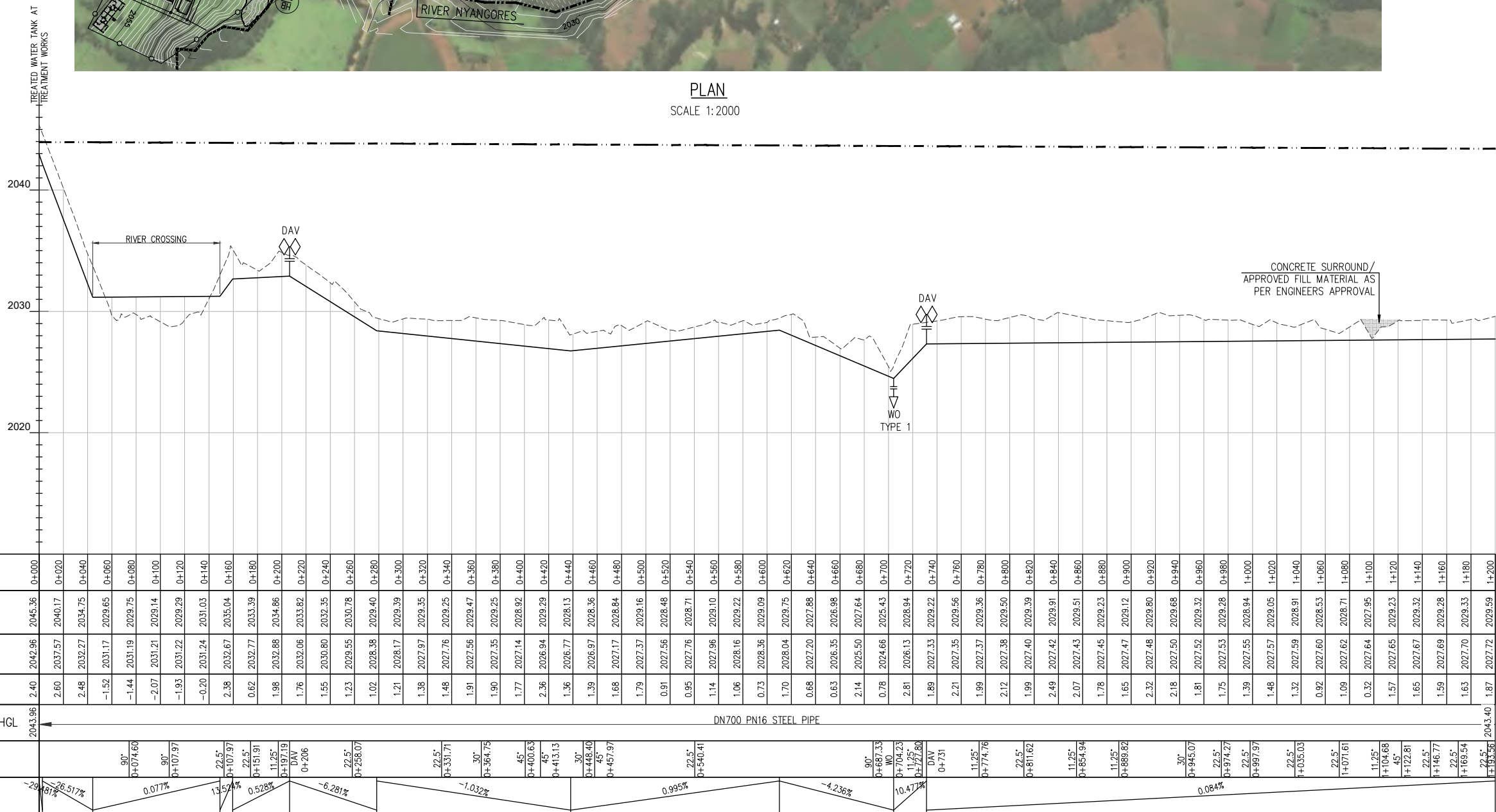
	Drawing Title
--	---------------

MASESE WATER TREATMENT PLANT
ROAD LAYOUT

Scale	Designed	Drawn	Checked	Authorised
SCALE				
Original Size	Date	Date	Date	Date
A1	MAR-20	MAR-20	MAR-20	MAR-20
Drawing Number				Revision
5161008-ATK-WTP-AR-DR-R-0001				T0



PLAN
SCALE 1:2000



PROFILE

SCALES HOR. 1:2000 & VER. 1:200

NOTES:

- ALL LEVELS ARE IN METERS ABOVE ORDINARY DATUM.
- PRECISE LOCATION OF AIR VALVES, WASHOUTS, BENDS AND OTHER FITTINGS TO BE DETERMINED ON SITE
- PIPES ARE TO BE LAID TO EVEN GRADIENTS WITH A MINIMUM COVER OF 1M.WHERE COVER IS LESS THAN 1M,PIPE TO BE SURROUNDED WITH CONCRETE
- ALL BENDS ARE HORIZONTAL UNLESS OTHERWISE STATED.
- GROUND AND INVERT LEVELS SHOWN ARE ONLY INDICATIVE. FINAL LEVELS TO BE CONFIRMED BY THE ENGINEER
- PIPE FITTINGS DETAILS ARE GIVEN ON DRAWING NO:5161008-ATK-TWM-ML-DR-W-33-39
- WASHOUT TYPE SHOWN IS INDICATIVE. FINAL TYPE TO BE CONFIRMED BY THE ENGINEER ON SITE.

LEGEND:


- PROPOSED PIPELINE PLAN VIEW
- EXISTING GROUND PROFILE
- PIPE INVERT PROFILE
- HYDRAULIC GRADE LINE
- RIVER
- STREAM
- DOUBLE AIR VALVE (D.A.V)
- SINGLE AIR VALVE (S.A.V)
- WASH-OUT (W.O.)
- SECTION VALVE
- NOMINAL PRESSURE
- HORIZONTAL BEND
- OUTSIDE DIAMETER
- HORIZONTAL BEND 45°

TO	TENDER ISSUE			
REV	DESCRIPTION	DATE	BY	TO

REVISION SCHEDULE

Drawing Status	FIT FOR APPROVAL	Suitability	S4
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Signed: Practise Lead.....

Project Implementing Agency:
 THE CHIEF EXECUTIVE OFFICER
RIFT VALLEY WATER WORKS DEVELOPMENT AGENCY
Maji Plaza, Prisons Road,
P.O Box 2451 - 20100
Nakuru - Kenya.

Project Executing Agency:
 THE CHIEF EXECUTIVE OFFICER
LAKE VICTORIA SOUTH WATER
WORKS DEVELOPMENT AGENCY
Lavadors House, Off Ring Road Milmani,
P.O Box 3325 - 40100
Kisumu - Kenya

Project Title
BOMET-MULOT WATER SUPPLY PROJECT
Contract No.:RVWWDA/LVS/KTSWSSP/C/BOMET/2017-18

Design Review and Supervision Consultant

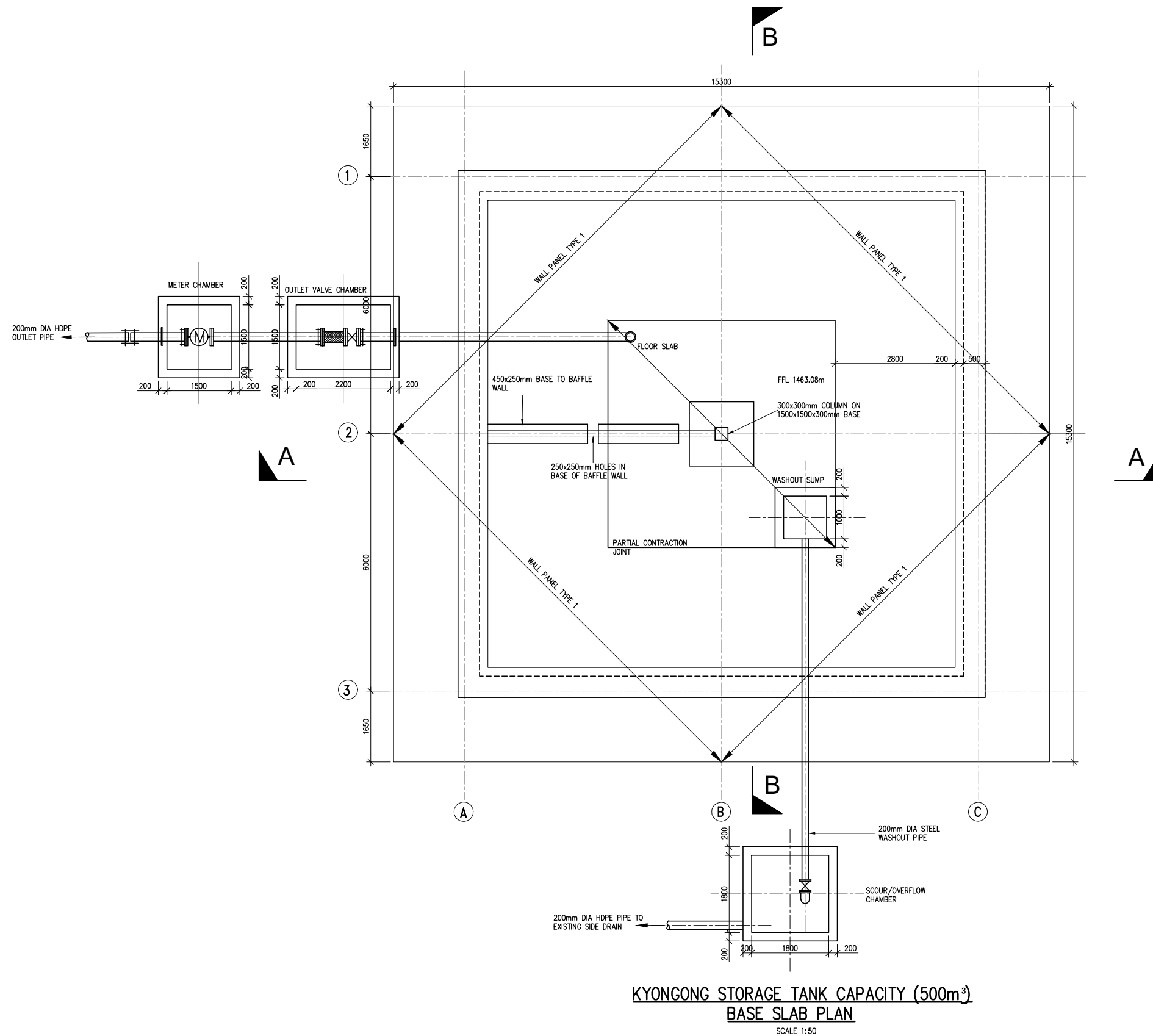
Member of the SNC-Lavalin Group
Muthangari Drive, off Waiyaki Way , Westlands
P.O. Box 30156-00100 Nairobi.

Drawing Title
**MAIN TRANSMISSION PIPELINE
PLAN AND PROFILE
CHAINAGE 0+000 - 1+200 (KM+M)**

Scale	Designed VMM	Drawn DNR	Checked PN	Authorised OBO
Original Size	Date	Date	Date	Date
A1	FEB-20	FEB-20	FEB-20	FEB-20
Drawing Number	5161008-ATK-TWM-ML-DR-W-0001			Revision
				T0



Drawing Number	Revision
5161008-ATK-GLP-TW-DR-W-0004	T0




NOTES:

- DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
- ALL EXPOSED CONCRETE EDGES TO HAVE 25mm X 25mm CHAMFER
- CONCRETE WORKS: ALL REINFORCED CONCRETE TO BE CLASS 35/20 EXCEPT WHERE OTHERWISE SPECIFIED
- ABBREVIATIONS :
 R.C - REINFORCED CONCRETE
 F.G.L - FINISHED GROUND LEVEL
 E.G.L - EXISTING GROUND LEVEL
 D.N - NOMINAL DIAMETER
 uPVC - UNPLASTICISED POLYVINYL
 G.I - GALVANIZED IRON
 F.G.L - FINISHED GROUND LEVEL

TO	TENDER ISSUE	DATE	BY	TO
REV	DESCRIPTION	DATE	BY	TO

REVISION SCHEDULE

Drawing Status	FIT FOR APPROVAL	Suitability	S4
Signed: Practise Lead.....			

Project Implementing Agency:

 THE CHIEF EXECUTIVE OFFICER
 RIFT VALLEY WATER WORKS DEVELOPMENT AGENCY
 Maji Plaza, Prisons Road,
 P.O Box 2451 - 20100
 Nakuru - Kenya.

Project Executing Agency:

 THE CHIEF EXECUTIVE OFFICER
 LAKE VICTORIA SOUTH WATER
 WORKS DEVELOPMENT AGENCY
 Lawitors House, Off Ring Road Milimani,
 P.O Box 3325 - 40100
 Kisumu - Kenya

Project Title
BOMET-MULOT WATER SUPPLY PROJECT
 Contract No.:RVWDA/LVS/KTSWSP/C/BOMET/2017-18

Design Review and Supervision Consultant

ATKINS
 Member of the SNC-Lavalin Group
 Muthangari Drive, off Waiyaki Way , Westlands
 P.O. Box 30156-00100 Nairobi.

Drawing Title
KYONGONG STORAGE TANK (500m³)
BASE SLAB LAYOUT
SHEET 2 OF 5

Scale	Designed	Drawn	Checked	Authorized
As Shown	JR	BAO	PN	OBO
Original Size	Date	Date	Date	Date
A1	MAR-20	MAR-20	MAR-20	MAR-20
Drawing Number	Revision			
5161008-ATK-STs-KY-DR-W-0010	TO			

Appendix C. Public consultation records

C.1. Workshop proceedings



Minutes of Meeting

Project: Consultancy Services for Design Review, Preparation of Tender Documents and Supervision of Construction Works for Bomet-Mulot Water Supply and Sanitation Project

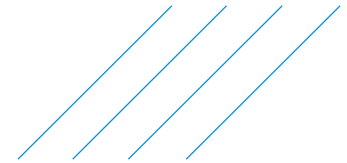
Subject: Minutes of the Presentation of Working Paper No.3 of Bomet-Mulot Water Supply & Sanitation Project.

Meeting place:	Sierra Springs Hotel, Bomet town	Meeting no:	5
Date and time:	21 February 2019 - 1100Hrs	Minutes by:	Daniel Areba
Present:	The List of attendants is included as an annex to these Minutes.	Representing:	

ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
1	<p>Introduction</p> <p>The workshop commenced at 11:30 hrs with a word of prayer. This was followed by introductions of all the members present by the Communications Manager (CCM)-RVWSB. The CEO BOMWASCO made introductory remarks and thereafter the Consultant was invited to take the meeting through the presentation.</p> <p>The Consultant took the meeting through the presentation of the Working Paper No.3 for the project which was submitted to the Client through email on 8th February 2019 and paper copies on 13th February 2019.</p> <p>During the presentation, the Consultant gave a brief history of the project and outlined the various deliverables that have been submitted so far.</p> <p>It was noted that in April 2018, the client gave instructions to put the project on hold. The Consultant went on to explain the reasons for the interruption and the eventual meeting on 17th January 2019, that resulted in a change of scope leading to the preparation of working paper No. 3.</p> <p>He concluded that the working paper was a result of the client requesting for information on the various options available for supplying the revised Bomet – Mulot Water Supply Project, using River Nyangores and River Amala.</p> <p>The participants concurred with the proposed project options. The following comments were made which should be incorporated in to the project as it advances</p>		For Info



ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
2	<p>Project Coverage and additional Supply Areas</p> <p>The Consultant was requested to explore if it is hydraulically feasible to supply the high areas within the project area such as Merigi, upper parts of Kembu town, Chamaner, entire Chepalungu and any other areas that might have been left out using the three options presented.</p> <p>The Consultant agreed to review this during the feasibility study as the areas are above the hydraulic grade line and will incorporate all the findings in the feasibility report.</p>		Atkins
3	<p>Hydrological Study</p> <p>The Consultant was requested to carry out detailed hydrological studies of the proposed sources of water for the project i.e. Rivers Nyangores and Amala. This will ascertain that the ultimate design demand for any option to supply the area will be met by these water sources. The study will also form part of the findings of the increased human activity in the Mau forest and other projects that rely on Mau forest as the catchment area.</p> <p>The Consultant agreed to carry out the hydrological studies during the feasibility study and incorporate all the findings in the feasibility report</p>		Atkins
4	<p>Pumping Schemes</p> <p>Due to high costs of electricity associated with pumping schemes, the Consultant was requested by the stakeholders and BOMWASCO to eliminate any pumping as proposed in option 2 as presented in the Working Paper No.3. However, if it is impossible to completely eliminate pumping due to the area topography, then only areas that are above the hydraulic grade line should be served through pumping.</p> <p>The Consultant agreed to review this during the feasibility study and incorporate all the findings in the feasibility report</p>		Atkins



5	<p>Project Budget.</p> <p>The revised Bomet-Mulot Water Supply Project shall utilise the original budget that was secured from AfDB. Therefore, the Consultant was requested to carry out a proper feasibility that will ensure higher project coverage area with the available budget.</p> <p>The Consultant agreed to incorporate this in the feasibility study and optimise it during detailed design.</p>	Atkins
6	<p>Environmental/Forest/Catchment Conservation</p> <p>The stakeholders/KFS challenged the Client and the Consultant to incorporate forest conversation as item in the project considerations. Forests are the main catchment areas which all water projects rely on hence the need to allocate some funds from the project to go towards forest conservation. The Consultant was tasked to ensure that the designs are done to minimise environmental degradation.</p> <p>The Consultant reiterated that all the environmental issues shall be put in to consideration including the preparation of the ESIA and EMP during detailed design.</p>	Atkins
7	<p>Other Comments</p> <ul style="list-style-type: none"> • RVWSB urged the stakeholders not to lose sight of the overall aim of the project, which is to serve the wider community of Bomet from rivers Nyangores and Amala and not Kipsonoi river which will now fully serve Bosto dam. The water companies and all other stakeholders within the project were challenged to attend and actively participate in the project progress meetings and activities from inception to completion. The media and all stakeholders were encouraged to promote honest, positive coverage of the project as social issues is a key concern for the donors. This will ensure that the project advances to full design and implementation very quickly. • RVWSB reiterated its commitment to ensure that the project reaches full implementation. In addition, the board noted that during asset/project development, county boundaries should not be taken as the defining supply area rather the needs of the population should be put in to consideration. • RVWSB requested the Consultant to immediately prepare an addendum and submit to the board for approval as this will pave way for the commencement of feasibility study. • LVSWSB stressed on the importance of the revised project scope of the Bomet-Mulot Water Supply project as it eliminates the duplication of the infrastructure and supply area with Bosto Dam. This therefore means that the funds already secured will be utilised by the new revised project. 	For Info.



ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
	<ul style="list-style-type: none"> LVSWSB requested the Consultant if possible to eliminate pumping as an option. However, this will be guided by the hydraulics of the supply area. If some minimal pumping is to be introduced, then this should be within the project budget. The Board also reiterated its full commitment towards the full implementation of the project and will work closely with RVWSB and the Consultant. BOMWASCO recommended that the project if possible should be a fully gravity scheme as the company is currently struggling with high electricity bills which is as a result of the existing pumping schemes. However, the company is also concerned about the population residing in high areas who can only be served through pumping. The area MP's representative reiterated the desire of the MP to have the populations residing at the edge of the forest to be served by the project The Consultant was tasked to explore the ways of serving these areas during feasibility study. The area Deputy County Commissioner acknowledged the efforts RVWSB and LVSWSB are putting in place in the Water Sector to ensure Bomet County attains 100% water coverage. If both Bosto dam and Bomet-Mulot projects are fully implemented, they would have a combined coverage of about 90% of Bomet County, which would be a benchmark for other counties in Kenya. The County invited the Consultant to work closely with the people on the ground during the feasibility studies and assured them of full support from the residents of Bomet County. 		For Info.
8	The workshop ended at 14:25 hrs with a word of prayer.		

Next meeting: To be confirmed

Distribution: All on mailing list

Date issued: 27 February 2019

File Ref: 5161008/9

NOTE TO RECIPIENTS:

These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.



RVWSB GAR 001

ATTENDANCE REGISTER

RIFT VALLEY WATER SERVICES BOARD					
FUNCTION: Bomet - Mulot Water Supply and Sanitation Project				DATE: 21/02/2019	
S/NO	NAME	DESIGNATION/ORGANISATION	EMAIL ADDRESS/PHONE NUMBER	ID NUMBER	SIGNATURE
1	Philip Kineli	EE - RVWSB	Kpkineli@gmail.com	24784297	
2	Carlos Chelugot	CCM - RVWSB	Carloschelugot@gmail.com	21709853	
3	Vivian S. Song	Forester - KFS	Viviansigei@gmail.com	01167547	
4	Joseph M. Kopejo	CDE - NEMA	bomet@nema.go.ke	11219345	
5	Anthony Bichii	Team Leader - Atkins	Anthony.Bichii@atkinsglobal.com	1074411	
6	Chapbas Nzabab	Engineer - Atkins	Chapbas.Nzabab@atkinsglobal.com	24209024	
7	Vivianne Mutulili	Engineer - Atkins	vivianne.mutulili@atkinsglobal.com	28879227	
8	DANIEL AREBA	Engineer - Atkins	Daniel.Machuka@atkinsglobal.com	22898271	
9	Milleta Ketur	Ag. TOM - BOMWASCO	KmilletaKetur@gmail.com	13886562	
10	Bernard Kimi	A.M - BOMWASCO	BKirmi51@gmail.com	22175121	
11	Vincent Mabatuk	CC - RVWSB	Mabatvin@yahoo.com	24105344	
12	Fredrick Ruto	As. Dir. Water C&D	jemorhka@yahoo.com	22661218	
13	Jobabore Nyanyuki	GC - RVWSB	nyanyukij6@gmail.com	29650947	
14	Patience Lengor	CFM BOMWASCO	pelagat07@gmail.com	20888992	
15	Pamela K. Maritim	CAB - WSE	pkmaritim@gmail.com	11369949	



S/NO	NAME	DESIGNATION/ORGANISATION	EMAIL ADDRESS/PHONE NUMBER	ID NUMBER	SIGNATURE
16	Beatrice Chobot	Director WASH	beatricechobot76@yahoo.co	13669837	
17	William Saka	SCM-RWBB	williamsaka@gmail.com	25042122	
18	Vitalis Kimutai	Nation media	nennyann@gmail.com	12550773	
19	David Wairage	NGDF Chief of Base Kiseri	davidwairage@gmail.com	2410366	
20	Kimutai Erick Nii	Communication	Ametwobi@gmail.com	25025473	
21	Eng. Samuel K. Oruma	GM-TS RWBB	samoruma@yahoo.co.uk	0722839424	
22	Henry K. Mello	DCC Burnet Centrl	cchumet@gmail.com	5576635	
23	Benson K. Song	CECM, Burnet County	bksong58@gmail.com	0246191	
24	Rachael Makokha	PC - AfDB / RVWSB	rmakokha@yahoo.com	14528195	
25	Eng Rosalia Sota	PE-AfDB / LWSWB	sotarosalia2000@gmail.com	14542861	
26	David K. Koehl	CO - WAI	koehlck@gmail.com	9837412	
27					
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33					



S/NO	NAME	DESIGNATION/ORGANISATION	EMAIL ADDRESS/PHONE NUMBER	ID NUMBER	SIGNATURE
34	David Koel	CO-WEI	koeldd@gmail.com	9837412	<i>[Signature]</i>
35	HOW KIPKIRURU DITUS	M-C-A	ola'slangza86@gmail.com	23339794	<i>[Signature]</i>
36	HOW RICH WESLEY	M-CA	kupkoelawell 200@gmail.com	24062412	<i>[Signature]</i>
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Minutes of Meeting

Project: Consultancy Services for Design Review, Preparation of Tender Documents and Supervision of Construction Works for Bomet-Mulot Water Supply and Sanitation Project

Subject: Minutes of Stakeholder Consultation Forum on Project Options for revised scope of Bomet-Mulot Water Supply Project

Meeting place:	Sierra Springs Hotel, Bomet town	Meeting no:	11
Date and time:	05 August 2019 - 1100Hrs	Minutes by:	Daniel Areba
Present:	The list of attendants is included as an annex to these Minutes	Representing:	Various organisations (See Attached List)

ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
1.	<p>Introduction</p> <p>The acting MD of Bomet Water Company chaired the meeting.</p> <p>The meeting began with a word of prayer at 11:00 am followed by a self-introduction by all members present. Key stakeholders were invited to give opening remarks who all confirmed their support for the Project.</p> <p>The Stakeholder forum was required because;</p> <ul style="list-style-type: none"> a) The initial coverage area overlapped with the proposed Bosto Dam supply area. This project scope would now cover areas in Bomet East i.e. Longisa, Mulot, and surrounding areas. b) Options had been developed by Atkins and presented to the Stakeholders on 21st February 2019 for discussion in Working Paper No. 3. c) A hydrological study was requested at the previous Stakeholder's forum to assess viability and sustainability of Rivers Nyangores and Amala as water sources for the Project. <p>Presentations were made by the Consultant and a Plenary/ question & answer session held thereafter.</p>		For Info



ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
2.	<p>Water Supply Options</p> <p>The 3 options developed for Water Supply to the project area were presented highlighting advantages and challenges of each system in terms of cost, operation, maintenance and sustainability. The three systems are:</p> <ul style="list-style-type: none"> a) River Amala supply with a fully gravity supply system, total cost 1.66 Billion. b) Two separate systems from Rivers Nyangores and Amala using both gravity and pumped supply at a cost of Kshs. 2.42 Billion. c) River Nyangores supply with combined gravity and pumping system at Kshs. 1.84 Billion <p>Findings from the hydrological studies conducted on the source rivers were presented. Data used in the study was from 1963 to 2000 since data to 2019 was not available from the authorities. The data showed that both rivers have sufficient capacity to provide water for the Bomet Water Supply System.</p> <p>It was highlighted in the discussions that the catchment area for River Nyangores had remained more intact than the River Amala catchment area from the year 2000 – 2019 period where river gauging data was not available.</p> <p>It was discussed and agreed by all present to adopt option 3 for the Bomet – Longisa – Mulot Water supply project.</p>		
3.	<p>Water Supply Coverage</p> <p>The supply to hilly areas of Merigi, Chemaner and surrounding areas was discussed by all present. It was agreed that the most economical pumping systems would be added to the selected option to supply the areas.</p> <p>The client informed that Kshs. 1.4Billion was available and advised that the source and treatment works would be fully developed, and distribution systems phased to suit available budget.</p> <p>A working committee was selected to identify the order of priority of towns to be supplied by the project. The committee had representation from Bomet County Government, Bomet Water Company, Bomet County Assembly and Bomet Residents.</p> <p>Discussions were held with the Client, Consultant and the working committee where it was agreed by all present that the consultant would design the entire project to cover the towns in the initial scope and add the high elevation areas.</p> <p>Areas to be implemented would be decided once after detailed cost estimates were available. With the design ready, funding for implementation could be procured from other sources by Client or the County.</p>		



ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
4.	General Remarks <ul style="list-style-type: none"> The Project is expected to be complete by year 2021, with tendering programmed for November 2019. Client informed that Bomet County would second officers to the project during implementation. Kenya Forest Service expressed their appreciation of the project and encouraged stakeholders to support the planting of indigenous trees along and near water sources. The WRUAs (Water Resource Users' Association) pledged their support for the project and urged stakeholders to join efforts against river pollution. The County Commissioner promised to provide support on security matters and mobilization of the public. 		
5.	There being no other business, the meeting was adjourned at 3.30 p.m.		

Next meeting: To be confirmed

Distribution: All on mailing list

Date issued: 09 August 2019	File Ref: 5161008/11
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NOTE TO RECIPIENTS:

These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.

LAKE VICTORIA SOUTH WATER WORKS DEVELOPMENT AGENCY

KENYA TOWNS SUSTAINABLE WATER SUPPLY & SANITATION PROGRAM

BOMET-MULOT WATER SUPPLY & SANITATION PROJECT


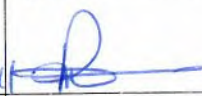




RIFT VALLEY CLUSTER

STAKEHOLDERS' CONSULTATIVE MEETING











Sierra Springs Hotel, BOMET




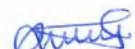






5TH August 2019

ATTENDANCE LIST

S/NO.	NAME	DESIGNATION	ORGANISATION	CONTACT ADDRESS (TELEPHONE & EMAIL)	SIGNATURE
1.	ERIK TOWEII	Customer Relations Officer	Bomwasco	0723472407 Sharekonnact@gmail.com	
2.	Richard Meeza	1/Andito.	Bomwasco	072555278 mesurecherd@gmail.com	
3.	BENJAMIN KIMU	ADMA MANAGER	Bomwasco	0723589644 Bkimm51@gmail.com	
4.	JOSPHAT M MARIGA	FORESTER	KENYA FOREST SERVICE	0722465005 josphat.mariga@kenyaforestservice.org	
5.	SHADRAK LINDAT	In-charge water plumbing and sanitation Tennet	TENNET HOSPITAL	0726637530 shadracklindat@gmail.com	
6.	JOSEPH NAIYO	PROJECTS AND MAINTENANCE MANAGER	TENNET HOSPITAL	jemaipo@gmail.com	

S/NO.	NAME	DESIGNATION	ORGANISATION	CONTACT ADDRESS (TELEPHONE & EMAIL)	SIGNATURE
7.	KIPROD LARAT	RESIDENT BUREAU	J. Party	0724106425	Kiprod
8.	Wilfred Osumo	County Director	NEMA	Wilfred.osumo@gmail.com 0712371180	Wilfred
9.	Bashir Duro	Director water	CGB	0721225240	Bashir
10.	Dolphine Chopkuri		NEMA	chopkuri.dolphine.2014@gmail.com 0728906822	Dolphine
11.	Rosemary Jaro	Attorney at Law	NWROA	ppout7010@gmail.com 0720 952 0782	Rosemary
12.	PATRICK LANGAT	CPM	BOMUASCO	0721934413	Patrick
13.	FREDRICK RUIO	AID LIAISON	CUB	0723142541	Frederick
14.	JAPHETH K MUTHI	INTERN WATER & IRRIGATION	GGOB	0720163174	Japheth
15.	MICHAEL KELLE	Director PH	CGB	0726012307	Michael
16.	PETER KIBATA	A.C.C.	National government	0728971637	Peter

S/NO.	NAME	DESIGNATION	ORGANISATION	CONTACT ADDRESS (TELEPHONE & EMAIL)	SIGNATURE
17.	DAVID WAITAGE	NG CDF CHAIR BOMET EAST	NG-CDF	0720632263 davidwaitage20@gmail.com	
18.	ENG. BENSON K. SANG	CECM, water Sanitation & Environ BOMET COUNTY	CGOB	072439951	
19.	DAVID K. KOSEH	Co/MD-BOMWASCO	BOMWASCO	0724642944 koechok@gmail.com	
20.	Eng. Phyllis Njoki	Project Engineer - Atkins	Atkins	Phyllis.njoki @ atkinsglobal.com	
21.	Daniel Areba	Civil Engineer	Atkins	Daniel. Machoka @ atkinsglobal.com	
22.	Eng. Nzaluh Cleophas.	Engineer	ATKINS	Cleophas Nzaluh @atkins global.com	
23.	Philip Kirieli	Engineer	RVWDA	KpKirieli@gmail.com 0726751271	
24.	George Agengo	Environmentalist	LVSWDA	george.agengo@gmail.com 072599782	
25.	Sharon A-liens	Engineer	LVSWDA	atienosharon2@ gmail.com 0726113792	
26.	Siva Miriata	CM/CP	LVSWDA	Sivacuna@lvswda.go.ke	

S/NO.	NAME	DESIGNATION	ORGANISATION	CONTACT ADDRESS (TELEPHONE & EMAIL)	SIGNATURE
27.	Vincent Kiyengo	Eng W	LW WWDA	0728453014 kiyengo.vkoyen@gmail.com	
28.	Rosalia Sota	Ag MRW SS	LUS WWDA	0721692305 Sotaroscha2000@gmail.com	
29.	Hon. TADOK KUEZ	MCA	BCA	0729666672	
30.	Hon Winnie BORG	MCA	BCA	0723380590	
31.	Hon Joseph Kellay	MCA	BCA	0725012407	
32.	Hon Kipkireu Davis	MCA	BCA	0728153316	
33.	Hon Mup Korr	MCA	BCA	0720285028	
34.	BENARD LAMBAT	MSE O	BOMWASCO	0725971844	
35.	KORUA WILSON	ICERSHA	ICERSHA	0728266488	
36.	Hon Chibay Aruasa	MCA	BCA	0723376626	

S/NO.	NAME	DESIGNATION	ORGANISATION	CONTACT ADDRESS (TELEPHONE & EMAIL)	SIGNATURE
37.	Joseph L Kous	Chairman	NIRNVA	0722562262	
38.					
39.					
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46.					



Minutes of Meeting

Project: Consultancy Services for Design Review, Preparation of Tender Documents and Supervision of Construction Works for Bomet - Mulot Water Supply and Sanitation Project

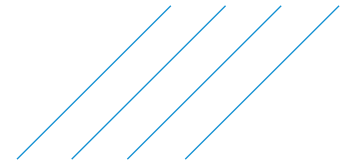
Subject: Minutes of Stakeholders Review Forum on Feasibility Study Report for Bomet - Mulot Water Supply Project

Meeting place:	BOMWASCO Boardroom, Bomet Town	Meeting no:	12
Date and time:	07 October 2019 - 1100Hrs	Minutes by:	Daniel Areba
Present:	The list of attendants is included as an annex to these Minutes	Representing:	Various organisations including; <ul style="list-style-type: none"> - LVWWDA - RVWWDA - WRA - Bomet Water Company - Bomet County Government - County Commissioner's office <p>See Annex 1.0 for the full attendance list.</p>

ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
1.	<p>Introduction</p> <p>The meeting begun with a word of prayer at 11:00 am followed by a self-introduction of all present.</p> <p>All stakeholders expressed support for the project and assured of assistance where required.</p>		For Info
2.	<p>Feasibility Study Report</p> <p>Atkins made a presentation of the Project Feasibility Study Report highlighting the following points;</p> <ul style="list-style-type: none"> • Changes in original project scope due to the proposed Bosto Dam project • Revised water supply area • Population and water demand projections for the ultimate design horizon, year 2041 • Water supply options developed for the project area as summarized in table below giving the main characteristics of capital cost, Operation and maintenance requirements and the anticipated water deficit based on hydrological studies carried out. 		



ITEM	DESCRIPTION AND ACTION				DEADLINE	RESPONSIBLE
	Options	CAPEX (KSh)	OPEX needs	Months of water deficit		
	Option 1 River Amala only	1.66 billion	<ul style="list-style-type: none"> Gravity system with low O&M costs Only one system to be managed 	2 months		
	Option 2 Combined Rivers Amala and Nyangores	2.42 billion	<ul style="list-style-type: none"> Some pumping with increased O&M costs Two systems to be managed 	2 months		
	Option 3 River Nyangores only	1.84 billion	<ul style="list-style-type: none"> Some pumping with increased O&M costs Only one system to be managed 	3 months		
	<ul style="list-style-type: none"> During the stakeholder forum held on 5th August 2019 it was agreed to adopt Option 3 for development. Water supply options to high elevation areas of Merigi and Chemaner (pumping heads of 235m - 285m) were presented and discussed. High power costs to be incurred were highlighted (Kshs 0.5–1.9 Million monthly). Supply to Merigi area through Tiroto hill will be considered at capital cost of Kshs. 126.8 Million and monthly power charge of Kshs 1.1 Million. Supply to Chemaner area is not feasible and will be carried out in a future project from Amala River. <p>Total Cost of Option 3 project works including Merigi water supply is Kshs 1.97 Billion. The available budget is Kshs 1.4 Billion.</p> <p>It was discussed and agreed that the intake, treatment works, and main transmission lines would be constructed in full under this project.</p> <p>Branch transmission lines and supply to Merigi will be reduced to suit available budget. Actual lines to be reduced will be agreed when the Engineer's estimate is completed.</p> <p>The draft final design report will be submitted to the Client at the end of November 2019.</p>				Nov 2019	Atkins
	<p>Access to site</p> <p>Atkins informed that access to the Intake and 5Km Raw Water Gravity Main in the Mau Forest had not been granted by the Kenya Forest Service Officers.</p> <p>It was agreed that RVWWDA, LVWWDA, Bomet County would follow up for a quick resolution to the issue to avert project delays.</p>				15 th Oct 2019	RVWWDA, LVWWDA, Bomet County



ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
3.	General Remarks <ul style="list-style-type: none"> WRA advised that the application for a water abstraction permit should be made 3 months prior to project commencement. Bomet County Government committed to assist in land issues since there was goodwill from the residents. 		
4.	There being no other business, the meeting was adjourned at 1.00 p.m. with a word of prayer.		For Info

Next meeting: To be confirmed

Distribution: All on mailing list
























Date issued: 15 October 2019

File Ref: 5161008/12

NOTE TO RECIPIENTS:

These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.

**ATTENDANCE LIST FOR STAKEHOLDERS MEETING FOR BOMET-MULOT
WATER PROJECT HELD ON MONDAY 7TH OCTOBER 2019 AT BOMET WATER
COMPANY'S BOARDROOM**

S/NO	NAME	DESIGNATION	CONTACTS	SIGNATURE
1.	MICAH KOECH	DIRECTOR	0726012387	
2.	Vincent Langat	% Co WWP	0729385185	
3.	Cornelius Langat	Engineer	0727033492	
4.	Victor K. Bosuben	Water Engineer	0722296678	
5.	Cheniyoi Langat	NE-CBP BOMET Water Engineer	0705814089	
6.	Christinus Wanjale	Sub Regional Manager WRA	0734424585	
7.	Philip Kimeli	Engineer - RVWUDA	0726731271	
8.	PATRICK LANGAT	Asst MD BOMWASA	0721934413	
9.	DAVID KOECH	CHIEF OFFICER	0724609411	
10.	ANTONY KIALUTHA	Genl. Manager - ATKINS	0707603626	
11.	Eng. Phyllis Njoki	Project Engineer	0710446644	
12.	DANIEL ARSOLA	Engineer - ATKINS	0726964304	
13.	HILDAH CHEPKOCH	C.E - RVWUDA	0728972413	
14.	Daniel Kariya	Engineer - RVWUDA	0726413111	
15.	PATRICIA KAGO	ACC - min inter	0723228759	
16.	Bastien Rudo	Nr. WTP	0721225210	
17.	FREDRICK RUTO	KTD WTP & En.	0722142541	
18.	BENARD KIMU	Asst. Manager	0723582644	
19.	JOEL LANGAT	T&M BUC	0720226955	
20.	DOMINIC CHIRCHIR	Engt - RVWUDA	0729454425	
21.	Kimani Chepkwony	SC-Admin, Bomet WTP	0722511848	
22.	Rosale Dany	NWRDA	0726952482	
23.	Vincent Njiragu	PE	0723453014	
24.				
25.				
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C.2. Minutes of public meetings



Meeting Notes

Project:	Bomet Mulot Water Supply		
Subject:	Public meeting for ESIA		
Meeting place:	Cheboin Primary School- Cheboin Location	Meeting no:	001
Date and time:	12 November 2019 at 1500hrs	Minutes by:	Beatrice Githinji
Present:	RVWWDA LSVWWDA Area Chief Sub-county Administrator Atkins Local residents (Signed attendance list attached)	Representing:	

ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
	Introduction	
	<p>The meeting begun at 3.00pm with a word of prayer.</p> <p>The chief welcomed all present to the meeting. He emphasised the importance of participation from all to ensure the success of the project.</p> <p>The agenda of the meeting was given as follows.</p> <ul style="list-style-type: none"> • Introduce the scope of the project to the members of the Public • To give the public an opportunity to understand the benefits and impacts of the project; • To give the public the opportunity to express their views about the project 	
	Remarks	
	<p>The village elders appreciated the proposed project. They mentioned that the area has major water supply problem. They reiterated the lack of portable water in the area and expressed their hope that the project would address the water shortage.</p> <p>They requested the attendees to support the project and participate in the meeting.</p>	Village elders
	<p>The administrator emphasised the importance of public participation and requested the attendees to fully support and embrace the Project.</p>	Bomet East Sub- county administrator

Next meeting:

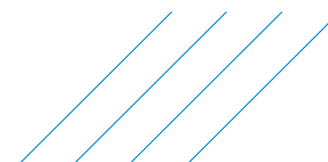
Distribution:	All copied		
Date issued:	29 November 2019	File Ref:	

NOTE TO RECIPIENTS:

These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.



Welcomed the participants and appreciated the project. He requested the attendees to participate in the meeting and support the initiative.	Ward Administrator
Assured the community of their commitment to execute the Project to completion and ensure that its benefits are felt by the residents. They welcomed the resident's views on the Project.	RVWWDA
Thanked the residents for the cooperation in other projects undertaken by the Agency in the area and looked forward to the successful completion of this Project.	LVSWWDA
Project Presentation by Atkins	
Project Scope The project is funded by the African Development Bank and will be implemented by Rift valley Water Works Development Agency and Lake Victoria Water Works Development Agency. The project coverage area is Cheboin, Bomet town, Olokyin, Kapliyo, Longisa, Kembu, Mulot, Kiplabotwa Sigor, and their environs to provide potable water for a design horizon of 20 years. Hydrological studies were done for Nyangores and Amala rivers and it was determined that Nyangores river has adequate flow for water supply and also provides sufficient head to supply water by gravity thus reducing pumping costs.	Eng. Daniel Areba
The project components include: <ul style="list-style-type: none"> • An intake on Nyangores River at the second waterfall; • 5Km Raw water gravity main within Mau Forest; • Full conventional water treatment works at Masese; • Transmission Pipelines to Bomet Town, Sigor, Mulot, Olokyin, Kiplabotwa, Longisa, Mulot Hill, Merigi, Kapkimolwa and Kembu; • Pumping stations at Cheboin and Longisa; • Storage Tanks at Kyogong, Kapkimolwa, Mulot hill, Longisa, Sigor, Tiroto, Merigi. After commissioning, the project will be handed over to Bomet Water and Sanitation Company (BOMWASCO) for customer connection and day- to- day operations.	Eng. Daniel Areba
Project environmental and social impacts The attendees were informed on the possible impacts during construction e.g. uptake of some private land; loss of vegetation; degradation of air quality from dust emissions, pollution of soil and water resources from spillage of hazardous chemicals/compounds and erosion; creation of occupational and community health and safety hazards at project sites; potential increase in moral decadence from inappropriate interactions between the construction workforce and the community; improved access to clean water; reduced disease burden caused by water-borne diseases; saving of time spent in search for water. Attendees were also informed that for each impact identified, practical mitigation measures will be proposed to avoid or reduce the impact. The ESIA carried out would also include development of an Environmental and Social Management Plan (ESMP) to address relevant issues during project construction and operations.	
Grievance management The community was informed that a grievance committee (GC) would be formed at the beginning of construction. The GC will provide a platform to receive and address complaints by affected communities.	Beatrice Githinji
Plenary session	



	<p>Question: Sought clarification on the alignment of the pipeline to Kyongong hill from Nyangores River</p> <p>Enquired about the inclusion of the water pump to Tiroto Hill Tank in the project plan.</p>	Moses Rotich
	<p>Answer: It was explained that the water treatment works will be in Masese. From Masese, pipelines will run along Nyangores River by gravity, and cross through Njerian. A pumping station will be located Cheboin to pump water to Tiroto hill. The pipeline will then run along road reserves to Kyongong hill tank and to other tanks in Sigor Longisa and Mulot</p>	Daniel Areba.
	<p>Question: Wanted to Know the location of the tank that will supply water to Cheboin</p>	Margaret
	<p>Answer: The county Government will be responsible for supplying the water to the community. The project has 6 storage tanks. Water will be distributed from the main distribution pipeline to the community in smaller pipes.</p>	Cornelius Langat
	<p>Question: Sought to know whether the water be billed every month, or it will be supplied to consumers at no cost</p> <p>Questioned if pumping water to Tiroto was sustainable and if the county government had the capacity to pay for electricity bills for the water pump.</p>	Margaret
	<p>Answer: The county government through BOMWASCO will be responsible for water distribution and will charge a fee for the water to each homestead.</p>	Cornelius Langat
	<p>Question: Enquired if the pipeline would traverse through private land and if landowners were entitled to compensation.</p>	Willy Ngetich
	<p>Answer: He was informed that the pipeline will be laid along the river riparian and road reserves. However, in cases where private land is utilised, there will be compensation for land and property that is affected.</p> <p>In case of riparian land, the landowners/farmers will be entitled to compensation for crops/trees that are affected.</p>	Beatrice Githinji
	<p>Question: Enquired when the project construction is starting</p>	Hassan Cheruyoit
	<p>Response: The project is currently at the design stage and ESIA for the project is being done. Thereafter, a RAP will be done to identify the affected persons. Construction is expected to begin in the year 2020</p>	Eng. Daniel Areba
Comment	<p>Local community should be given priority in employment during construction of the project.</p>	Nicholas Rono
	Conclusion	
	<p>The chief appreciated the attendees for availing themselves for the meeting.</p> <p>There being no other issue to discuss, the meeting ended at 5.00 pm with a word of prayer.</p>	



ATKINS

Member of the SNC-Lavalin Group



Attendance Register Public Consultation Meeting

The Environment and Social Impact Assessment for Bomet - Mulot Water Supply and Sanitation Project

Date: 12/11/2019 Time: 2:00 PM - 5:15 PM Venue: CHEBOIN

S/No	Name	Location	Designation	Mobile no	Signature.
1	WILLY LANGAT	CHEBOIN	MEMBER	0723227922	
2	Florida Cheruoch	CHEBOIN	MEMBER	0717811643	
3	GILBERT cheruoch	CHEBOIN	MEMBER	0720822832	
4	ELIZABETH LASOI	CHEBOIN	MEMBER		
5	EVALINE MAINA	CHEBOIN	DEPUTY H/TEACHER CHEBOIN	0724665193	
6	Moses ROTICH	CHEBOIN	MEMBER	0712912186	
7	CHEPKORIR ROSELINE	CHEBOIN	MEMBER	0715430223	
8	SANG FESTUS	CHEBOIN	MEMBER	0701838738	
9	NGENO K. BERNARD	CHEBOIN	MEMBER	0705028540	
10	ELIZABETH KOROREN	CHEBOIN	VILLAGE ELDER	07247639829	
11	ABRAHAM K. MUTAI	CHEBOIN	TOWIT LEADER	0729872384	
12	Ngweni Wally	Cheboin	Toutu	0792703440	
13	Wagner Tuma	cheboin	Ward admin Longon	0711459426	



S/No	Name	Location	Designation	Mobile no	Signature.
14	Linus Chephway	Longisa	Sub-County Adm	0722511848	
15	Joseph Kiri	Cheboin	member	0726238587	
16	Benevo Rono	Cheboin	Youth	0716278875	
17	EZEKIEL K.N. KENYUWINO	CHEBOIN	VILLAGE ELDER	07070113956	
18	DAVID C. ACHERUSE	CHEBOIN	MEMBER	0723619894	
19	DAVID TOG	CHEBOIN	MEMBER	0713607700	
20	ELIJAH K.A. BOIT	CHEBOIN	MEMBER	0707766937	
21	ALICE BETT	CHEBOIN	MEMBER		
22	BIADUSE CHEMUTA	CHEBOIN	member	0723727906	
23	NGETICH ELIAS	CHEBOIN	Member	0717755739	
24	BENARD NGETICH	CHEBOIN	MEMBER	0756649356	
25	JOSPHAT NGETICH	CHEBOIN	MEMBER	0712019582	
26	HASSAN KIRI	CHEBOIN	MEMBER	0710137723	
27	DOMINIC SANGE	CHEBOIN	MEMBER		
28	YERON KUPICEMAI	CHEBOIN	MEMBER	0719486370	
29	Langat Duncan	Cheboin	Member	0724346781	
30	RONO NICHOLAS	CHEBOIN	MEMBER	0720362136	



S/No	Name	Location	Designation	Mobile no	Signature.
31	CHARLES LANGAT	CHEBOIN	Community member	0729450432	
32	MARTHA TOO	CHEBOIN	Community member	0724364400	
33	PHILEMON K. SIELE	CHEBOIN	Community member	0713465055	
34	DAVID K. RUTO	CHEBOIN	Community member	0720370889	
35	WESLEY CHEPKWONT	CHEBOIN	C- member	0742830566	
36	GENOLINE CHEPKWONT	CHEBOIN	Community Member		
37	PHILIP K RUTO	CHEBOIN	Community member	0714923980	
38	AARON K. CHERUSG	CHEBOIN	Community member	0799488678	
39	JOEL K. LANGAT	CHEBOIN	Comm member	0702348665	
40	CHARLES TOO	CHEBOIN	Community member	0792711803	
41	KORIR LEONARD	CHEBOIN	Community member	0728012385	
42	ALICE CHEPTO BIT	CHEBOIN	Community member	07	



Meeting Notes

Project:	Bomet - Mulot Water Supply		
Subject:	Meeting Minutes-Longisa		
Meeting place:	Longisa market	Meeting no:	
Date and time:	13 November 2019 at 11.00 am	Minutes by:	Beatrice Githinji
Present:	RVWWDA/LVSWWDA Area Chief Sub-county Admin ATKINS Local Residents (Attendance list attached)	Representing:	

ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
1.	Introduction	
	The meeting begun with a word of prayer at 11.00am. The area Chief welcomed all present to the meeting and introduced the meeting agenda emphasising the importance of participation from all to ensure the success of the project. The agenda of the meeting was given as follows <ul style="list-style-type: none"> Introduce the scope of the project to the members of the Public Give the public an opportunity to understand the benefits and impacts of the project Give the public the opportunity to express their views about the project 	Area Chief
2.	Remarks	
	Appreciated the residents for attending the meeting. She reiterated the government agenda to provide services close to residents. She encouraged the residents to contribute and support the project.	ACC- Longisa
	Emphasised on the lack of portable water in Longisa and environs. Expressed support on the proposed project.	Chief- Longisa
	They emphasised on the scarcity of water in Longisa. They appreciated and expressed support towards the project.	Village elders

Next meeting:

Distribution:	All copied		
Date issued:	29 November 2019	File Ref:	

NOTE TO RECIPIENTS:

These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.



ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
	Assured of their commitment to execute project to completion and to ensure that benefits are felt by the residents. They welcomed the resident's views on the Project	RVWWDA
	Thanked the residents for their co-operation in other projects undertaken by the Agency in the area and looked forward to the successful completion of the proposed Project.	LVWWDA
3.	Project Presentation	
	<p>Project scope</p> <p>The project is funded by the African Development Bank and will be implemented by Rift valley Water Works Development Agency and Lake Victoria Water Works Development Agency.</p> <p>The project coverage area is Cheboin, Bomet town, Olokyin, Kapliyo, Longisa, Kembu, Mulot, Kiplabotwa Sigor, and their environs to provide potable water for a design horizon of 20 years.</p> <p>Hydrological studies were done for Nyangores and Amala rivers and it was determined that Nyangores river has adequate flow for water supply and also provides sufficient head to supply water by gravity thus reducing pumping costs. The project components include:</p> <ul style="list-style-type: none"> • An intake on Nyangores River at the second waterfall; • 5Km Raw water gravity main within Mau Forest; • Full conventional water treatment works at Masese; • Transmission Pipelines to Bomet Town, Sigor, Mulot, Olokyin, Kiplabotwa, Longisa, Mulot Hill, Merigi, Kapkimolwa and Kembu; • Pumping stations at Cheboin and Longisa; • Storage Tanks at Kyogong, Kapkimolwa, Mulot hill, Longisa, Sigor, Tiroto, Merigi. <p>After commissioning, the project will be handed over to Bomet Water and Sanitation Company (BOMWASCO) for customer connection and day- to- day operations.</p>	Eng. Phyllis Njoki
	<p>Environmental and social impacts</p> <p>The attendees were informed on the possible impacts during construction e.g. uptake of private land; loss of vegetation; degradation of air quality from dust emissions, pollution of soil and water resources from spillage of hazardous chemicals/compounds and erosion; creation of occupational and community health and safety hazards at project sites; potential increase in moral decadence from inappropriate interactions between the construction workforce and the community; improved access to clean water; reduced disease burden caused by water-borne diseases; saving of time spent in search for water.</p> <p>Attendees were also informed that for each impact identified, practical mitigation measures will be proposed to avoid or reduce the impact. The ESIA carried out would also include development of an Environmental and Social Management Plan (ESMP) to address relevant issues during project construction and operations.</p> <p>Grievance management</p> <p>The community was informed that a grievance committee (GC) would be formed at the beginning of construction. The GC will provide a platform to receive and address complaints by affected communities.</p>	Beatrice Githinji



ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
4.	Plenary Session	
	Public participation is done for the community to be informed and to embrace the project; The project comes with socio economic benefits to the community There will be employment opportunities for the local people; The community should embrace the project and ensure that there is security during construction, and that there are no disturbances on the distribution lines after implementation	Assistant County Commissioner
	Question: Wanted to know if the cost of distributing water to households was included in the project	Julius Ng'eno
	Response: This Phase of the Project entails abstracting the water and supplying it in bulk. After completion of the main pipeline, the water shall be distributed to households using smaller pipes by the water services provider	Eng. Phyllis Njoki
	Question: How will residents in high areas access water	Watson Too
	Response: The county government has planned other projects that will distribute water to the higher areas. It might not be possible for the residents in very high areas to access the water on this project.	Eng Cornelius Langat - Bomet County
	Question: Does the water project have a dam or a storage tank from the source? What will happen in the dry season when the river flow is low?	George Sietenei
	Response: The water quantity of water Nyangores River is enough to supply the projected population for the next 20 years, and the design is within government regulations for abstracted amounts	Eng. Phyllis Njoki
	Question: Is it possible to use the water to irrigate farms?	Kiprono Rotich
	Response: The project is planned for the purpose of household use. It will be expensive to use the water to irrigate	Eng. Phyllis Njoki
	Question: What criteria will be used to hire the employees	Jesica Tesot
	Response: In Kenya there are set regulations and labour laws. The law provides that 60% of the non -skilled workers are sourced locally.	
5.	Conclusion	
	The ACC expressed support for the project and assured the residents that the government would offer the necessary support. There being no other issues to discuss, the meeting ended with a word of prayer at 1.00 pm	



ATKINS

Member of the SNC-Lavalin Group

Attendance Register Public Consultation Meeting

The Environment and Social Impact Assessment for Bomet - Mulot Water Supply and Sanitation Project

Date: 14/11/2019 Time: 11:00 am Venue: Longisa

S/No	Name	Location	Designation	Mobile no	Signature.
1	CHEPKEMOI VERONICA	KAPKIMOLWA	STUDENT	0708909902	
2	JOEL TANGUS	KAPKIMOLWA	TAILOR	07	
3	Kipgambulet Kirwar	Kapkimolwa	VILLAGE ELDER	0798258446	
4	SAMUEL BOREE	CHEBOIN	NONE	0720923632	
5	JOEL KOECH	KAPKIMOLWA	CLEANER	0729525623	
6	WILSON MARITIM	CHEBOIN	FARMER	0720327987	
7	Ezekiel Ruto	Village Elder CHEBOIN	Village Elder	072810497	
8	JOSEPH KORIR	CHEBOIN	FARMER	0710876572	
9	MATHEW SOI	CHEBOIN	V. ELDER	0720883798	
10	NGIGA KTO	Cheboin	Resident	0726266145	
11	Samuel Kervinot Koech	Cheboin	V. Elder	0707866718	
12	STEPHEN MOSONYI	TOWNSHIP	CONTRACTOR	0716515169	
13	FREDRICK MARITIM	CHEBOIN	TAILOR	0724135224	



S/No	Name	Location	Designation	Mobile no	Signature.
14	WILLIAM K. SOI	CHEBOIN	V/L	0713456184	[Signature]
15	JOSEPH K. SOI	Cheboin	V/L	0724887694	[Signature]
16	JOEL K. SOI	Kipreses	V/L	0713325706	[Signature]
17	BENARD C. KORIR	Cheboin	Teacher	0715110028	[Signature]
18	ALLAN SOKOMO	-	Engineers - RVWWDA	0711162024	[Signature]
19	LORRAINE NJOKI	-	Soundologist - RVWWDA	0721532276	[Signature]
20	DENNIS KIPROTICH PONO	cheboin		0728235648	[Signature]
21	ROBERT MUNGOTI	cheboin	V. I. Tabor	0720752329	[Signature]
22	EVANS SOGI	Kipreses	Harbinger	0728400466	[Signature]
23	GEOFFREY LANGEN	CHEBOIN	H. Barlang	0704454848	[Signature]
24	RIMWU S. KIRO	CHEBOIN	D. BONS	2410102	[Signature]
25	EZEKIEL LIKWOP	CHEBOIN	FARMER	-	[Signature]
26	RAEL BOREE	KAPKIMOLWA	FARMER	-	[Signature]
27	ERNEST KIRINTET	KAPKIMOLWA	FARMER	-	[Signature]
28	PASKAUA CHEPPI KORIR	KAPKIMOLWA	FARMER	0712659865	[Signature]
29	DOMINIC CHIRCHIR	N/A	ENGINEER - LVSWDA	0729454425	[Signature]
30	Huldah Chepkoech	N/A	ENGINEER - RVWWDA	0728972413	[Signature]



S/No	Name	Location	Designation	Mobile no	Signature.
31	CAROLINE LANGAT		ENVIRONMENTALIST - RVN WDA	0728555266	<i>[Signature]</i>
32	SHAMWE -IC. CHEBORGE	KAKIMOTWO	VILLAGE	0728213028	<i>[Signature]</i>
33	John Langat	KAPKIMOTWO	Village	0714593945	<i>[Signature]</i>
34	Rusi Langat	KAPKIMOTWO	Village	0712002757	<i>[Signature]</i>
35	PHILIP KIRUI	KAPKIMOTWO	FARMER	0723568349	<i>[Signature]</i>
36	JAMUEL K. CHELULE	LONGISA	BUSINESS	0721215589	<i>[Signature]</i>
37	Isack Rongo	Longisa	Business	0715744677	<i>[Signature]</i>
38	John Susingot	Longisa	Business	0721237177	<i>[Signature]</i>
39	Ann Chemurwok	Longisa	Business	0710683444	<i>[Signature]</i>
40	CHEPHKETCH JUDY	Longisa	Social	0728266738	<i>[Signature]</i>
41	JESCAH TESOT	Longisa	Social	0723880924	<i>[Signature]</i>
42	Wilson. Chelulei	Longisa	Social	0710580686	<i>[Signature]</i>
43	HASSAN KIRUI	LONGISA	MEMBER	0710731223	<i>[Signature]</i>
44	TOWETT JOSPHAT OTHUYOT	KAPKIMOTWO	ADMINISTRATION	0722949573	<i>[Signature]</i>
45	Chemuyot Gilbert	Longisa	Agriculture	0714006540	<i>[Signature]</i>
46	Collins K. Chemuyot	Longisa	Administrator	0725413743	<i>[Signature]</i>
47	ROICH DENNIS	LONGISA	RESIDENT	0713841674	<i>[Signature]</i>
48	Paul KENDUYO	Longisa	Urban	0710458140	<i>[Signature]</i>



S/No	Name	Location	Designation	Mobile no	Signature.
49	Joseph Koskei	CHENANIER	Administration	0720120845	
50	PHILIPH MITEI	LONGISA	URBAN DEPTH	0710817571	
51	Stella Nene	Longisa	Urban	0710779946	
52	JULIUS NYENO	LONGISA	Farmer	0704657142	
53	PATRICK CHEPKWONY	LONGISA	FARMER	0725644976	
54	JOSEPH JERZ	LONGISA	FORMER	0769585932	
55	LUCY MUTAI	LONGISA	FORMERS	0797144341	
56	GEOFFREY KOECH	LONGISA	FARMER	0728708364	
57	NAOMI LANGAT	LONGISA	FARMER	0703710782	
58	FRANKLINE CHERUYOT	CHEBOIN	FARMER	0795286468	
59	KIBET LANGAT	LONGISA	FARMER	0710390610	
60	Nahashin Kimi	Kemba	FARMER	0712357047	
61	GIDEON KEMEI	LONGISA	BUSINESS	0727123521	
62	PHILIP CHENYA KOECH	LONGISA	farmer	0712054044	



ATKINS

Member of the SNC-Lavalin Group

Attendance Register Public Consultation Meeting

The Environment and Social Impact Assessment for Bomet - Mulot Water Supply and Sanitation Project

Date: 14/11/2019 Time: 11:00am Venue: Longisa

S/No	Name	Location	Designation	Mobile no	Signature.
	GEORGE K. SITHOLE	LONGISA MKT			
	GEORGE K. SITHOLE	LONGISA MARKET	Business man	0711158479	[Signature]
	Geoffrey Tuma	Longisa market	Ward admin - Longisa	0711459426	[Signature]
	Benjamin - REP	Kipkess	Ward Admin.	0713647583	[Signature]
	PATRICIA KAGA	LONGISA	ACC	0723228759	[Signature]
	PINK U. LANGAT	KMPKIMOKWA	S/CLERK	0716643217	[Signature]
	LIVINGSTONE K. BII	LONGISA MARKET.	CHAIR - BUSINESS COMMUNITY	0723212823	[Signature]
	ROTHEN - V. DUCHARA	LONGISA	FROM THE COMMUNITY	0716912358	[Signature]
	CHEMUTET S. OTERINTIT.	CHEMURUR	Secretary Urban	0708142566	[Signature]
	Leonard K. Rotch	Kembu	W/ Administrator	0720570156	[Signature]



Meeting Notes

Project:	Bomet- Mulot Water Supply		
Subject:	ESIA Public meeting and consultations		
Meeting place:	Mulot- Mulot Dispensary	Meeting no:	001
Date and time:	11 November 2019 at 1.00pm	Minutes by:	Beatrice Githinji
Present:	RVWWDA/LVSWWDA Bomet East Sub-county Admin Ward Administrator ATKINS Local Residents (Attendance list attached)	Representing:	Various organisations and the general public

ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
1.	Introduction The meeting begun with a word of prayer at 1:00pm The Chief welcomed all present to the meeting. He emphasised the importance of participation from all to ensure the success of the project. The agenda of the meeting was given as follows. <ul style="list-style-type: none"> • Introduce the scope of the project to the members of the Public • To give the public an opportunity to understand the benefits and impacts of the project; • To give the public the opportunity to express their views about the project 	
2.	Remarks Appreciated the government initiative to develop the water project in the area. He emphasised to the community members to participate in the process. Appreciated RVWWDA and LVWWDA for initiating the project. Added that the project will reduce the time spent fetching water, and it will ease the burden on the women. Appreciated the government for the initiative to provide safe water to the community.	Joseph Kosgey - village elder William Masas – Village elder Phillip Koech- Village elder

Next meeting:

Distribution:	All copied	
Date issued:	25 November 2019	File Ref:

NOTE TO RECIPIENTS:

These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.



ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
	Supported and appreciated the project. Added that water in the area is scarce and that Kiplabotwa is the most arid. He encouraged the attendees to participate in the open forum. He appreciated the attendees for making time to attend the meeting.	Linus Chepkwony-Bomet East Sub-County administrator
	Appreciated the project initiative and encouraged the attendees to participate in the open forum.	Bernard Rop Kipreres - Ward Administrator
	Assured of their commitment to execute project to completion and to ensure that its benefits are felt by the residents. They welcomed the resident's views on the Project	RVWWDA
	Appreciated the residents for their co-operation in other projects undertaken by the Agency in the area and looked forward to the successful completion of the proposed Project.	LVWWDA
3.	Project presentation by ATKINS	
	<p>Project scope</p> <p>The project is funded by the African Development Bank and will be implemented by Rift valley Water Works Development Agency and Lake Victoria Water Works Development Agency.</p> <p>The project coverage area is Cheboin, Bomet town, Olokyin, Kapliyo, Longisa, Kembu, Mulot, Kiplabotwa Sigor, and their environs to provide potable water for a design horizon of 20 years. Hydrological studies were done for Nyangores and Amala rivers and it was determined that Nyangores river has adequate flow for water supply and also provides sufficient head to supply water by gravity thus reducing pumping costs.</p> <p>The project components include:</p> <ul style="list-style-type: none"> • An intake on Nyangores River at the second waterfall; • 5Km Raw water gravity main within Mau Forest; • Full conventional water treatment works at Masese; • Transmission Pipelines to Bomet Town, Sigor, Mulot, Olokyin, Kiplabotwa, Longisa, Mulot Hill, Merigi, Kapkimolwa and Kembu; • Pumping stations at Cheboin and Longisa; • Storage Tanks at Kyogong, Kapkimolwa, Mulot hill, Longisa, Sigor, Tiroto, Merigi. <p>After commissioning, the project will be handed over to Bomet Water and Sanitation Company (BOMWASCO) for customer connection and day- to- day operations.</p>	Eng. Phyllis Njoki



ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
	<p>Environmental and social impacts</p> <p>The attendees were informed on the possible impacts during construction e.g. uptake of private land; loss of vegetation; degradation of air quality from dust emissions, pollution of soil and water resources from spillage of hazardous chemicals/compounds and erosion; creation of occupational and community health and safety hazards at project sites; potential increase in moral decadence from inappropriate interactions between the construction workforce and the community; improved access to clean water; reduced disease burden caused by water-borne diseases; saving of time spent in search for water.</p> <p>Attendees were also informed that for each impact identified, practical mitigation measures will be proposed to avoid or reduce the impact. The ESIA carried out would also include development of an Environmental and Social Management Plan (ESMP) to address relevant issues during project construction and operations.</p> <p>Grievance management</p> <p>The community was informed that a grievance committee (GC) would be formed at the beginning of construction. The GC will provide a platform to receive and address complaints by affected communities.</p>	Beatrice Githinji
4.	Plenary/ Question and comments session.	
	<p>Question: When is the project expected to start?</p> <p>Response: The project is currently at the Design stage. Other processes that must be completed include the ESIA and RAP which must be approved by NEMA</p> <p>After the Client has approved the designs, bidding for a contractor will commence.</p>	Simon Soi
	<p>Question: Will there be charges for the water to the households that will be connected?</p> <p>Response: BOMWASCO will be responsible for connecting the residents. There will be water metres issued and there will be charges for the water to enable the maintenance of the project.</p>	Eng. Phyllis Njoki
	<p>Question: In cases where the pipeline crosses peoples land, will there be compensation?</p> <p>Response: BOMWASCO will be responsible for connecting the residents. There will be water metres issued and there will be charges for the water to enable the maintenance of the project.</p>	Johnstone Kosgey
	<p>Question: Will there be charges for the water to the households that will be connected?</p> <p>Response: BOMWASCO will be responsible for connecting the residents. There will be water metres issued and there will be charges for the water to enable the maintenance of the project.</p>	Eng. Cornelius Langat Bomet County
	<p>Question: In cases where the pipeline crosses peoples land, will there be compensation?</p> <p>Response: The pipeline will be laid along road reserves and along Nyangores River. The storage tanks and treatment works will be Located on the private land. A Resettlement Action Plan will be done to identify the properties that will be affected. Compensation will be done to the private landowners and affected crops/trees.</p>	Clement Chirchir.
	<p>Question: Is it possible to use the water to irrigate crops?</p> <p>Response: The water project is meant for household use. The water will be treated to meet WHO standards and therefore it would be expensive to use the water in irrigating farms.</p> <p>The water will be chlorinated, and the chlorine may not be good to irrigate to some crops.</p>	Beatrice Githinji
	<p>Question: Is it possible to use the water to irrigate crops?</p> <p>Response: The water project is meant for household use. The water will be treated to meet WHO standards and therefore it would be expensive to use the water in irrigating farms.</p> <p>The water will be chlorinated, and the chlorine may not be good to irrigate to some crops.</p>	Elijah Bett
	<p>Question: Is it possible to use the water to irrigate crops?</p> <p>Response: The water project is meant for household use. The water will be treated to meet WHO standards and therefore it would be expensive to use the water in irrigating farms.</p> <p>The water will be chlorinated, and the chlorine may not be good to irrigate to some crops.</p>	Eng Phyllis Njoki



ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
	Question: Which organisation is responsible for distributing the water in people's homes?	David Mitee
	Response: The project will be handed to Bomet County Government. The county government through the water service Provider Bomet Water and Sewerage Company (BOMWASCO) will provide services to distribute the water in homes once the project is complete.	Eng. Phyllis Njoki
	Question: What consequences will there be for the contractor's staff if they commit criminal offences during construction works?	John Tunui
	Response: It will be clear in the construction contract that the Contractor must develop a code of conduct for the workers. The social management plan will also provide guidelines to some of the identified impacts.	Beatrice Githinji
	Comment: The project should also distribute water to Merigi through Tiroto by pumping.	Eunice Kones
	Comment: Proposed an alternative route where more people could get access to water through Kapkimolwa to Chebinyin	Samuel Tesot
	Question: Is it possible to connect the water direct from main pipeline to households?	Naomi Chepngeno
	Response: The project is a bulk water project and the pipeline has high volumes of water. It is not possible to distribute the water directly to homes. Smaller distribution pipelines will be done by the County through BOMWASCO	Eng. Phyllis Njoki
5.	Conclusion	
	The chief expressed his support for the project and assured the residents that the government would offer the necessary support in ensuring the project is fully implemented. He appreciated the attendees for availing themselves for the meeting. The meeting ended at 4.00pm with a word of prayer.	



ATKINS

Member of the SNC-Lavalin Group

Attendance Register Public Consultation Meeting

The Environment and Social Impact Assessment for Bomet - Mulot Water Supply and Sanitation Project

Date: 12/11/2019 Time: 1.20pm Venue: Mulot Dispensary

S/No	Name	Location	Designation	Mobile no	Signature.
01	JOHN SIKEY	KIPLABOTWA	Asst Chief	0705915998	
02	BENARD RUP	KIPRENED WARD	WARD ADMINISTRATOR	0713647583	
03	LINUS CHEPKWONY		SUB COUNTY ADM	0722511848	
04	HULDAH CHEPROECH	N/A	ENGINEER - RVWDA	0728972413	
05	CAROLINE LANGAT		ENVIRONMENTALIST - RVWDA	0728555266	
06	KIRWI K. BENATAH	"	MULOT HEALTH CENTER RED MEMBER	0728325500	
07	DOMINIC CHIRCHIR	N/A	ENGINEER - LVS WDA	0729454425	
08	GEORGE AGENGIO	N/A	Environmentalist - LVS WDA	072589732	
09	Simon K. Joo	Kiplabotwa		0726953653	
10	Eng. Phyllis NJOKI	—	Project Engineer - Atkins	0710446611	
11	Beatrice Gitwigi	—	Sociologist Atkins	0717306792	
12	DANIEL ARESA		ENGINEER - ATKINS	0720964304	
13	CLEMENT CHURCHIR	Kiplabotwa		0712427733	



S/No	Name	Location	Designation	Mobile no	Signature.
14	BEATRICE CHELANGAT	KIPLABOTWA		0715141268	
15	Kiplangat Chandany	"	Mulot Health Center Nutritionist	0727707548	
16	DOROTHY CHERMOTAI	"		0714267862	
17	NADMY CHERNGENOH	"		0719337231	
18	CORNELIUS LANGAT	-	SCWE - Bomet East	0727033492	
19	JOHNSTONE KASKEY	"	RESIDENT	0728690256	
20	JACKSON KOECH	"	Okbobo	0724518249	
21	Isaiah K. ASIGILAI	Kiplabotwa	Kapliyo	072034406	
22	Wilson K. Turiga	Kiplabotwa	Kapliyo CHV	0797120724	
23	ZUBRAH K. SIGILAI	KIPLABOTWA	KALYET	0723262294	
24	Leonard K. Rotich	Kiplabotwa	Kalyet	0720576156	
25	PHILIP KORIA	KIPLABOTWA	KIPTUNOI	0728228826	
26	GILBERT CHERMOTAI	Kiplabotwa	KALYET	0718502935	
27	JOHN A. SESOT	KIPLABOTWA	Koprot	0720260798	
28	SHEILA CHERKEMOI	KIPLABOTWA	Mulot HC CENTRE	0717993408	
29	SAHIM A. RUTO	Kiplabotwa	Kap-USUD VILLAGE	0712671055	
30	GRACE CHERKEMOI RUTO	Kiplabotwa	KAP-USUD V		



S/No	Name	Location	Designation	Mobile no	Signature.
31	Joseph Kasgei	Kiplabotwa	Village Elder	0707125091	<i>[Signature]</i>
32	William G.K. Masas	Kiplabotwa	Village Elder	0728674559	<i>[Signature]</i>
33	PHILIPH KOECH	Kiplabotwa	Village elder	0711566021	<i>[Signature]</i>
34	DENIS BETT	Kiplabotwa	Farmer	0719489203	<i>[Signature]</i>
35	JOHN LIKROP	Kiplabotwa	Farmer	0722308471	<i>[Signature]</i>
36	Kiniteri Arap Tonui	Kiplabotwa	Farmer	0710273375	<i>[Signature]</i>
37	ALICE KONES	OLOKYIN	FARMER	0763698396	<i>[Signature]</i>
38	Festus Kioni	OLOKYIN	Farmer	0720062951	<i>[Signature]</i>
39	Paul Ngeleche	Kiplabotwa	farmer	0707057605	<i>[Signature]</i>
40	Peter Ngeleche	Kiplabotwa	farmer	07	<i>[Signature]</i>
41	Daniel cheruiyot labaso	Kiplabotwa	farmer	0729428493	<i>[Signature]</i>
42	John Ngeleche	Kiplabotwa	farmer	0729862252	<i>[Signature]</i>
43	Steve Kuni	Kiplabotwa	farmer	0704684602	<i>[Signature]</i>
44	Leonard Sang	Kiplabotwa	farmer	0793997529	<i>[Signature]</i>
45	John Miti	Kiplabotwa	Farmer	—	<i>[Signature]</i>
46	David Odello	Kiplabotwa	Farmer	—	<i>[Signature]</i>
47	Samuel Ngeleche	Kiplabotwa	Farmer	0729622253	<i>[Signature]</i>



S/No	Name	Location	Designation	Mobile no	Signature.
48	KIPKIRUI DENNIS	MULOT	Youth ^{MULOT} Farmer	0724 951 846	
49	KOSKEY RICHARD	MULOT	MUR CHEBINTINY	0726 021 817	
50	HENRY TONU	MULOT		0728 33 2832	
51	JOSEPH SANG			07180 91740	
52	KIPKORIR LAIGONG	KAPKINDWA		0701097784	
53	Samuel Ceur	MULOT	Pastor	0721818100	
54	Joseph Segenger	MULOT		0714 695263	
55	STANLEY TONGI	KIPLABOTWA	chief	0728104507	
56	JOSEPH KORUR	Muloti	SNR CHIEF	0726926608	
57	Samuel Ratich	Muloti	Pastor	0710142279	
58	PAUL W. AMGAT	KAPKINDWA	SECRETARY	0716663257	
59	DEBORRAH NJOKI BABU		Asset Mgr. Asst. - RVWDA	0721532276	
	Alice LTBGSO	KIPLABOTWA	CHV	0721591005	
	ESTHER MUGO	KIPLABOTWA	CHV	0791403097	
	Reuben KILELES	KIPLABOTWA	farmer	0700653127	
	NELLY TUIYA	KIPLABOTWA	Business	0710860957	
	Alice CHEPKOIECH	MULOT	B Survey/Business	0713377621	



ATKINS

Member of the SNC-Lavalin Group

Attendance Register Public Consultation Meeting

The Environment and Social Impact Assessment for Bomet - Mulot Water Supply and Sanitation Project

Date: 12/11/2019 Time: 2PM - 3PM Venue: MULOT HEALTHS CENTER

S/No	Name	Location	Designation	Mobile no	Signature.
1	JACKSON K. LOGICH	KIPLABOTWA		0703982920	[Signature]
2	Amos J. J. J.	KIPLABOTWA	ASS / Chief	0727253845	[Signature]
3	SIMION KOECH	MULOT		670855976	[Signature]
4	KIPUGETIDE K. CHEPKELAK	KIPLABOTWA	Resident (Youth leader)	0719253181	[Signature]
5	KIPRONO ROBERT	KIPLABOTWA	Chairman Boda	0796711888	[Signature]
6	NEVERIO DENIS	KIPLABOTWA	Bodaboda Kiprono Coordinator	070099898	[Signature]
7	DAVID RONDOK	KIPLABOTWA	VILLAGE ELDER	0705576059	[Signature]
8	JOSEPH CHEKACHAK	KIPLABOTWA	FARMER	0729648420	[Signature]
9	JOHN MARINDAM	KALIYO MULOT SUNSET	Chairman Nyumba Kumi mulot	0721261379	[Signature]
10	JOHN TOMI	KALIYO	Driver	0710736301	[Signature]
11	S. JOHN MUKIR BOIT.	KALIYO	- Farmer	0714881689	[Signature]
12	JULIUS KONGOTO	KALIYO	FARMER	0727072335	[Signature]



Meeting Notes

Project: Bomet Mulot Water Supply and Sanitation

Subject: Resettlement Action Plan Meeting for the Bomet Mulot Water Supply and Sanitation Project

Meeting place:	Mugango Chief's office	Meeting no:	001
Date and time:	7/01/2020	Minutes by:	Beatrice Githinji
Present:	Hulda Chepkoech Daniel Konga Lorraine N. Babu George Ageng'o Cornelius Langat Norah Mukhwanah Beatrice Githinji John Cheruiyot Local community (attendance register attached)	Representing:	RVWWDA RVWWDA RVWWDA LVSWWDA BOMET COUNTY ATKINS ATKINS Chief Mugango Location

ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
1.	Introduction The meeting begun at 1.30 pm with a word of prayer. The Chief welcomed all present he emphasised on the importance of participating in the meeting. The objective of the meeting was given as the follows. <ul style="list-style-type: none"> • Introduction of the project to the attendees • To give the public the opportunity to understand the RAP process. • Give the landowners and farmers an opportunity to express their views on the project 	Area Chief
2.	Remarks Appreciated the proposed project and assured their support towards project implementation. Requested that the area be supplied with piped water through the project. Assured of their commitment to execute the project to completion and ensure that the project achieves its intended purpose. Welcomed the views of the residents towards the project.	Village elders RVWWDA

Next meeting:

Distribution:

Date issued: 17 February 2020

File Ref:

NOTE TO RECIPIENTS:

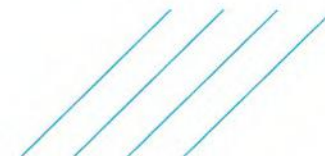
These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.



ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
	Appreciated the co-operation that had existed between the residents and the Agency in previously implemented project. Expressed optimism on the successful implementation of the project.	LVSWWDA
3.	<p>Presentation of the Project</p> <p>Project scope The project is funded by the African Development Bank and will be implemented by Rift valley Water Works Development Agency and Lake Victoria Water Works Development Agency. The project coverage area is Cheboin, Bomet town, Olokyin, Kapliyo, Longisa, Kembu, Mulot, Kiplabotwa Sigor, and their environs to provide potable water for a design horizon of 20 years. Hydrological studies were done for Nyangores and Amala rivers and it was determined that Nyangores river has adequate flow for water supply and also provides sufficient head to supply water by gravity thus reducing pumping costs. The project components include:</p> <ul style="list-style-type: none"> • An intake on Nyangores River at the second waterfall; • 5Km Raw water gravity main within Mau Forest; • Full conventional water treatment works at Masese; • Transmission Pipelines to Bomet Town, Sigor, Mulot, Olokyin, Kiplabotwa, Longisa, Mulot Hill, Merigi, Kapkimolwa and Kembu; • Pumping stations at Cheboin and Longisa; • Storage Tanks at Kyogong, Kapkimolwa, Mulot hill, Longisa, Sigor, Tiroto, Merigi. <p>After commissioning, the project will be handed over to Bomet Water and Sanitation Company (BOMWASCO) for customer connection and day- to- day operations.</p> <p>Environmental and social impacts The attendees were informed on the possible impacts during construction e.g. uptake of private land; loss of vegetation; degradation of air quality from dust emissions, pollution of soil and water resources from spillage of hazardous chemicals/compounds and erosion; creation of occupational and community health and safety hazards at project sites; potential increase in moral decadence from inappropriate interactions between the construction workforce and the community; improved access to clean water; reduced disease burden caused by water-borne diseases; saving of time spent in search for water. Attendees were also informed that for each impact identified, practical mitigation measures will be proposed to avoid or reduce the impact. The ESIA carried out would also include development of an Environmental and Social Management Plan (ESMP) to address relevant issues during project construction and operations.</p> <p>Grievance management The community was informed that a grievance committee (GC) would be formed at the beginning of construction. The GC will provide a platform to receive and address complaints by affected communities.</p>	<p>Cornelius Langat Bomet County</p> <p>Beatrice Githinji</p>



ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
	<p>Land valuation process</p> <p>Valuation of property and assets is enshrined in the Land Act 2012.</p> <p>The valuation will be done on riparian and on the private land where land acquisition is required.</p> <p>The activities that will be carried out will include counting of trees, identifying the crops and measurement of the size of land required</p> <p>Requirements during valuation will include the land registration number, the name and identification numbers of the landowners.</p> <p>The assessment will consider the beneficiaries of properties within the areas affected (those who own crops/trees but are not the title holders/ tenants).</p> <p>The valuation report will be handed to the client.</p> <p>The disclosure for valuation will be done by the client and the farmers and landowners will be informed of the next phase of compensation and notice to vacate the sites.</p>	Norah Mukhwanah
4.	<p>Plenary session</p> <p>Question: Wanted to know if there will be compensation Land.</p> <p>Response: Assessment of property will be done within the 6m corridor on the riparian. Any crops or trees affected will be assessed and valued</p> <p>Question: Will the water from the project supply Mugango village?</p> <p>Response: Bomet County Government has plans to distribute water to Mugango from another project that will sufficiently supply the area.</p> <p>Due to the terrain, this project will only supply the towns and communities on lower zones</p> <p>Question: Many of the names on the titles are deceased and people have not done succession. In such cases what will process will be undertaken?</p> <p>Response: During the assessment/Valuation all the affected people will be considered as beneficiaries, however it is important to begin the succession process.</p> <p>Question: Will compensation be paid before implementation or after implementation?</p> <p>Response: The requirement by AfDB is for compensation to be paid prior to start of construction.</p> <p>Question: What rates will be used during the valuation and compensation?</p> <p>Response: The valuation will be based on market rates.</p>	<p>Joel Korir</p> <p>Norah Mukhwanah</p> <p>David Kirui</p> <p>Cornelius Langat</p> <p>Ismael Kirui</p> <p>Norah Mukhwanah</p> <p>Jonah Bett</p> <p>Beatrice Githinji</p> <p>Festus Chepkoi</p> <p>Norah Mukhwanah</p>
5.	<p>Conclusion</p> <p>The chief informed the farmers and landowners to cooperate and be available in their farms during the RAP exercise. He reiterated the community support for the government initiative.</p> <p>There being no other issues to discuss, the meeting ended at 3.00pm</p>	

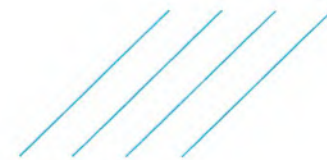


Attendance Register
For Resettlement Action Plan Meeting for the Bomet Mulot Water
Supply and Sanitation Project.

7/01/2020

S/No	Name	Residence/organisation	Mobile no	Designation	Sign
01	Nashin Id. Ngeno	Salauk	0729046559	Farmer	
02	Erie K. Retich	Kwoleta	0716428093	Farmer	
03	ROTICH PHILEMON	CHUIYAT	0729046462	FARMER	
04	DAVID MURU	KWELHETIA	0703694745	FARMER	
05	JOSEPH CHEPKURU	Jugut		Farmer	
06	PHILEMON CHEPKURU	Jugut		Farmer	
07	BENJAMIN MUTAI	CHUIYAT	0704244075	Farmer	
08	Debra Chepkemoi	Jordan	0714086228	Farmer	
09	Evaline Terer	Jordan	0706070583	Farmer	
10	Janneth Chepkemoi	Kwoleta	0716691564	farmer	
11	David cheriyot	Jordan	0729702124	farmer	
12	Esther Chepkukul	Masoso		farmer	
13	William Koel	Semoi	0717332768	Farmer	
14	Fr. Joel Koinin	SALAIK	0723577531	farmer	

S/No	Name	Residence/organisation	Mobile no	Designation	Sign
15	Datto Vincent	Semoi	0724938887	Farmer	[Signature]
16	ISAAC KORIR	SEMoi	0713578054	Farmer	[Signature]
17	Jonah Bett	Kwalela	0711852782	Farmer	[Signature]
18	Sammy - m - ROAD	Chungat	0729757419	Plat Farmer	[Signature]
19	Festus K Chepkusung	Jordan	0727007187	Farmer	[Signature]
20	Samuel K. Sol	Nyamboni	0713009331	Fundi masai	[Signature]
21	Daniel Pomi	Nyamboni	0724624854	Farmer	[Signature]
22	BYRON BERNARD	SEMoi	0702840088	Plumber	[Signature]
23	Arbom Korir	SEMoi	0725465138	Farmer	[Signature]
24	Joseph Langat	SEMoi	0703584216	Farmer	[Signature]
25	HILLARY BETT	SEMoi	0706726943	Agriculturist	[Signature]
26	Ismael Kiker	MASESO	0799305398	Farmer	[Signature]
27	ROBERT KORIR	MASESO	0715167009	Farmer	[Signature]
28	JOSEPH K Mutai	Semai	0718421405	Farmer	[Signature]
29	BOY BO	Kwalela	0797006374	Farmer	[Signature]
	Bug Samboi Ngeny	Semai	0700560056	Farmer	[Signature]
	PAUL K Langat	Chungat	-	Farmer	[Signature]
	BETI ARON	Mugango	0797973828	Plumber	[Signature]



Attendance Register
For Resettlement Action Plan Meeting for the Bomet Mulot Water
Supply and Sanitation Project.

7/01/2020





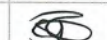









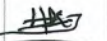
S/No	Name	Residence/organisation	Mobile no	Designation	Sign
	Daniel Cherkeny	Jegat		farmer	
	Richard Langat	Kimungu	074241232	farmer	
	Joseph Chapkonot	Kweleto	0716691564	farmer	
	ROTH NELSON	Chuiyat	0701435651	plumber	
	DAVID KIBI KAVI	Borowet	0701077167	farmer	
	Chapkulul Kimutai	Borowet	072396372	farmer	
	NICKSON BII	Salaik	0727231554	farmer	
	JOEL KIPKIRI O'KONG	Reberwet	0722123933	farmer	
	Stanley Kipsigi	Chuiyat	0717459875	Bundi	
	RICHARD LANGAT	Chuiyat	0711832854	Fundi	
	KIESLEY MARURA	CHUIYAT	0715050875	farmer	
	JOSEPH KORIR	CHUIYAT	0725119474	farmer	
	KILSON ROTH	CHUIYAT	0712661801	farmer	



7/01/2020

Attendance Register
For Resettlement Action Plan Meeting for the Bomet Mulot Water
Supply and Sanitation Project.

S/No	Name	Residence/organisation	Mobile no	Designation	Sign
1.	HULDAH CHEPROECH ROTICH	RVW WDA MEMBER	0728972413	ENGINEER	
2.	DANIEL KONGA	RVW WDA	0721641311	ENGINEER	
3.	FORRAINE NJOKI BABU	RVW WDA	0721532276	SOCIOLOGIST	
4.	GEORGE AGENGIO	LUSW WDA	0722589782	ENVIRONMENTALIST	
5.	CORNELIUS LANGAT	CGOB	0727033492	ENGINEER	
6.	MORAH MUKHAWAH	ROACH CONSULT LTD	0720590739	VALUER	
7.	Beatrice Gufunji	Atkins.	0727306792	Sociologist	
8.	RICHARD ROTICH	ARCHITECT INTERIOR	072983143	ARCHITECT	
9.	JOHN CHERUROT	CHIEF INTERIOR MULOT WDA	0710215806	CHIEF	
10.	JANEH CHERUROT	Kimugue	0718785951		
11.	CHEROTICH IRENE	Kimugue	0712577344		
12.	CHEPROECH DIANA	Rwaleta	0715540018		
13.	CHEBOT SHEILA	Robernet	0742854983		
14.	CHEROMOH JEDDAH	Chuyat	0710575913		

S/No	Name	Residence/organisation	Mobile no	Designation	Sign
1	EDITH CHEPGENO	CHUIYAT	0796706677		
2	NAOMI CHEMUTAI	CHUIYAT	0708164026		
3	Sarah ROTICH	CHUIYAT	0729968898		
4	HELLEN KENDUINO	KWELETA	0797006278		
5	CHEROTICH JACKLINE	SEMOL	0706540772		
6	JANE KIRUI	MASESE	07...		
7	DENNIS KIRUI	KIMUGUL	0790857057		
8	SEGEY JONATHAN	KIMUGUL	0702443702		
9	David K. Kerich	Chuyat	0701886135		
10	Joseph Kirui	Kwelleto	0716338869	Farmer	
11	MICHAEL BII	JORDAN	0705876807		
12	DAVID KIRUI	KIMUGUL	0790857057	PLANT OPERATOR	
13	Eunice Chemutai	KIMUGUL	0727073633	Farmer	
14	Nancy Tanni	nyabongo	0718372289	Farmer	
*15	Hellen Kenduino	Kwelleto	0797006278	Farmer	



Meeting Notes

Project:	Bomet Mulot Water Supply		
Subject:	Public Meeting Notes		
Meeting place:	Kibuchi primary school grounds- Ndarawetta Location	Meeting no:	001
Date and time:	12 November 2019 at 11.00 am	Minutes by:	Beatrice Githinji
Present:	RVWWDA/ LVSWWDA Bomet East Sub-County Administrator Area MCA Atkins Local residents (Attendance Sheet Attached)	Representing:	

ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
1.	Introduction <p>The meeting begun with a word of prayers at 11.00 am with a word of prayer.</p> <p>The chief welcomed all present and to the meeting and introduced the meeting agenda emphasizing the importance of participation from all the members to ensure the success of the project.</p> <p>The agenda of the project was introduced as follows.</p> <ul style="list-style-type: none"> • Introduce the scope of the project to the members of the public. • Give the public the opportunity to understand the benefit and impacts of the project. • Give the public an opportunity to share their views about the Project. 	
2.	Remarks <p>Appreciated the initiative of the water project.</p> <p>Emphasised on the lack of piped water and the suffering of women who fetch water from Nyangores River.</p> <p>Expressed hope that the project will benefit the community and end the struggles of water in the village.</p>	Village elders

Next meeting:

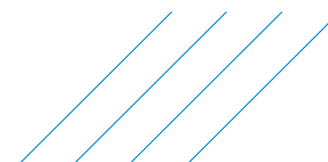
Distribution:	For ESIA Report	
Date issued:	25 November 2019	File Ref:

NOTE TO RECIPIENTS:

These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.



	<p>Appreciated the attendees for availing themselves for the meeting.</p> <p>Requested the participants to give their views on the project during the meeting.</p> <p>Emphasised on the lack of piped and clean water for community and schools in the area</p>	Ward administrator
	<p>Appreciated the members of the community, and the public participation approach.</p> <p>Encouraged the members of the public to give their views and opinion on the project.</p> <p>Assured the attendees that Bomet county supports the project and they will ensure that RVWWDA and LVWWDA are able to implement the project for the benefit of the community</p>	MCA, Ndarawetta Ward
	<p>Appreciated the members of the public for their continued support in other projects.</p> <p>Added that the Agency was looking forward to the full implementation of the proposed project.</p> <p>Promised that the Agency was planning other projects to curb the water insufficiency in the area.</p>	LVWWDA
	<p>Assured the members of the public of their commitment to fully implement the Project to completion and ensure that project benefits are felt by the residents. They encouraged the residents to give input and views to the Project</p>	RVWWDA
3.	Project presentation by Atkins	
	<p>Project Scope</p> <p>The project is funded by the African Development Bank and will be implemented by Rift valley Water Works Development Agency and Lake Victoria Water Works Development Agency.</p> <p>The project coverage area is Cheboin, Bomet town, Olokyin, Kapliyo, Longisa, Kembu, Mulot, Kiplabotwa Sigor, and their environs to provide potable water for a design horizon of 20 years.</p> <p>Hydrological studies were done for Nyangores and Amala rivers and it was determined that Nyangores river has adequate flow for water supply and also provides sufficient head to supply water by gravity thus reducing pumping costs.</p> <p>The project components include:</p> <ul style="list-style-type: none"> • An intake on Nyangores River at the second waterfall; • 5Km Raw water gravity main within Mau Forest; • Full conventional water treatment works at Masese; • Transmission Pipelines to Bomet Town, Sigor, Mulot, Olokyin, Kiplabotwa, Longisa, Mulot Hill, Merigi, Kapkimolwa and Kembu; • Pumping stations at Cheboin and Longisa; • Storage Tanks at Kyogong, Kapkimolwa, Mulot hill, Longisa, Sigor, Tiroto, Merigi. <p>After commissioning, the project will be handed over to Bomet Water and Sanitation Company (BOMWASCO) for customer connection and day- to- day operations.</p>	Eng. Phyllis Njoki
	<p>Environmental and social impacts</p> <p>The attendees were informed on the possible impacts during construction e.g. uptake of private land; loss of vegetation; degradation of air quality from dust emissions, pollution of soil and water resources from spillage of hazardous chemicals/compounds and erosion; creation of occupational and community health and safety hazards at project sites; potential increase in moral decadence from inappropriate</p>	Beatrice Githinji



	<p>interactions between the construction workforce and the community; improved access to clean water; reduced disease burden caused by water-borne diseases; saving of time spent in search for water.</p> <p>Attendees were also informed that for each impact identified, practical mitigation measures will be proposed to avoid or reduce the impact. The ESIA carried out would also include development of an Environmental and Social Management Plan (ESMP) to address relevant issues during project construction and operations.</p> <p>Grievance management</p> <p>The community was informed that a grievance committee (GC) would be formed at the beginning of construction. The GC will provide a platform to receive and address complaints by affected communities.</p>	
4.	Plenary session	
	<p>Comment: Appreciated the water project as it will save women the many hours spent fetching water.</p> <p>The community has preserved the forest and has not encroached. Therefore, the volume of water in the river is sufficient</p>	Emmy Langat
	<p>Question: Enquired whether there would be land compensation where pipelines pass through private property</p>	Joseph Tanui
	<p>Response: A Resettlement Action plan will be prepared identifying properties affected. The pipelines will be laid mainly along the road reserves and riparian areas. Any crops lost will be compensated. Treatment works and storage tanks will be located on private land and the owners will be compensated.</p>	Beatrice Githinji
	<p>Question: What happens if the loan is not paid back to the donors?</p>	Samuel Langat
	<p>Response: The National government oversees repayment of the loans to the lender. BOMWASCO will be required to distribute the water and charge for water use on behalf of the government.</p>	Eng. Phyllis Njoki
	<p>Question: Will there be compensation for loss of crops and tea bushes if they are removed during construction?</p>	Dennis
	<p>Response: A Resettlement Action Plan study will be done to identify all property including crops that will be affected by the project. Thereafter, compensation of affected items will be done.</p>	Beatrice Githinji
	<p>Question: Youth lack employment in the area. Will opportunities be provided for local youth before importing workers from elsewhere?</p>	Peter Chirchir
	<p>Response: The local residents will be given priority in employment as it is required by law. This will be well detailed in the construction contract.</p>	Beatrice Githinji
	<p>Question: The water should be supplied to Nyangores and neighbouring villages before distribution to other areas</p>	Paul Keringet
	<p>Response: Once the main pipeline is complete, the County Government through BOMWASCO will progressively install consumer connections to all supply areas as needed</p>	Eng. Cornelius Langat- Bomet County.



	<p>Comments: Commended the project and proposed that trees be planted in schools to recover lost vegetation. Suggested that the contractor improves the roads they will use to transport the construction materials.</p> <p>Response: The plan for environment rehabilitation shall be agreed between the Kenya Forest and the Client. The Contractor will be required to ensure that roads and other facilities are not left in a worse condition than they were after use</p>	<p>Ngetich Joseph</p> <p>Eng Phyllis Njoki</p>
	<p>Comments: The area is a tea zone and the roads are narrow. The movement of vehicles should be managed to avoid accidents especially with school going children</p> <p>Response: Mitigation measures to avoid accidents will be implemented. The contractor will be informed to develop a traffic management plan to ensure that risks and accidents are minimised.</p>	<p>Irene Chepkoech</p> <p>Beatrice Githinji</p>
5.	Conclusion	
	Expressed his support for the project and assured that the County Government would offer the necessary support	Hon. Josphat Kirui MCA Ndarawetta ward
	There being no other issues to discuss, the meeting ended at 13.30 pm.	



ATKINS

Member of the SNC-Lavalin Group

Attendance Register Public Consultation Meeting

The Environment and Social Impact Assessment for Bomet - Mulot Water Supply and Sanitation Project

Date: 13/11/2019 Time: 11:00 Venue: KIBOGI - Ndarakweta Location

S/No	Name	Location	Designation	Mobile no	Signature.
1	JEREMIAH CHIRCHIR	NDARAWETA	CHAIRMAN NYONGORESS Commu Water Project	0718 441 743	
2	RICHARD BIJEGON			0720938042	
3	STANTLEY BONO			0712065219	
4	RICHARD TONUI			0719466647	
5	PAUL KIBINYEI			0796043202	
6	KIPTONUI KOSKEI			0725569253	
7	HENRY CHESIELE			0719193880	
8	RICHARD LANIAT	NDARAWETTA		0719179059	
9	PAUL K BZU			0708367817	
10	SAMUEL SIGEI			0717644479	
11	KIPKOECH TONUI			0708382834	
12	BENARD CHURURE	NDARAWETTA		0712661558	
13	CAROLINE ROP	NDARAWETTA		0729619623	



S/No	Name	Location	Designation	Mobile no	Signature.
14	ARON BII				
15	NELSON K. LANGAT	NYONGORES		0702729684	<i>[Signature]</i>
16	Emmy Langat	NYongores		0728708708 ⁶⁹⁰	<i>[Signature]</i>
17	GEOFFREY KIRUI	NYON		0708660930	<i>[Signature]</i>
18	JARLE MARINTANYI			0706809104	<i>[Signature]</i>
19	JOSEPH TEGERET	Area Assi Chief		0728161843	<i>[Signature]</i>
20	SAMUEL LANGAT	(SENIOR)		0726857324	<i>[Signature]</i>
21	CHERUITOT RICHARD	NYONGORES		0722958979	<i>[Signature]</i>
22	Cornelius Langat	—	Water Engineer	0727033492	<i>[Signature]</i>
23	Phyllis Njoki	—	Project Engineer - Atkins	0710446611	<i>[Signature]</i>
24	Daniel Areba	NA	Engineer - Atkins	0710964304	<i>[Signature]</i>
25	Dominic Chirchir	N/A	Engineer - LVSWDA	0729454425	<i>[Signature]</i>
26	Beatrice Githungyi	N/A	Sociologist - Atkins	0727306792	<i>[Signature]</i>
27	Johni Rop	NYONGORES		0724170218	<i>[Signature]</i>
28	Huldah Chepkoech	N/A	ENGINEER - RNWDA	0728972413	<i>[Signature]</i>
29	LORRAINE NJOKI BABU	—	Asset Mgt Ass - RVWDA	0721532276	<i>[Signature]</i>
30	ALLAN K. SOGOMO	—	Engineer - RVWDA	0727078890	<i>[Signature]</i>



S/No	Name	Location	Designation	Mobile no	Signature
31	CAROLINE LANGAT		ENVIRONMENTALIST - RVWDA	0728555268	<i>[Signature]</i>
32	JOSEPH RUGUT			0726435474	<i>[Signature]</i>
33	NOBERT MUTAI			0745649174	<i>[Signature]</i>
34	NOAH KIRUI			0799020728	<i>[Signature]</i>
35	LEONARD MUTAI			0724427837	<i>[Signature]</i>
36	JOSEPH CHERUYOT				<i>[Signature]</i>
37	JOHN C-BII		Headteacher	0720283210	<i>[Signature]</i>
38	SARAH NGASURA			2417	<i>[Signature]</i>
39	JEREMIAH KOECH			0714658358	<i>[Signature]</i>
40	DAVID LANGAT			0714675975	<i>[Signature]</i>
41	JOHN MALEL			0726160337	<i>[Signature]</i>
42	HELEN SIGIRA				<i>[Signature]</i>
43	DAVID NGETICH		Youth Rep	0721543494	<i>[Signature]</i>
44	JOSEPH K. NGETICH	Ndarawetta	NYO ngoneg Ht Kapkigomwe, Resilance	072824624	<i>[Signature]</i>
45	MOIM GEOFFREY		Village Elder	0708006683	<i>[Signature]</i>
46	JOSEPH K. LANGAT			0701527512	<i>[Signature]</i>
47	Deftu chinchin				<i>[Signature]</i>



S/No	Name	Location	Designation	Mobile no	Signature.
48	Killsanketony			0724319003	(Def)
49	Joel K. Langat			0792584645	Joel
50	Sammy Cheruio			0727667093	Sammy
51	Steve Tanvi			0726800908	Steve
52	Joseph Tavi			0711422097	Joseph
53	Hon. Kirui K Josephat	NDARAWETA	AREA MCA & MAJORITY LEADER	0723842415	Kirui
54	Ronald Lley	Singorwet	Ward Administrator	072496383	Ronald
55	Edward Cheruio	Ndaraweta	Ward Administrator	0720980923	Edward
56	Violet Rono			0727748680	Violet
57	Alice Tegawet	Ndarawetta		0715780350	Alice
58	Hellen Sigina	Ndarawetta			Hellen
59	DETT ROBERT	NDARAWETA	Kiboroti member	0722205657	DETT
60	Wesley K. Mdati	Ndarawetta	Ribodun	0726714717	Wesley
61	Leonard Kering	Ndarawetta		0715473995	Leonard
62	Agnes Koskei	nd		0725218280	Agnes
63	Festus Ronoh			0728008133	Festus
64	Benard Kirui			0712639512	Benard



ATKINS

Member of the SNC-Lavalin Group

Attendance Register Public Consultation Meeting

The Environment and Social Impact Assessment for Bomet - Mulot Water Supply and Sanitation Project

Date: 13/11/2019 Time: 11:00 Venue: Kiboga Primary - Ndarawetta Location

S/No	Name	Location	Designation	Mobile no	Signature.
1	FLORIDA CHERUMOT	NYONGORES	FARMER	0718100293	
2	IRENE TERER	NYONGORES	FARMER	079011715	
3	Philip Rono	Ndarawetta		0727070384	
4	Winnie Chepkirui			0706808732	
5	Huskel Dorcas			0726558300	
6	JOHN KIPKEMOI LANGAT	NDARAWETTA	farmer	0726432596	
7	Nichola Kirui	Ndarawetta	farmer	0729063383	
8	Simon Bonoh				
9	Isaac Langat	Ndarawetta	farmer	0726554514	
10	William Chepkwony				
11	MATHEW SANCH	SILIBWET	SUB-COUNTY WQ WATER INSPECTOR	0704512945	
12	Nessan Rutto				
13	Simon Rono			0721340299	



S/No	Name	Location	Designation	Mobile no	Signature.
14	Kenneth Langat	Ndarawetta	Farmer	0708526372	Ken
15	MUTH K. ARVINE	Ndarawetta	Farmer	0790853426	Ado
16	LEONARD C. CHEPKEYOT	Ndarawetta	Farmer	0715418732	CE
17	CHEPKEMOI JACKLINE	Ndarawetta	Farmer	0716516167	GR
18	Janeth Langat	Ndarawetta	Farmer	0723833902	GR
19	Chepkemoi Merai	Ndarawetta	Farmer	0790822042	GR
20	Isaac C. Poni			0718796466	GR
21	Samuel K. Tionu			0718698481	GR
22	Elizabeth Ngeno	Ndarawetta	Farmer		GR
23	John K. Korir	Ndarawetta	Teacher	0710380607	GR
24	Kimutai Joseph Langat	Ndarawetta	Farmer	0	GR
25	Daniel Chepkwony	Ndarawetta	Farmer	0727225616	GR
26	Leonard Langat	Ndarawetta	Farmer	0711466135	GR
27	Daniel Mutai	Ndarawetta	Farmer	0717298103	GR
28	EDWARD CHEPKWONY	Ndarawetta	Farmer	0715253047	GR
29	Wilman Cherichini	Ndarawetta	Farmer	07101812806	GR
30					



Meeting Notes

Project:	Bomet Mulot Water Supply		
Subject:	ESIA Notes for Public Participation		
Meeting place:	Sigor	Meeting no:	
Date and time:	13 November 2019 at 15:00	Minutes by:	Beatrice Githinji
Present:	(see Attendance Sheet attached)	Representing:	

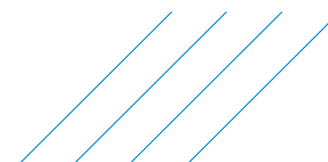
ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
1.	Introduction The meeting started at 3.00pm with a word of prayer. Thereafter, the area Chief invited the village elders from the Location to address the attendees. Team representing institutions from the County Government of Bomet, Lake Victoria Water Works Development Agency, Rift Valley Water Works Development Agency and Atkins Consulting Engineers were invited to address the attendees. The Public meeting agenda was <ul style="list-style-type: none"> • Introduce the scope of the project to the members of the Public • To give the public an opportunity to understand the benefits and impacts of the project • To give the public the opportunity to express their views on the project 	Area Chief
2.	Project presentation by Atkins Project Scope The project is funded by the African Development Bank and will be implemented by Rift valley Water Works Development Agency and Lake Victoria Water Works Development Agency. The project coverage area is Cheboin, Bomet town, Olokyin, Kapliyo, Longisa, Kembu, Mulot, Kiplabotwa Sigor, and their environs to provide potable water for a design horizon of 20 years. Hydrological studies were done for Nyangores and Amala rivers and it was determined that Nyangores river has adequate flow	Eng. Phyllis Njoki

Next meeting:

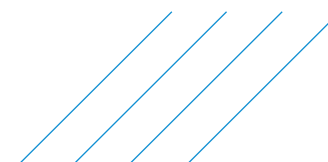
Distribution:	To all copied	
Date issued:	29 November 2019	File Ref:

NOTE TO RECIPIENTS:

These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.



	<p>for water supply and also provides sufficient head to supply water by gravity thus reducing pumping costs.</p> <p>The project components include:</p> <ul style="list-style-type: none"> • An intake on Nyangores River at the second waterfall; • 5Km Raw water gravity main within Mau Forest; • Full conventional water treatment works at Masese; • Transmission Pipelines to Bomet Town, Sigor, Mulot, Olokyin, Kiplabotwa, Longisa, Mulot Hill, Merigi, Kapkimolwa and Kembu; • Pumping stations at Cheboin and Longisa; • Storage Tanks at Kyogong, Kapkimolwa, Mulot hill, Longisa, Sigor, Tiroto, Merigi. <p>After commissioning, the project will be handed over to Bomet Water and Sanitation Company (BOMWASCO) for customer connection and day- to- day operations.</p>	
	<p>Environmental and social impacts</p> <p>The attendees were informed on the possible impacts during construction e.g. uptake of private land; loss of vegetation; degradation of air quality from dust emissions, pollution of soil and water resources from spillage of hazardous chemicals/compounds and erosion; creation of occupational and community health and safety hazards at project sites; potential increase in moral decadence from inappropriate interactions between the construction workforce and the community; improved access to clean water; reduced disease burden caused by water-borne diseases; saving of time spent in search for water.</p> <p>Attendees were also informed that for each impact identified, practical mitigation measures will be proposed to avoid or reduce the impact. The ESIA carried out would also include development of an Environmental and Social Management Plan (ESMP) to address relevant issues during project construction and operations.</p> <p>Grievance management</p> <p>The community was informed that a grievance committee (GC) would be formed at the beginning of construction. The GC will provide a platform to receive and address complaints by affected communities.</p>	Beatrice Githinji
3.	<p>Plenary session</p>	
	<p>Comment: Sigor area is very arid and lacks enough water supply.</p> <p>The water from the project should be pumped to the highest hill in the area to allow distribution through gravity to many households</p>	Henry Kipruto
	<p>Question: Enquired on how long it would take before the project is implemented.</p> <p>Comment: The tank in Sigor is very small to hold enough water that can be distributed to the households within Sigor.</p> <p>Proposed to have the tank moved to a higher hill.</p>	Samuel Melile
	<p>Response: The project includes a proposal to have a new storage tank near the existing tank. The water will use gravity to get to the tank.</p> <p>It is expensive to pump water to storage tanks on top of high hills.</p> <p>The proposed project is funded through a loan and therefore introducing the pumping system will be expensive for the project.</p>	Eng. Phyllis Njoki



	<p>Comment: Consideration for a reservoir should be done. The tank should be located on one of the highest hills in Sigor to enable supply of water in many households</p> <p>Response: The project includes a tank that will be located next to the existing one at Sigor. The project is designed to use gravity and save on operating cost. Having a tank on a very high hill will not be sustainable for the project</p>	<p>Josiah Korir</p> <p>Eng. Phyllis Njoki</p>
	<p>Comment: Have downstream impacts on Nyangores River been identified? What will happen in during the dry season when the river doesn't have enough water that can be abstracted and still retain the minimum flow?</p> <p>Response: a hydrological assessment of the river has been done. The volume of water to be abstracted from the river will not significantly affect the downstream flow.</p>	<p>Rotich Dominic</p> <p>Eng Phyllis Njoki</p>
	<p>Comment: Ensure that the contractor provides employment to the locals during the construction phase of the project</p> <p>Response: The labour force will be sourced locally for non-skilled labour. For skilled labour, if there are qualified locals, they will also be given an opportunity to work.</p>	<p>Bernard Yegon</p> <p>Beatrice Githinji</p>
	<p>Comment: Women suffer a lot while searching for water. Tank locations should be strategic to supply water in many areas. The distribution pipelines should also cover all villages.</p> <p>Response: There will be a reservoir tank at Sigor. Water distribution will be done by the County Government through BOMWASCO. Distribution will be by gravity, therefore it won't be possible to build tanks at very high points</p>	<p>Anna Sitoni</p> <p>Eng Phyllis Njoki</p>
4.	<p>Conclusion</p> <p>The chief appreciated the attendees for availing themselves for the meeting. The meeting ended at 5.00pm with a word of prayer</p>	



ATKINS

Member of the SNC-Lavalin Group

Attendance Register Public Consultation Meeting

The Environment and Social Impact Assessment for Bomet - Mulot Water Supply and Sanitation Project

Date: 14/11/2019 Time: 8:00am Venue: SIGOR

S/No	Name	Location	Designation	Mobile no	Signature.
1	Benard K. Rop	Sigor	Chief	0721578777	
2	David K. Rotich	Sigor	Alchier	0722432667	
3	Sammy K. Koeh	Sigor	Alchier	0723917795	
4	Simon K. BORE	SIGOR	Member of public	0725176442	
5	Philip Terer	SIGOR	member of public	0713671541	
6	Mutai K. Hillany	Sigor	member of public	0728784971	
7	Paul Chepkwony	Sigor	Area manager (BOMWASA)	0728859968	
8	Koeh Kamiti	Sigor	ITS (BOMWASA)	0725372365	
9	Joseph Rotich	Onephose SIGOR		0726025896	
10	Simon Rotich	SIGOR	member of public	—	
11	Rotich Dominic	SIGOR	Member of Public	0718166808	
12	ALLAN SOGOMO	—	ENGINEER - RVWASA	0711162024	
13	Alexander Ngorechi	Sigor	Member of public	0714275622	
14	Sammy K. MBLIL	Sigor	Opinion leader	0711252253	



S/No	Name	Location	Designation	Mobile no	Signature.
15	Rakhael Siele	Sigor	2422165	0757850032	<i>[Signature]</i>
16	Ann Ngem	Sigor	13109905	0729533458	<i>[Signature]</i>
17	Stanley Brenus	Sigor	11794883	0718447827	<i>[Signature]</i>
18	David Cherumot	Sigor	20529246	0713854770	<i>[Signature]</i>
19	Grace chumo	Sigor	2430492	0728540983	<i>[Signature]</i>
20	Peter Seng	Sigor	26538957	0723971641	<i>[Signature]</i>
21	Pop Johnstone	"	11797081	0791024254	<i>[Signature]</i>
22	Bernard Ntola	Nyamugo	5452575 <i>farmer</i>	0711308784	<i>[Signature]</i>
23	Joseph K. A. Korir	Susumerga / Resoi	4343336	0724958344	<i>[Signature]</i>
24	Naomi church	nga	<i>customer care (Kericho)</i> 33060484	0705 12880	<i>[Signature]</i>
25	Rono Rick	Sigor	30133551	0704430010	<i>[Signature]</i>
26	Ruth Bii	Sigor	3831300	0717041013	<i>[Signature]</i>
27	Lucina Cheriro	Sigor			<i>[Signature]</i>
28	CHERUIYOT. K. RICKSAM	SUGUMERGA / KESKUT	30176649	0728058222	<i>[Signature]</i>
29	Kipwiro citam Ndayi	SIGOR	FARMER.	0729370289	<i>[Signature]</i>
30	Nictmas Osoro	SIGOR	FARMER.	0726810866	<i>[Signature]</i>
31	JULIUS SIGEI	AREIYE7	FARMER	0705164614	<i>[Signature]</i>



S/No	Name	Location	Designation	Mobile no	Signature.
32	PAUL ROND	SIGOR	FARMERS	0726114386	
33	WILLIAM LOSKE	SIGOR.	FARMER.	0726986455	
34	KIRUI K COSMAS	SIGOR	FARMER	072466963	
35	SUMON ILA SANGATI	CHELELE	FARMER	071194727	
36	BENARD K. YEGON	LELAITICH	FARMER	0740194621	
37	LAWRENCE K. CHEBOLG	NGONKE KIPGEICIEI	FARMER	0714031044	
38	GABRIEL KIPRONO LANGAT	SIGOR	FARMER	0727253455	
39	ZAKAYO KOO MARUSOI	SIGOR	FARMER	0710740520	
40	NICKSON LELEI	SUGUMERGA	C.B.O SEC.	0757207260	
41	DECLAR CHEPKIRUI	SUGUMERGA	FARMER	0710508604	
42	CHEPNGETICH CAROLINE	SIGOR	FARMER	0723209203	
43	RICHARD SANG	SUGUMERGA	FARMER	0724565266	
44	KIBET LANGAT	SUGUMERGA	FARMER	0700711888	
45	KIMI JOSEPH	SIGOR	FARMER	0715432233	
46	PAUL K. LANGAT	SIGOR	FARMER	0710255596	
47	RICHARD K. BILGON	SUGUMERGA	CHEF	0724799257	

Attendance Register for Bomet Mulot water supply



ATKINS

Member of the SNC-Lavalin Group

Attendance Register Public Consultation Meeting

The Environment and Social Impact Assessment for Bomet - Mulot Water Supply and Sanitation Project

Date: 14/11/2019 Time: 8:00pm Venue: SIGOR

S/No	Name	Location	Designation	Mobile no	Signature.
1.	Abraham churich	SIGOR		0726600919	<i>[Signature]</i>
2.	Agnes Langat	SIGOR		0705363371	<i>[Signature]</i>
3.	Janet Tonui	SIGOR		0797551611	<i>[Signature]</i>
4.	David Kigat	SIGOR		072141376	<i>[Signature]</i>
5.	IONAH KOECH	SIGOR		0708531679	<i>[Signature]</i>
6.	CAROLINE LANGAT		ENVIRONMENTALIST - RVWDA	0728555266	<i>[Signature]</i>
7.	Loice Kerui	CHEMAGEL		0710716178	<i>[Signature]</i>
8.	Alice C Tower	SIGOR		0721125807	<i>[Signature]</i>
9.	Janet Brett	SIGOR		07202167359	<i>[Signature]</i>
10.	NERTICH PHILIP	LELATICH	Community leader	0710431007	<i>[Signature]</i>
11.	WILLIAM BURYWO	SIGOR		079511368	<i>[Signature]</i>
12.	Joseph Langat	Cheptelethor (v)		0722353479	<i>[Signature]</i>
13.	Wilson Kimutai Chepkwong	Chekinib (v)			



Attendance Register for Bomet Mulot water supply

C.3. Sample Questionnaires

Environmental and Social Impact Assessment (ESIA) of the Proposed Bomet-Mulot Water Supply and Sanitation Project.

ESIA Public Consultation Questionnaire.

The Government of Kenya has received financing from the African Development Bank (AfDB) towards the cost of Kenya Towns Sustainable Water Supply and Sanitation Program (KTSWSSP).

Rift Valley Water Works Development Agency (RVWWDA) on behalf of Lake Victoria South Water Works Development Agency (LVSWWDA) intends to apply part of the funds under the Program to the design and construction of Bomet-Mulot Water Supply Project.

Atkins Consulting Engineers Ltd was commissioned by Rift Valley Water Works Development Agency (RVWDA) to provide Engineering, and Environmental and Social Management Consultancy Services for the water supply project.

The project is targeted to supply water in parts of Bomet Central, Bomet East, Chepalungu and parts of Narok South sub-county. The project components include:

- Intake works on Nyangores River;
- 4.6Km long Raw water gravity main DN 450mm;
- Full conventional water treatment works, production capacity 18,000m³/day;
- Gravity and pumped transmission mains, total length 105 km and;
- 6 Nr storage tanks.



The Environmental Management and Coordination Act, Cap. 387 and AfDB's Environmental and Social Assessment Procedures provide that a project of the proposed nature shall undergo an Environmental and Social Impact Assessment (ESIA) before implementation. These regulations also provide for stakeholder engagement as part of the ESIA process to establish the views and concerns of the interested and/or affected stakeholders.

As an affected and/or interested stakeholder in the proposed project, you are requested to document your views, opinions and/or concerns regarding the proposed water project. Kindly answer the questions overleaf.

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	CHEPHORIR ROSELINE
1.2	Date	14/11/2019
1.3	County	BOMET
1.4	Sub- County	B-E
1.5	Location name	CHEBOIN
1.6	Village name	CHEBOIN
1.7	Community/Clan	KIPSIKUS

2. Respondents background information

2.1 Gender of the respondent

- a) male ☒ b) female

2.2 Age group

- a) 18 – 28years, ☒
 b) 29 – 38years,
 c) 39 - 48 years,
 d) 49 – 58 years,
 e) 59 – 68 years,
 f) 69 – 78 years
 g) Above 79years

2.3 Marital status

- a) Married, ☒ b) Single c) Widow/Widower d) Divorced

2.4 Highest level of education achieved by the respondent

- a) Never attended school b) Primary school
 c) Secondary school d) College level, ☒
 e) University level
 f) Other, specify _____

2.5 Religious affiliation of the respondent

- a) Christian ☒ b) Muslim, c) Indigenous,
 d) Other, Specify _____

2.6 Does any of your household members have disability?

- a) Yes ☒ b) No

2.6.1 If yes, what type of disability

- a) Physical b) Psychological ☒ c) Visual

- d) Other: specify _____

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

Illness	Yes	No
Diarrhoea		<input checked="" type="checkbox"/>
Cholera		<input checked="" type="checkbox"/>
malaria		<input checked="" type="checkbox"/>
Typhoid		<input checked="" type="checkbox"/>

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- a) Farming/Agriculture ☒
 b) Formal employment/ Salary
 c) Self-employed /business
 d) Livestock keeping/Pastoralism
 e) Sand harvesting
 f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	500-1000 - b
Formal employment/Salary	
Self-employed/ Business	
Livestock keeping /Pastoralism	<input checked="" type="checkbox"/>
Sand Harvesting.	
Other specify	

- a. Kshs 0-500 b. 501- 1000, c. 1001- 5000 d. 5001-10000 e. over 10,001

4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	
b	Paraffin Lamp	
c	solar <input checked="" type="checkbox"/>	
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood <input checked="" type="checkbox"/>	
b	Charcoal	
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- a) Public hospital / health Centre ☒
 b) Private hospital/Clinic
 c) Chemist
 d) Ordinary shop

- e) Traditional healer
f) Others (specify): _____

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
b) 1-5Km
☒ c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- ☒ a. River / stream / spring
b. Rainwater harvesting
c. Piped tap in the homestead
d. Water kiosk
e. Dam / pond
f. Water vendors /Boozers
g. Other specify: _____

6.2 How far (in Kilometers) is the water source from your house?

- a) Less than 1km
☒ b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- ☒ a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- ☒ a) Nothing
b) Sieve
c) Add chlorine
d) Waite for the water to settle
e) Others indicate

6.5 if you are supplied with water, will you be willing to pay? ☒ YES ☐ NO

7. Sanitation

7.1 Does your household own a toilet?

- ☒ a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
☒ b) Pit latrine with slab (concrete, earth, wood)
c) Other specify: _____

7.3 Does your household have a Dish rack

- ☒ a) Yes
b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- ☒ a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/path
g) Other specify: _____

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

<input checked="" type="checkbox"/> 1. Yes	2. No
--	-------

8.2 Are you aware that there are Sexually Transmitted Infections (STIs)?

<input checked="" type="checkbox"/> 1. Yes	2. No
--	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
b) Abstinence
☒ c) Stick to one faithful partner
d) Other specify: _____

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
☒ b) No

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a. To get water for farming
b. To get drinking water and water for domestic use
c. Fishing
d. Other
(Specify) _____

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a. Yes
b. No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

9.7 What are some of the birds along the riparian, and their significance to the community?

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

- a. yes
b. no

8.2 Please explain your answer

This project will help assist many people especially those living in area where water rivers and dams are far

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

- a. Yes
b. No

If no, please indicate your reason below

12. What **positive** socio-economic and environmental impacts do you anticipate during the **construction stage** of project?

source of employment to many jobless people.

13. What **positive** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

It will save on time being wasted to get water and the time will be employed on any other activities e.g. farming.

14. What **negative** socio-economic and environmental impacts do you anticipate during the **construction stage** of the project?

Social injustice because the employers or workers are from different areas and backgrounds.

15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

Incase of pipes likages they may cause soil erosion.

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

Ensure that there are plumbers which are stationed near.

17. Do you have any other comments about the proposed project? It is a nice project and the country government should ensure that the project is done with transparency.

Gender issues


a) Resource access and control profile: (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land	✓	✓	✓	
Financial capital/credit	✓	✓	✓	✓
Water	✓	✓		✓
Production tools (equipment for farming, cattle/poultry breeding)	✓	✓	✓	✓
Production inputs (for farming,	✓	✓	✓	✓

cattle/poultry breeding)	✓	✓	✓	✓
Labor	✓	✓	✓	✓
Market as a buyer	✓	✓	✓	✓
Market as a seller	✓	✓	✓	✓
Transport	✓	✓		
Education services	✓	✓	✓	✓
Health services	✓	✓	✓	✓
Training	✓	✓		

- b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work	✓	✓	✓	
Self-employment	✓	✓		
Wage work/employment		✓		
Access to urban and rural markets	✓	✓	✓	✓
B. Reproductive work				
Fetching water	✓		✓	
Fetching wood	✓		✓	
Preparing food	✓	✓	✓	
Child care	✓		✓	
Sanitation	✓	✓	✓	
Health care for the sick	✓	✓	✓	
C. Socio-cultural activities				
Participation in village meetings	✓	✓		
Participation in religious meetings	✓	✓	✓	
School meetings	✓	✓		
Participation in funeral & other ceremonies	✓	✓		

Name of Respondent FAITH CHERONO	
Name of Organization or Village SEGEROT	
Phone number 0720787995	
Signature or stamp 	Date: 14/11/2019

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	SANG K. FESTUS
1.2	Date	14/11/2019
1.3	County	BOMET
1.4	Sub- County	BOMET EAST
1.5	Location name	CHERBOIN
1.6	Village name	CHERBOIN
1.7	Community/Clan	KIPSIGES

2. Respondents background information

2.1 Gender of the respondent

☒ a) male ☐ b) female

2.2 Age group

a) 18 – 28years,

☒ b) 29 – 38years,

c) 39 – 48 years,

d) 49 – 58 years,

e) 59 – 68 years,

f) 69 – 78 years

g) Above 79years

2.3 Marital status

a) Married, b) Single c) Widow/Widower ☒ d) Divorced

2.4 Highest level of education achieved by the respondent

a) Never attended school b) Primary school

c) Secondary school ☒ d) College level, e) University level

f) Other, specify _____

2.5 Religious affiliation of the respondent

☒ a) Christian b) Muslim, c) Indigenous,

d) Other, Specify _____

2.6 Does any of your household members have disability?

a) Yes ☒ b) No

2.6.1 If yes, what type of disability

a) Physical b) Psychological c) Visual

d) Other: specify N/A

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

Illness	Yes	No
Diarrhoea		<input checked="" type="checkbox"/>
Cholera		<input checked="" type="checkbox"/>
malaria	<input checked="" type="checkbox"/>	
Typhoid		<input checked="" type="checkbox"/>

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- ☒ a) Farming/Agriculture
☐ b) Formal employment/ Salary
☐ c) Self-employed /business
☐ d) Livestock keeping/Pastoralism
☐ e) Sand harvesting
☐ f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	10 000
Formal employment/Salary	N/A
Self-employed/ Business	N/A
Livestock keeping /Pastoralism	3 000
Sand Harvesting.	N/A
Other specify	N/A

a. Kshs 0-500 b. 501- 1000, c. 1001- 5000 d. 5001-10000 e. over 10,001

4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	
b	Paraffin Lamp	
c	solar	<input checked="" type="checkbox"/>
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood	<input checked="" type="checkbox"/>
b	Charcoal	<input checked="" type="checkbox"/>
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- ☒ a) Public hospital / health Centre
☐ b) Private hospital/Clinic
☐ c) Chemist
☐ d) Ordinary shop

- e) Traditional healer
f) Others (specify): _____

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
b) 1-5km
c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- a) River / stream / spring
b) Rainwater harvesting
c) Piped tap in the homestead
d) Water kiosk
e) Dam / pond
f) Water vendors /Boozers
g) Other specify: _____

6.2 How far (in Kilometers) is the water source from your house?

- a) Less than 1km
b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- a) Nothing
b) Sieve
c) Add chlorine
d) Waite for the water to settle
e) Others indicate

6.5 If connected to water supply, will you be willing to pay? (A) YES (B) NO

7. Sanitation

7.1 Does your household own a toilet?

- a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
b) Pit latrine with slab (concrete, earth, wood)
c) Other specify: _____

7.3 Does your household have a Dish rack

- a) Yes
b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/path
g) Other specify: _____

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes	2. No
--------	-------

8.2 Are you aware that there are Sexually Transmitted Infections (STIs)?

1. Yes	2. No
--------	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
b) Abstinence
c) Stick to one faithful partner
d) Other specify: _____

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
b) No

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a) To get water for farming
b) To get drinking water and water for domestic use
c) Fishing
d) Other
(Specify) _____

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a) Yes
b) No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

Farming / Irrigation

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

Dirty

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

-

9.7 What are some of the birds along the riparian, and their significance to the community?

Weaver birds

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

Crocodiles

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails

NO

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

- ☒ a. yes
☐ b. no

8.2 Please explain your answer

Will alleviate the water shortage in the area

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

- ☒ a. Yes
☐ b. No

If no, please indicate your reason below

12. What **positive** socio-economic and environmental impacts do you anticipate during the **construction stage** of project?

Improved economic condition

13. What **positive** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

Growth of business

14. What **negative** socio-economic and environmental impacts do you anticipate during the **construction stage** of the project?

Spread of diseases

big population

15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

- Dirty

- Felling of trees

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

Participating in community meeting

17. Do you have any other comments about the proposed project?

Should be implemented with speed

Gender issues

a) Resource access and control profile: (Tick where applicable)

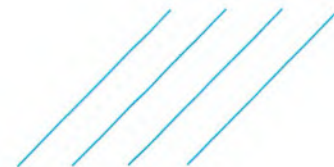
	Access		Control	
	Men	Women	Men	Women
Land	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Financial capital/credit	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Water				
Production tools (equipment for farming, cattle/poultry breeding)	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Production inputs (for farming,	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

cattle/poultry breeding)		✓		✓
Labor	✓		✓	
Market as a buyer		✓		✓
Market as a seller		✓		✓
Transport	✓		✓	
Education services	✓			✓
Health services	✓			✓
Training	✓			✓

- b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work		✓		
Self-employment				
Wage work/employment		✓		
Access to urban and rural markets		✓		
B. Reproductive work				
Fetching water	✓		✓	✓
Fetching wood	✓		✓	✓
Preparing food	✓			
Child care	✓		✓	
Sanitation	✓			
Health care for the sick	✓			
C. Socio-cultural activities				
Participation in village meetings		✓		
Participation in religious meetings	✓			
School meetings		✓		
Participation in funeral & other ceremonies	✓	✓		

Name of Respondent Renard Doro	
Name of Organization or Village Cheboin	
Phone number 0716 27 8875	
Signature or stamp 	Date: 14/11/2019.



Environmental and Social Impact Assessment (ESIA) of the Proposed Bomet-Mulot Water Supply and Sanitation Project.

ESIA Public Consultation Questionnaire.

The Government of Kenya has received financing from the African Development Bank (AfDB) towards the cost of Kenya Towns Sustainable Water Supply and Sanitation Program (KTSWSSP).

Rift Valley Water Works Development Agency (RVWWDA) on behalf of Lake Victoria South Water Works Development Agency (LVSWWDA) intends to apply part of the funds under the Program to the design and construction of Bomet-Mulot Water Supply Project.

Atkins Consulting Engineers Ltd was commissioned by Rift Valley Water Works Development Agency (RVWWDA) to provide Engineering, and Environmental and Social Management Consultancy Services for the water supply project.

The project is targeted to supply water in parts of Bomet Central, Bomet East, Chepalungu and parts of Narok South sub-county. The project components include:

- Intake works on Nyangores River;
- 4.6Km long Raw water gravity main DN 450mm;
- Full conventional water treatment works, production capacity 18,000m³/day;
- Gravity and pumped transmission mains, total length 105 km and;
- 6 Nr storage tanks.



The Environmental Management and Coordination Act, Cap. 387 and AfDB's Environmental and Social Assessment Procedures provide that a project of the proposed nature shall undergo an Environmental and Social Impact Assessment (ESIA) before implementation. These regulations also provide for stakeholder engagement as part of the ESIA process to establish the views and concerns of the interested and/or affected stakeholders.

As an affected and/or interested stakeholder in the proposed project, you are requested to document your views, opinions and/or concerns regarding the proposed water project. Kindly answer the questions overleaf.

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	BENARD RONO
1.2	Date	13/11/2019
1.3	County	BOMET
1.4	Sub- County	BOMET EAST
1.5	Location name	KAPKIMOLWA
1.6	Village name	KIPTOBIT
1.7	Community/Clan	KIPSTIGIS

2. Respondents background information

2.1 Gender of the respondent

- ☒ a) male ☐ b) female

2.2 Age group

- a) 18 – 28years,
b) 29 – 38years,
c) 39 - 48 years,
☒ d) 49 – 58 years,
e) 59 – 68 years,
f) 69 – 78 years
g) Above 79years

2.3 Marital status

- a) Married, b) Single, ☒ c) Widow/Widower d) Divorced

2.4 Highest level of education achieved by the respondent

- a) Never attended school b) Primary school
☒ c) Secondary school d) College level, e) University level
f) Other, specify _____

2.5 Religious affiliation of the respondent

- ☒ a) Christian b) Muslim, c) Indigenous,
d) Other, Specify _____

2.6 Does any of your household members have disability?

- a) Yes ☒ b) No

2.6.1 If yes, what type of disability

- a) Physical b) Psychological c) Visual

- d) Other: specify _____

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

Illness	Yes	No
Diarrhoea		<input checked="" type="checkbox"/>
Cholera		<input checked="" type="checkbox"/>
malaria		<input checked="" type="checkbox"/>
Typhoid		<input checked="" type="checkbox"/>

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- ☒ a) Farming/Agriculture
b) Formal employment/ Salary
c) Self-employed /business
d) Livestock keeping/Pastoralism
e) Sand harvesting
f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	Ksh 1000 - 5000
Formal employment/Salary	
Self-employed/ Business	
Livestock keeping /Pastoralism	
Sand Harvesting.	
Other specify	

- a. Kshs 0-500 b. 501- 1000, ☒ c. 1001- 5000 d. 5001-10000 e. over 10,001

4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	<input checked="" type="checkbox"/>
b	Paraffin Lamp	
c	solar	
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood	<input checked="" type="checkbox"/>
b	Charcoal	
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- ☒ a) Public hospital / health Centre
b) Private hospital/Clinic
c) Chemist
d) Ordinary shop

- e) Traditional healer
f) Others (specify): _____

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
b) 1-5Km
c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- a) River / stream / spring
b) Rainwater harvesting
c) Piped tap in the homestead
d) Water kiosk
e) Dam / pond
f) Water vendors /Boozers
g) Other specify: _____

6.2 How far (in Kilometers) is the water source from your house?

- a) Less than 1km
b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

Not charged

6.4 How do you ensure that the water you access is safe for drinking?

- a) Nothing
b) Sieve
c) Add chlorine
d) Waite for the water to settle
e) Others indicate

7. Sanitation

7.1 Does your household own a toilet?

- a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
b) Pit latrine with slab (concrete, earth, wood)
c) Other specify: _____

7.3 Does your household have a Dish rack

- a) Yes
b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/path
g) Other specify: _____

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes	2. No
--------	-------

8.2 Are you aware that there are Sexually Transmitted Infections (STIs)?

1. Yes	2. No
--------	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
b) Abstinence
c) Stick to one faithful partner
d) Other specify: _____

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
b) No

Not aware

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a. To get water for farming
b. To get drinking water and water for domestic use
c. Fishing
d. Other
(Specify) _____

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a. Yes
b. No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

9.7 What are some of the birds along the riparian, and their significance to the community?

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

- ☒ a. yes
☐ b. no

8.2 Please explain your answer

There's shortage of water in the village.

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

- ☒ a. Yes
☐ b. No

If no, please indicate your reason below

12. What **positive** socio-economic and environmental impacts do you anticipate during the **construction stage** of project?

(i) Employment creation to the locals

13. What **positive** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

(i) Improve health service.
(ii) provision of water for irrigation.

14. What **negative** socio-economic and environmental impacts do you anticipate during the **construction stage** of the project?

(i) farm agricultural products might get affected

15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

(i) prepayment for water bills.

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

(i) public awareness

17. Do you have any other comments about the proposed project?

Gender issues


a) Resource access and control profile: (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Financial capital/credit	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Water		<input checked="" type="checkbox"/>		
Production tools (equipment for farming, cattle/poultry breeding)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Production inputs (for farming,	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

cattle/poultry breeding)	✓	✓	✓	
Labor	✓	✓	✓	✓
Market as a buyer				
Market as a seller				
Transport				
Education services				
Health services				
Training				

- b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work	✓	✓		
Self-employment	✓	✓		
Wage work/employment				
Access to urban and rural markets	✓			
B. Reproductive work				
Fetching water	✓		✓	
Fetching wood	✓		✓	
Preparing food	✓			
Child care	✓	✓		
Sanitation	✓	✓	✓	✓
Health care for the sick	✓	✓		
C. Socio-cultural activities				
Participation in village meetings	✓	✓		
Participation in religious meetings	✓			
School meetings	✓	✓		
Participation in funeral & other ceremonies	✓	✓		

Name of Respondent BENARD RONO	
Name of Organization or Village KIPTOBIT VILLAGE	
Phone number 0712 280557	
Signature or stamp 	Date: 13/11/2019

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	BENARD RONO
1.2	Date	13/11/2019
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- a) Never attended school b) Primary school
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f) Other, specify _____

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2.6 Does any of your household members have disability?

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2.6.1 If yes, what type of disability

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f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
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4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	<input checked="" type="checkbox"/>
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e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood	<input checked="" type="checkbox"/>
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b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
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- a) Nothing
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c) Add chlorine
d) Waite for the water to settle
e) Others indicate

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c) Other specify: _____

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--------	-------

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9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
b) No

Not aware

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- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

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b. To get drinking water and water for domestic use
c. Fishing
d. Other
(Specify) _____

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a. Yes
b. No

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10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

- ☒ a. yes
☐ b. no

8.2 Please explain your answer

There's shortage of water in the village.

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

- ☒ a. Yes
☐ b. No

If no, please indicate your reason below

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15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

(i) prepayment for water bills.

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

(i) public awareness

17. Do you have any other comments about the proposed project?

Gender issues


a) Resource access and control profile: (Tick where applicable)

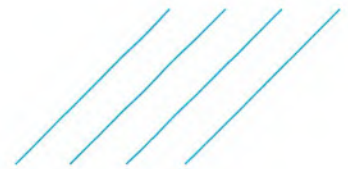
	Access		Control	
	Men	Women	Men	Women
Land	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Financial capital/credit	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Water		<input checked="" type="checkbox"/>		
Production tools (equipment for farming, cattle/poultry breeding)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Production inputs (for farming,	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

cattle/poultry breeding)	✓	✓	✓	
Labor	✓	✓	✓	✓
Market as a buyer				
Market as a seller				
Transport				
Education services				
Health services				
Training				

- b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work	✓	✓		
Self-employment	✓	✓		
Wage work/employment				
Access to urban and rural markets	✓			
B. Reproductive work				
Fetching water	✓		✓	
Fetching wood	✓		✓	
Preparing food	✓			
Child care	✓	✓		
Sanitation	✓	✓	✓	✓
Health care for the sick	✓	✓		
C. Socio-cultural activities				
Participation in village meetings	✓	✓		
Participation in religious meetings	✓			
School meetings	✓	✓		
Participation in funeral & other ceremonies	✓	✓		

Name of Respondent BENARD RONO	
Name of Organization or Village KIPTOBIT VILLAGE	
Phone number 0712 280557	
Signature or stamp 	Date: 13/11/2019



Environmental and Social Impact Assessment (ESIA) of the Proposed Bomet-Mulot Water Supply and Sanitation Project.

ESIA Public Consultation Questionnaire.

The Government of Kenya has received financing from the African Development Bank (AfDB) towards the cost of Kenya Towns Sustainable Water Supply and Sanitation Program (KTSWSSP).

Rift Valley Water Works Development Agency (RVWWDA) on behalf of Lake Victoria South Water Works Development Agency (LVSWWDA) intends to apply part of the funds under the Program to the design and construction of Bomet-Mulot Water Supply Project.

Atkins Consulting Engineers Ltd was commissioned by Rift Valley Water Works Development Agency (RVWWDA) to provide Engineering, and Environmental and Social Management Consultancy Services for the water supply project.

The project is targeted to supply water in parts of Bomet Central, Bomet East, Chepalungu and parts of Narok South sub-county. The project components include:

- Intake works on Nyangores River;
- 4.6Km long Raw water gravity main DN 450mm;
- Full conventional water treatment works, production capacity 18,000m³/day;
- Gravity and pumped transmission mains, total length 105 km and;
- 6 Nr storage tanks.



The Environmental Management and Coordination Act, Cap. 387 and AfDB's Environmental and Social Assessment Procedures provide that a project of the proposed nature shall undergo an Environmental and Social Impact Assessment (ESIA) before implementation. These regulations also provide for stakeholder engagement as part of the ESIA process to establish the views and concerns of the interested and/or affected stakeholders.

As an affected and/or interested stakeholder in the proposed project, you are requested to document your views, opinions and/or concerns regarding the proposed water project. Kindly answer the questions overleaf.

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	SANSON ROTICH
1.2	Date	14-11-2019
1.3	County	BOMET
1.4	Sub- County	BOMET EAST
1.5	Location name	KIPLABOTWA
1.6	Village name	KOITA
1.7	Community/Clan	KIPLABOTWO

2. Respondents background information

2.1 Gender of the respondent

☒ a) male ☐ b) female

2.2 Age group

- a) 18 – 28years,
☒ b) 29 – 38years,
 c) 39 - 48 years,
 d) 49 – 58 years,
 e) 59 – 68 years,
 f) 69 – 78 years
 g) Above 79years

2.3 Marital status

☒ a) Married, ☐ b) Single ☐ c) Widow/Widower ☐ d) Divorced

2.4 Highest level of education achieved by the respondent

- a) Never attended school ☐ b) Primary school
☐ c) Secondary school ☒ d) College level, ☐ e) University level
☐ f) Other, specify _____

2.5 Religious affiliation of the respondent

☒ a) Christian ☐ b) Muslim, ☐ c) Indigenous,
☐ d) Other, Specify _____

2.6 Does any of your household members have disability?

a) Yes ☒ b) No

2.6.1 If yes, what type of disability

a) Physical ☐ b) Psychological ☐ c) Visual
☐ d) Other: specify N/A

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

Illness	Yes	No
Diarrhoea		<input checked="" type="checkbox"/> NO
Cholera		<input checked="" type="checkbox"/> NO
malaria	<input checked="" type="checkbox"/>	
Typhoid		<input checked="" type="checkbox"/> NO

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- a) Farming/Agriculture
☒ b) Formal employment/ Salary
 c) Self-employed /business
 d) Livestock keeping/Pastoralism
 e) Sand harvesting
 f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	
Formal employment/Salary	
Self-employed/ Business	
Livestock keeping /Pastoralism	
Sand Harvesting.	
Other specify	

a. Kshs 0-500 b. 501- 1000, c. 1001- 5000 d. 5001-10000 ☒ e. over 10,001

4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	
b	Paraffin Lamp	
c	solar	<input checked="" type="checkbox"/>
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood	<input checked="" type="checkbox"/>
b	Charcoal	
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- ☒ a) Public hospital / health Centre
☐ b) Private hospital/Clinic
☐ c) Chemist
☐ d) Ordinary shop

- e) Traditional healer
f) Others (specify): -----

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
b) 1-5Km
c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- a) River / stream / spring
b) Rainwater harvesting
c) Piped tap in the homestead
d) Water kiosk
e) Dam / pond
f) Water vendors /Boozers
g) Other specify: -----

6.2 How far (in Kilometers) is the water source from your house?

- a) Less than 1km
b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- a) Nothing
b) Sieve
c) Add chlorine
d) Waite for the water to settle
e) Others indicate **BOILED WATER**

7. Sanitation

7.1 Does your household own a toilet?

- a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
b) Pit latrine with slab (concrete, earth, wood)
c) Other specify: -----

7.3 Does your household have a Dish rack

- a) Yes
b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/path
g) Other specify: -----

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes	2. No
--------	-------

8.2 Are you aware that there are Sexually Transmitted Infections (STIs)?

1. Yes	2. No
--------	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
b) Abstinence
c) Stick to one faithful partner
d) Other specify: -----

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
b) No

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a. To get water for farming
b. To get drinking water and water for domestic use
c. Fishing
d. Other **N/A**
(Specify) **N/A**

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a. Yes
b. No

9.3.1 If Yes, please list their names below.

----- **N/A** -----

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

N/A

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

N/A

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

N/A

9.7 What are some of the birds along the riparian, and their significance to the community?

N/A

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

N/A

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails

N/A

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

- a. yes
b. no

8.2 Please explain your answer

To reduce breakdown of water borne diseases such as Typhoid.

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

- a. Yes
b. No

If no, please indicate your reason below

The land is ancestral

12. What **positive** socio-economic and environmental impacts do you anticipate during the **construction stage** of project?

Job-creation.

13. What **positive** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

Tenders will be available to the community members

14. What **negative** socio-economic and environmental impacts do you anticipate during the **construction stage** of the project?

Workers engaging in drugs thus giving rise to bad behaviour such as abusive language

15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

Noise Pollution.

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

working ethics

17. Do you have any other comments about the proposed project?

It is a very exciting project since we have been promised for clean water for a very long period.

Gender issues


a) Resource access and control profile: (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land		✓	✓	
Financial capital/credit		✓	✓	
Water	✓	✓	✓	
Production tools (equipment for farming, cattle/poultry breeding)	✓	✓	✓	
Production inputs (for farming,	✓		✓	

cattle/poultry breeding)	✓		✓	
Labor	N/A			
Market as a buyer	N/A			
Market as a seller	N/A			
Transport	N/A			
Education services	✓		✓	
Health services	N/A			
Training	N/A			

- b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work	✓	✓		
Self-employment	✓			
Wage work/employment		✓		
Access to urban and rural markets	✓			
B. Reproductive work				
Fetching water	✓			
Fetching wood	✓			
Preparing food	✓			
Child care	✓			
Sanitation	✓			
Health care for the sick	✓	✓		
C. Socio-cultural activities				
Participation in village meetings	✓			
Participation in religious meetings	✓			
School meetings	✓			
Participation in funeral & other ceremonies	✓			

Name of Respondent SAMSON ROTICH	
Name of Organization or Village KORTA VILLAGE	
Phone number 0728287862	
Signature or stamp 	Date: 14-11-2019

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	REUBEN TOWETT
1.2	Date	13-11-2019
1.3	County	BOMET
1.4	Sub- County	BOMET EAST
1.5	Location name	KIPLABOTWA
1.6	Village name	SINDI WAT-MULOT
1.7	Community/Clan	MULOT COMMUNITY

2. Respondents background information

2.1 Gender of the respondent

☒ a) male ☐ b) female

2.2 Age group

- a) 18 – 28years,
 b) 29 – 38years,
 c) 39 - 48 years,
☒ d) 49 – 58 years,
 e) 59 – 68 years,
 f) 69 – 78 years
 g) Above 79years

2.3 Marital status

☒ a) Married, ☐ b) Single ☐ c) Widow/Widower ☐ d) Divorced

2.4 Highest level of education achieved by the respondent

- a) Never attended school ☐ b) Primary school
☐ c) Secondary school ☒ d) College level, ☐ e) University level
☐ f) Other, specify _____

2.5 Religious affiliation of the respondent

☒ a) Christian ☐ b) Muslim, ☐ c) Indigenous,
☐ d) Other, Specify _____

2.6 Does any of your household members have disability?

☐ a) Yes ☒ b) No

2.6.1 If yes, what type of disability

a) Physical ☐ b) Psychological ☐ c) Visual

d) Other: specify N/A

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

Illness	Yes	No
Diarrhoea		<input checked="" type="checkbox"/>
Cholera		<input checked="" type="checkbox"/>
malaria	<input checked="" type="checkbox"/>	
Typhoid		<input checked="" type="checkbox"/>

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- a) Farming/Agriculture
 b) Formal employment/ Salary
☒ c) Self-employed /business
 d) Livestock keeping/Pastoralism
 e) Sand harvesting
 f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	
Formal employment/Salary	
Self-employed/ Business	
Livestock keeping /Pastoralism	
Sand Harvesting.	
Other specify	

a. Kshs 0-500 b. 501- 1000, c. 1001- 5000 d. 5001-10000 ☒ e. over 10,001

4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	<input checked="" type="checkbox"/>
b	Paraffin Lamp	
c	solar	
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood	<input checked="" type="checkbox"/>
b	Charcoal	
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- ☒ a) Public hospital / health Centre
☒ b) Private hospital/Clinic
☐ c) Chemist
☐ d) Ordinary shop

- e) Traditional healer
f) Others (specify): _____

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
b) 1-5Km
c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- a. River / stream / spring
b. Rainwater harvesting
c. Piped tap in the homestead
d. Water kiosk
e. Dam / pond
f. Water vendors /Boozers
g. Other specify: _____

6.2 How far (in Kilometers) is the water source from your house?

- a) Less than 1km
b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- a) Nothing
b) Sieve
c) Add chlorine
d) Waite for the water to settle
e) Others indicate

7. Sanitation

7.1 Does your household own a toilet?

- a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
b) Pit latrine with slab (concrete, earth, wood)
c) Other specify: _____

7.3 Does your household have a Dish rack

- a) Yes
b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/path
g) Other specify: _____

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes	2. No
--------	-------

8.2 Are you aware that there are Sexually Transmitted Infections (STIs)?

1. Yes	2. No
--------	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
b) Abstinence
c) Stick to one faithful partner
d) Other specify: _____

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
b) No

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a. To get water for farming
b. To get drinking water and water for domestic use
c. Fishing
d. Other
(Specify) N/A

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a. Yes
b. No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

N/A

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

N/A

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

N/A

9.7 What are some of the birds along the riparian, and their significance to the community?

N/A

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

N/A

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails

N/A

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

a. yes
b. no

8.2 Please explain your answer

Easily access to clean drinking water thus reducing disease

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

a. Yes
b. No

If no, please indicate your reason below

N/A

12. What **positive** socio-economic and environmental impacts do you anticipate during the **construction stage** of project?

Employment to unemployed.

13. What **positive** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

Employment to youth.

14. What **negative** socio-economic and environmental impacts do you anticipate during the **construction stage** of the project?

Spread of disease.

15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

Drought seasons there would be shortage of water.

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

To ensure that each person get atleast little water on those seasons to avoid other lacking.

17. Do you have any other comments about the proposed project?

A dream of such a long period.

Gender issues


a) Resource access and control profile: (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land		✓	✓	
Financial capital/credit		✓	✓	
Water		✓		✓
Production tools (equipment for farming, cattle/poultry breeding)	✓		✓	
Production inputs (for farming,	✓		✓	

cattle/poultry breeding)	✓		✓	
Labor		✓	✓	
Market as a buyer	N/A		N/A	
Market as a seller	N/A		N/A	
Transport	N/A		N/A	
Education services	✓		✓	
Health services	✓		✓	
Training	✓		✓	

- b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work	✓			
Self-employment	✓	✓		
Wage work/employment	N/A			
Access to urban and rural markets	✓			
B. Reproductive work				
Fetching water	✓		✓	
Fetching wood	✓		✓	
Preparing food	✓		✓	
Child care	✓		✓	
Sanitation	✓			
Health care for the sick	✓			
C. Socio-cultural activities				
Participation in village meetings	✓	✓		
Participation in religious meetings	✓			
School meetings		✓		
Participation in funeral & other ceremonies		✓		

Name of Respondent TOWETT REUBEN	
Name of Organization or Village MULOT FOLGASPEL	
Phone number 0723723852	
Signature or stamp 	Date: 13-11-2019

Environmental and Social Impact Assessment (ESIA) of the Proposed Bomet-Mulot Water Supply and Sanitation Project.

ESIA Public Consultation Questionnaire.

The Government of Kenya has received financing from the African Development Bank (AfDB) towards the cost of Kenya Towns Sustainable Water Supply and Sanitation Program (KTSWSSP).

Rift Valley Water Works Development Agency (RVWWDA) on behalf of Lake Victoria South Water Works Development Agency (LVSWWDA) intends to apply part of the funds under the Program to the design and construction of Bomet-Mulot Water Supply Project.

Atkins Consulting Engineers Ltd was commissioned by Rift Valley Water Works Development Agency (RVWWDA) to provide Engineering, and Environmental and Social Management Consultancy Services for the water supply project.

The project is targeted to supply water in parts of Bomet Central, Bomet East, Chepalungu and parts of Narok South sub-county. The project components include:

- Intake works on Nyangores River;
- 4.6Km long Raw water gravity main DN 450mm;
- Full conventional water treatment works, production capacity 18,000m³/day;
- Gravity and pumped transmission mains, total length 105 km and;
- 6 Nr storage tanks.



The Environmental Management and Coordination Act, Cap. 387 and AfDB's Environmental and Social Assessment Procedures provide that a project of the proposed nature shall undergo an Environmental and Social Impact Assessment (ESIA) before implementation. These regulations also provide for stakeholder engagement as part of the ESIA process to establish the views and concerns of the interested and/or affected stakeholders.

As an affected and/or interested stakeholder in the proposed project, you are requested to document your views, opinions and/or concerns regarding the proposed water project. Kindly answer the questions overleaf.

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	Wasley Korir
1.2	Date	14/11/2019
1.3	County	Narok
1.4	Sub- County	Narok West
1.5	Location name	Letak Mulot
1.6	Village name	Loluk
1.7	Community/Clan	Kalenjin

2. Respondents background information

2.1 Gender of the respondent

- ☒ a) male b) female

2.2 Age group

- ☒ a) 18 – 28years,
 b) 29 – 38years,
 c) 39 - 48 years,
 d) 49 – 58 years,
 e) 59 – 68 years,
 f) 69 – 78 years
 g) Above 79years

2.3 Marital status

- ☒ a) Married, b) Single c) Widow/Widower d) Divorced

2.4 Highest level of education achieved by the respondent

- a) Never attended school b) Primary school
☒ c) Secondary school d) College level, e) University level
 f) Other, specify _____

2.5 Religious affiliation of the respondent

- ☒ a) Christian b) Muslim, c) Indigenous,
 d) Other, Specify _____

2.6 Does any of your household members have disability?

- a) Yes ☒ b) No

2.6.1 If yes, what type of disability

- a) Physical b) Psychological c) Visual

- d) Other: specify _____

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

Illness	Yes	No
Diarrhoea		<input checked="" type="checkbox"/>
Cholera		<input checked="" type="checkbox"/>
malaria		<input checked="" type="checkbox"/>
Typhoid		<input checked="" type="checkbox"/>

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- a) Farming/Agriculture
 b) Formal employment/ Salary
☒ c) Self-employed /business
 d) Livestock keeping/Pastoralism
 e) Sand harvesting
 f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	NA
Formal employment/Salary	NA
Self-employed/ Business	0
Livestock keeping /Pastoralism	NA
Sand Harvesting.	NA
Other specify	

- a. Kshs 0-500 b. 501- 1000, c. 1001- 5000 d. 5001-10000 e. over 10,001

4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	
b	Paraffin Lamp	
c	solar	<input checked="" type="checkbox"/>
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood	<input checked="" type="checkbox"/>
b	Charcoal	
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- a) Public hospital / health Centre
☒ b) Private hospital/Clinic
 c) Chemist
 d) Ordinary shop

- e) Traditional healer
f) Others (specify): _____

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
b) 1-5Km
c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- a) River / stream / spring
b) Rainwater harvesting
c) Piped tap in the homestead
d) Water kiosk
e) Dam / pond
f) Water vendors /Boozers
g) Other specify: _____

6.2 How far (in Kilometers) is the water source from your house?

- a) Less than 1km
b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- a) Nothing
b) Sieve
c) Add chlorine
d) Waite for the water to settle
e) Others indicate

7. Sanitation

7.1 Does your household own a toilet?

- a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
b) Pit latrine with slab (concrete, earth, wood)
c) Other specify: _____

7.3 Does your household have a Dish rack

- a) Yes
b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/path
g) Other specify: _____

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes	2. No
--------	-------

8.2 Are you aware that there are Sexually Transmitted Infections (STIs)?

1. Yes	2. No
--------	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
b) Abstinence
c) Stick to one faithful partner
d) Other specify: _____

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
b) No

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a. To get water for farming
b. To get drinking water and water for domestic use
c. Fishing
d. Other
(Specify) _____

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a. Yes
b. No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

9.7 What are some of the birds along the riparian, and their significance to the community?

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

- a. yes ☒
b. no ☒

8.2 Please explain your answer

The cost of operation might be high

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

- a. Yes ☒
b. No ☐

If no, please indicate your reason below

12. What **positive** socio-economic and environmental impacts do you anticipate during the **construction stage** of project?

Employment

13. What **positive** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

Reduction, Improvement of cost of living

14. What **negative** socio-economic and environmental impacts do you anticipate during the **construction stage** of the project?

Conflict, and harsh environment

15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

High cost

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

Working with everyone peaceful and being interactive

17. Do you have any other comments about the proposed project?

A better way to improve our health

Gender issues


a) Resource access and control profile: (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Financial capital/credit	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Water		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Production tools (equipment for farming, cattle/poultry breeding)		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Production inputs (for farming,		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

cattle/poultry breeding)	✓		✓	✓
Labor		✓		✓
Market as a buyer	✓	✓	✓	
Market as a seller		✓	✓	
Transport	✓	✓		✓
Education services	✓	✓	✓	
Health services	✓	✓	✓	✓
Training	✓	✓	✓	✓

- b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work	✓	✓	✓	
Self-employment		✓		
Wage work/employment				
Access to urban and rural markets	✓	✓		
B. Reproductive work				
Fetching water	✓		✓	
Fetching wood	✓		✓	
Preparing food	✓		✓	
Child care	✓		✓	
Sanitation	✓		✓	
Health care for the sick	✓	✓	✓	
C. Socio-cultural activities				
Participation in village meetings	✓	✓		
Participation in religious meetings	✓	✓		
School meetings	✓	✓		
Participation in funeral & other ceremonies	✓	✓		

Name of Respondent Warby Kosis	
Name of Organization or Village Laluk	
Phone number 0728 887 138	
Signature or stamp 	Date: 14/11/2019

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	Wilson Munari
1.2	Date	14/11/2019
1.3	County	Narok
1.4	Sub- County	Narok-West
1.5	Location name	Mulot
1.6	Village name	Laluk
1.7	Community/Clan	Kalenjin

2. Respondents background information

2.1 Gender of the respondent

- ☒ a) male ☐ b) female

2.2 Age group

- a) 18 – 28years,
☒ b) 29 – 38years,
 c) 39 - 48 years,
 d) 49 – 58 years,
 e) 59 – 68 years,
 f) 69 – 78 years
 g) Above 79years

2.3 Marital status

- ☒ a) Married, ☐ b) Single ☐ c) Widow/Widower ☐ d) Divorced

2.4 Highest level of education achieved by the respondent

- a) Never attended school ☐ b) Primary school
☒ c) Secondary school ☐ d) College level, ☐ e) University level
 f) Other, specify _____

2.5 Religious affiliation of the respondent

- ☒ a) Christian ☐ b) Muslim, ☐ c) Indigenous,
 d) Other, Specify _____

2.6 Does any of your household members have disability?

- a) Yes ☒ b) No

2.6.1 If yes, what type of disability

- a) Physical ☐ b) Psychological ☐ c) Visual
 d) Other: specify _____

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

Illness	Yes	No
Diarrhoea		<input checked="" type="checkbox"/>
Cholera		<input checked="" type="checkbox"/>
malaria		<input checked="" type="checkbox"/>
Typhoid		<input checked="" type="checkbox"/>

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- a) Farming/Agriculture
 b) Formal employment/ Salary
☒ c) Self-employed /business
 d) Livestock keeping/Pastoralism
 e) Sand harvesting
 f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	NA
Formal employment/Salary	NA
Self-employed/ Business	d
Livestock keeping /Pastoralism	NA
Sand Harvesting.	NA
Other specify	

- a. Kshs 0-500 b. 501- 1000, c. 1001- 5000 d. 5001-10000 e. over 10,001

4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	
b	Paraffin Lamp	
c	solar	<input checked="" type="checkbox"/>
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood	<input checked="" type="checkbox"/>
b	Charcoal	
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- ☒ a) Public hospital / health Centre
☐ b) Private hospital/Clinic
☐ c) Chemist
☐ d) Ordinary shop

- e) Traditional healer
- f) Others (specify): _____

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
- ☒ b) 1-5Km
- c) 6-10km
- d) 10-120km
- e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- ☒ a. River / stream / spring
- b. Rainwater harvesting
- c. Piped tap in the homestead
- d. Water kiosk
- e. Dam / pond
- f. Water vendors /Boozers
- g. Other specify: _____

6.2 How far (in Kilometers) is the water source from your house?

- ☒ a) Less than 1km
- ☒ b) 0-5 km
- ☒ c) 6- 10 km
- d) 11-20 km
- e) More than 20 km

6.3 How Much do you pay for water in a month?

- ☒ a) Kshs0- 50
- b) 51-100
- c) Kshs 001- 200
- d) Kshs 201- 500
- e) Kshs 501- 1000
- f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- a) Nothing
- b) Sieve
- c) Add chlorine
- ☒ d) Waite for the water to settle
- e) Others indicate

7. Sanitation

7.1 Does your household own a toilet?

- ☒ a) Yes
- b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
- ☒ b) Pit latrine with slab (concrete, earth, wood)
- c) Other specify: _____

7.3 Does your household have a Dish rack

- ☒ a) Yes
- b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- a) Composite Pit
- b) Bury or burn in the ground
- c) Collected by the municipal county
- d) Collected by private garbage disposers
- ☒ e) Throw behind house
- f) Dispose by the roadside/path
- g) Other specify: _____

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes	2. No <input checked="" type="checkbox"/>
--------	---

8.2 Are you aware that there are Sexually Transmitted Infections (STIs)?

1. Yes <input checked="" type="checkbox"/>	2. No
--	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
- b) Abstinence
- ☒ c) Stick to one faithful partner
- d) Other specify: _____

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
- b) No

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
- b) Through the baraza
- c) Through church
- d) Through Neighbors
- e) Others indicate

9.2 In what ways do you use Nyangores River?

- a. To get water for farming
- b. To get drinking water and water for domestic use
- c. Fishing
- d. Other

(Specify) _____

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a. Yes
- b. No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

9.7 What are some of the birds along the riparian, and their significance to the community?

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails.

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

a. yes

b. no

8.2 Please explain your answer

clean and affordable water

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

a. Yes

b. No

If no, please indicate your reason below

12. What **positive** socio-economic and environmental impacts do you anticipate during the **construction stage** of project?

Job creation and interaction
thus learning

13. What **positive** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

clean affordable water that
is nearer

14. What **negative** socio-economic and environmental impacts do you anticipate during the **construction stage** of the project?

Noise pollution

15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

mismanagement and corruption

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

Ensuring transparency and
Accountability in Management

17. Do you have any other comments about the proposed project?

It will help reduce the
various types of water-borne
disease.

Gender issues


a) Resource access and control profile: (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land	✓	✓	✓	
Financial capital/credit	✓	✓	✓	
Water		✓		✓
Production tools (equipment for farming, cattle/poultry breeding)		✓		✓
Production inputs (for farming,		✓	✓	

cattle/poultry breeding)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Labor		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Market as a buyer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Market as a seller	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Transport	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Education services	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Health services	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Training	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

- b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Self-employment		<input checked="" type="checkbox"/>		
Wage work/employment				
Access to urban and rural markets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
B. Reproductive work				
Fetching water	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Fetching wood	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Preparing food	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Child care	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Sanitation	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Health care for the sick	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Socio-cultural activities				
Participation in village meetings	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Participation in religious meetings	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
School meetings	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Participation in funeral & other ceremonies	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		

Name of Respondent <u>Wilson Murali</u>	
Name of Organization or Village <u>Laluk</u>	
Phone number <u>0713 170 026</u>	
Signature or stamp 	Date: <u>14/11/2019</u>



Environmental and Social Impact Assessment (ESIA) of the Proposed Bomet-Mulot Water Supply and Sanitation Project.

ESIA Public Consultation Questionnaire.

The Government of Kenya has received financing from the African Development Bank (AfDB) towards the cost of Kenya Towns Sustainable Water Supply and Sanitation Program (KTSWSSP).

Rift Valley Water Works Development Agency (RVWWDA) on behalf of Lake Victoria South Water Works Development Agency (LVSWWDA) intends to apply part of the funds under the Program to the design and construction of Bomet-Mulot Water Supply Project.

Atkins Consulting Engineers Ltd was commissioned by Rift Valley Water Works Development Agency (RVWWDA) to provide Engineering, and Environmental and Social Management Consultancy Services for the water supply project.

The project is targeted to supply water in parts of Bomet Central, Bomet East, Chepalungu and parts of Narok South sub-county. The project components include:

- Intake works on Nyangores River;
- 4.6Km long Raw water gravity main DN 450mm;
- Full conventional water treatment works, production capacity 18,000m³/day;
- Gravity and pumped transmission mains, total length 105 km and;
- 6 Nr storage tanks.



The Environmental Management and Coordination Act, Cap. 387 and AfDB's Environmental and Social Assessment Procedures provide that a project of the proposed nature shall undergo an Environmental and Social Impact Assessment (ESIA) before implementation. These regulations also provide for stakeholder engagement as part of the ESIA process to establish the views and concerns of the interested and/or affected stakeholders.

As an affected and/or interested stakeholder in the proposed project, you are requested to document your views, opinions and/or concerns regarding the proposed water project. Kindly answer the questions overleaf.

Consultation Questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	ROP CAROLINE
1.2	Date	14 th Nov 2019
1.3	County	Bomet
1.4	Sub- County	BOMET CGIRI
1.5	Location name	NDARANGA
1.6	Village name	NDONGOD
1.7	Community/Clan	KIRSIGU

2. Respondents background information

2.1 Gender of the respondent

☒ a) male ☐ b) female

2.2 Age group

- a) 18 – 28years,
b) 29 – 38years,
c) 39 - 48 years,
☒ d) 49 – 58 years,
e) 59 – 68 years,
f) 69 – 78 years
g) Above 79years

2.3 Marital status

☒ a) Married, ☐ b) Single ☐ c) Widow/Widower ☐ d) Divorced

2.4 Highest level of education achieved by the respondent

- a) Never attended school ☐ b) Primary school
☒ c) Secondary school ☐ d) College level, ☐ e) University level
f) Other, specify _____

2.5 Religious affiliation of the respondent

☒ a) Christian ☐ b) Muslim, ☐ c) Indigenous,
d) Other, Specify _____

2.6 Does any of your household members have disability?

a) Yes ☒ b) No

2.6.1 If yes, what type of disability

a) Physical ☐ b) Psychological ☐ c) Visual

d) Other: specify _____

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

Illness	Yes	No
Diarrhoea		<input checked="" type="checkbox"/>
Cholera		<input checked="" type="checkbox"/>
malaria		<input checked="" type="checkbox"/>
Typhoid		<input checked="" type="checkbox"/>

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- a) Farming/Agriculture
b) Formal employment/ Salary
☒ c) Self-employed /business
d) Livestock keeping/Pastoralism
e) Sand harvesting
f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	
Formal employment/Salary	
Self-employed/ Business	<input checked="" type="checkbox"/> d) 5001 - 10,000
Livestock keeping /Pastoralism	
Sand Harvesting.	
Other specify	

a. Kshs 0-500 b. 501- 1000, c. 1001- 5000 ☒ d. 5001-10000 e. over 10,001

4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	
b	Paraffin Lamp	
c	solar	<input checked="" type="checkbox"/>
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood	<input checked="" type="checkbox"/>
b	Charcoal	
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- a) Public hospital / health Centre
☒ b) Private hospital/Clinic
c) Chemist
d) Ordinary shop

- e) Traditional healer
f) Others (specify): -----

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
☒ b) 1-5Km
c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- ☒ a. River / stream / spring
b. Rainwater harvesting
c. Piped tap in the homestead
d. Water kiosk
e. Dam / pond
f. Water vendors /Boozers
g. Other specify: -----

6.2 How far (in Kilometers) is the water source from your house?

- ☒ a) Less than 1km
b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- ☒ a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- ☒ a) Nothing
b) Sieve
c) Add chlorine
d) Waite for the water to settle
e) Others indicate

7. **Sanitation** Are you willing to pay for water when get connected *B- 125*

7.1 Does your household own a toilet? *No*

- ☒ a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
☒ b) Pit latrine with slab (concrete, earth, wood)
c) Other specify: -----

7.3 Does your household have a Dish rack

- ☒ a) Yes
b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- ☒ a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/path
g) Other specify: -----

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes	2. <input checked="" type="checkbox"/> No
--------	---

8.2 Are you aware that there are Sexually Transmitted Infections (STIs)?

1. <input checked="" type="checkbox"/> Yes	2. No
--	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
☒ b) Abstinence
c) Stick to one faithful partner
d) Other specify: -----

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- ☒ a) Yes
b) No

9.1.1 If yes where did you get information about the Project?

- ☒ a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a. To get water for farming
☒ b. To get drinking water and water for domestic use
c. Fishing
d. Other
(Specify) -----

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a. Yes
☒ b. No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

Fishing
washing

- 9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

Some times more so during drought the level of water goes down and become dirty

- 9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

Yes for circum-
cision

- 9.7 What are some of the birds along the riparian, and their significance to the community?

Ducks

- 9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

Scorpion
crab

- 9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails

No

10. Perception of the proposed water supply and sanitation project.

- 10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

a. yes
b. no

- 8.2 Please explain your answer

we as the people of this community will get clean water

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

a. Yes
b. No

If no, please indicate your reason below

12. What **positive** socio-economic and environmental impacts do you anticipate during the **construction stage** of project?

The environment will be open up for other good things

13. What **positive** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

after project may rise up after construction

14. What **negative** socio-economic and environmental impacts do you anticipate during the **construction stage** of the project?

wastage of land (fence land)

15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

destruction of forest
environs

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

work well with
a lot of care & minimize the land use

17. Do you have any other comments about the proposed project?

we are eagerly waiting it was good if the National govt had given more in supplying of water since the county is slow

Gender issues


- a) Resource access and control profile: (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land	✓	✓	✓	
Financial capital/credit	✓	✓	✓	
Water	✓	✓		
Production tools (equipment for farming, cattle/poultry breeding)	✓		✓	
Production inputs (for farming,	✓		✓	

cattle/poultry breeding)	✓		✓	
Labor	✓	✓		
Market as a buyer	✓	✓		
Market as a seller	✓	✓	✓	
Transport	✓		✓	
Education services	✓		✓	
Health services	✓	✓	✓	
Training	✓	✓	✓	

b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work	✓	✓		
Self-employment	✓	✓		
Wage work/employment	✓	✓		
Access to urban and rural markets	✓	✓		
B. Reproductive work				
Fetching water	✓		✓	
Fetching wood	✓		✓	
Preparing food	✓		✓	
Child care	✓			
Sanitation	✓	✓		
Health care for the sick	✓	✓		
C. Socio-cultural activities				
Participation in village meetings	✓	✓		
Participation in religious meetings	✓	✓		
School meetings				
Participation in funeral & other ceremonies	✓	✓		

Name of Respondent LEONARD K. MUTAL	
Name of Organization or Village NYONGORE VILLAGE	
Phone number	
Signature or stamp 	Date: 14.11.19

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	CHEWLE BENTAB KIRKOGCH TENGU
1.2	Date	13/11/2019
1.3	County	BOMET
1.4	Sub- County	BOMET CENTRAL
1.5	Location name	NDARAWETA
1.6	Village name	C. HENDIEMO
1.7	Community/Clan	KIRSICIS / KIBAEK

2. Respondents background information

2.1 Gender of the respondent

- a) ☒ male b) ☐ female

2.2 Age group

- a) ☒ 18 – 28years,
b) 29 – 38years,
c) 39 - 48 years,
d) 49 – 58 years,
e) 59 – 68 years,
f) 69 – 78 years
g) Above 79years

2.3 Marital status

- a) Married, b) ☒ Single c) Widow/Widower d) Divorced

2.4 Highest level of education achieved by the respondent

- a) Never attended school b) Primary school
c) Secondary school d) ☒ College level, e) University level
f) Other, specify college

2.5 Religious affiliation of the respondent

- a) ☒ Christian b) Muslim, c) Indigenous,
d) Other, Specify _____

2.6 Does any of your household members have disability?

- a) Yes b) ☒ No

2.6.1 If yes, what type of disability

- a) Physical b) Psychological c) Visual

- d) Other: specify _____

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

Illness	Yes	No
Diarrhoea		<input checked="" type="checkbox"/>
Cholera		<input checked="" type="checkbox"/>
malaria		<input checked="" type="checkbox"/>
Typhoid		<input checked="" type="checkbox"/>
		<input checked="" type="checkbox"/>

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- a) ☒ Farming/Agriculture
b) Formal employment/ Salary
c) Self-employed /business
d) Livestock keeping/Pastoralism
e) Sand harvesting
f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	3000
Formal employment/Salary	0
Self-employed/ Business	1500
Livestock keeping /Pastoralism	0
Sand Harvesting.	0
Other specify	

- a. Kshs 0-500 b. 501- 1000, c. 1001- 5000 d. 5001-10000 e. over 10,001

4. Energy

4.1 indicate the most common source of energy for lighting

a	Electricity	
b	Paraffin Lamp	<input checked="" type="checkbox"/>
c	solar	<input checked="" type="checkbox"/>
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood	<input checked="" type="checkbox"/>
b	Charcoal	
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- a) ☒ Public hospital / health Centre
b) Private hospital/Clinic
c) Chemist
d) Ordinary shop

- e) Traditional healer
f) Others (specify): _____

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
b) 1-5Km
c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- a. River / stream / spring
b. Rainwater harvesting
c. Piped tap in the homestead
d. Water kiosk
e. Dam / pond
f. Water vendors /Boozers
g. Other specify: _____

6.2 How far (in Kilometers) is the water source from your house?

- a) Less than 1km
b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- a) Nothing
b) Sieve
c) Add chlorine
d) Waite for the water to settle
e) Others indicate

b) is connected with piped water will you pay the bill? (Yes) or (No)

7. Sanitation

7.1 Does your household own a toilet?

- a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
b) Pit latrine with slab (concrete, earth, wood)

c) Other specify: _____

7.3 Does your household have a Dish rack

- a) Yes
b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/path
g) Other specify: _____

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes ✓	2. No
----------	-------

8.2 Are you aware that there are Sexually Transmitted Infections (STIs)?

1. Yes /	2. No
----------	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
b) Abstinence
c) Stick to one faithful partner
d) Other specify: _____

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
b) No

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a. To get water for farming
b. To get drinking water and water for domestic use
c. Fishing
d. Other
(Specify) _____

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a. Yes
b. No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

1. Fish farming
2. Tea nurseries

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

solid waste

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

YES SWAMP - get reeds from it.

9.7 What are some of the birds along the riparian, and their significance to the community?

N/B

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

Fish
Source of protein
Source of food

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails

NO

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet - Mulot Water Supply and Sanitation Project a worthwhile investment in your community

- a. yes
- b. no

8.2 Please explain your answer

1. Residents will get water
2. Employment of youths
3. Improve transport network

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

- a. Yes
- b. No

If no, please indicate your reason below

12. What **positive** socio-economic and environmental impacts do you anticipate during the **construction stage** of project?

employment

13. What **positive** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

water supply
employment

14. What **negative** socio-economic and environmental impacts do you anticipate during the **construction stage** of the project?

1. Pollution - water, air and environment
2. Displacement

15. a. What **negative** socio-economic and environmental impacts do you anticipate during the **operation stage** of the project?

oil spillage - which affect oil and aquatic animals

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

proper Maintenance of pipe

17. Do you have any other comments about the proposed project?

I agree with the water project to be constructed.

Gender issues


a) Resource access and control profile: (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land				
Financial capital/credit	/		/	
Water		/		/
Production tools (equipment for farming, cattle/poultry breeding)				
Production inputs (for farming,	/	/	/	/

cattle/poultry breeding)		✓	✓	✓
Labor	✓		✓	✓
Market as a buyer		✓	✓	
Market as a seller	✓	✓	✓	✓
Transport	✓		✓	
Education services	✓		✓	
Health services	✓	✓	✓	✓
Training	✓		✓	

- b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work	✓	✓		
Self-employment				
Wage work/employment	✓	✓		
Access to urban and rural markets	✓	✓		
B. Reproductive work				
Fetching water	✓		✓	✓
Fetching wood	✓		✓	
Preparing food	✓			
Child care	✓	✓		
Sanitation	✓	✓	✓	✓
Health care for the sick	✓	✓		
C. Socio-cultural activities				
Participation in village meetings	✓	✓		
Participation in religious meetings	✓	✓	✓	✓
School meetings	✓	✓		
Participation in funeral & other ceremonies	✓	✓		

Name of Respondent ID. PROECH TONGU -----	
Name of Organization or Village CHONGUENGO -----	
Phone number 0708 382 834	
Signature or stamp 	Date: 13/11/2019

Environmental and Social Impact Assessment (ESIA) of the Proposed Bomet-Mulot Water Supply and Sanitation Project.

ESIA Public Consultation Questionnaire.

The Government of Kenya has received financing from the African Development Bank (AfDB) towards the cost of Kenya Towns Sustainable Water Supply and Sanitation Program (KTSWSSP).

Rift Valley Water Works Development Agency (RVWWDA) on behalf of Lake Victoria South Water Works Development Agency (LVSWWDA) intends to apply part of the funds under the Program to the design and construction of Bomet-Mulot Water Supply Project.

Atkins Consulting Engineers Ltd was commissioned by Rift Valley Water Works Development Agency (RVWWDA) to provide Engineering, and Environmental and Social Management Consultancy Services for the water supply project.

The project is targeted to supply water in parts of Bomet Central, Bomet East, Chepalungu and parts of Narok South sub-county. The project components include:

- Intake works on Nyangores River;
- 4.6Km long Raw water gravity main DN 450mm;
- Full conventional water treatment works, production capacity 18,000m³/day;
- Gravity and pumped transmission mains, total length 105 km and;
- 6 Nr storage tanks



The Environmental Management and Coordination Act, Cap. 387 and AfDB's Environmental and Social Assessment Procedures provide that a project of the proposed nature shall undergo an Environmental and Social Impact Assessment (ESIA) before implementation. These regulations also provide for stakeholder engagement as part of the ESIA process to establish the views and concerns of the interested and/or affected stakeholders.

As an affected and/or interested stakeholder in the proposed project, you are requested to document your views, opinions and/or concerns regarding the proposed water project. Kindly answer the questions overleaf

Consultation questionnaire

Bomet - Mulot Water Supply Project

1. Introduction

1.1	Name of the interviewer	ROTH DOMALIC
1.2	Date	14 th , 11, 2019
1.3	County	BOMET
1.4	Sub- County	CHEPALUNGU
1.5	Location name	SIGOR
1.6	Village name	MUKUN
1.7	Community/Clan	KIRIGIS

2. Respondents background information

2.1 Gender of the respondent

☒ a) male ☐ b) female

2.2 Age group

- a) 18 – 28years,
b) 29 – 38years,
c) 39 - 48 years. ☒
d) 49 – 58 years,
e) 59 – 68 years,
f) 69 – 78 years
g) Above 79years

2.3 Marital status

☒ a) Married, ☐ b) Single ☐ c) Widow/Widower ☐ d) Divorced

2.4 Highest level of education achieved by the respondent

a) Never attended school ☐ b) Primary school ☐
☒ c) Secondary school ☐ d) College level, ☐ e) University level
f) Other, specify _____

2.5 Religious affiliation of the respondent

☒ a) Christian ☐ b) Muslim, ☐ c) Indigenous,
d) Other, Specify _____

2.6 Does any of your household members have disability?

a) Yes ☐ b) No ☒

2.6.1 If yes, what type of disability

a) Physical ☐ b) Psychological ☐ c) Visual ☐
d) Other: specify _____

2.7 Have any of your household members suffered from the following illnesses in the past 6 months

NO

Illness	Yes	No <input checked="" type="checkbox"/>
Diarrhoea		
Cholera		
malaria		
Typhoid		

3. Sources of livelihood

3.1 What is the **MAIN** source of Income for the Household?

- ☒ a) Farming/Agriculture
☐ b) Formal employment/ Salary
☐ c) Self-employed /business
☐ d) Livestock keeping/Pastoralism
☐ e) Sand harvesting
☐ f) Other Specify:

3.2 What is the average source of income per month from the following?

Source of Income	Kshs. Per month
Farming / Agriculture	5000
Formal employment/Salary	
Self-employed/ Business	
Livestock keeping /Pastoralism	
Sand Harvesting.	
Other specify	

a. Kshs 0-500 b. 501- 1000, ☒ c. 1001- 5000 d. 5001-10000 e. over 10,001

4. Energy

4.1 Indicate the most common source of energy for lighting

a	Electricity	
b	Paraffin Lamp	
c	solar <input checked="" type="checkbox"/>	
d	Candle	
e	Others indicate	

4.2 Indicate your source of cooking energy.

a	Firewood <input checked="" type="checkbox"/>	
b	Charcoal	
c	Electricity	
d	LPG Gas	
e	Cow dung	
f	Others indicate	

5. Access to health services

5.1 Where do you seek medical treatment when you or a member of your household is sick?

- ☒ a) Public hospital / health Centre
☐ b) Private hospital/Clinic
☐ c) Chemist
☐ d) Ordinary shop

- e) Traditional healer
f) Others (specify): _____

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
b) 1-5Km
c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- a) River / stream / spring
b) Rainwater harvesting
c) Piped tap in the homestead
d) Water kiosk
e) Dam / pond
f) Water vendors /Boozers
g) Other specify: _____

6.2 How far (in Kilometers) is the water source from your house?

- a) Less than 1km
b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- a) Nothing
b) Sieve
c) Add chlorine
d) Waite for the water to settle
e) Others indicate

6.5 Are you willing to pay for the water if

7. Sanitation Connected. *Connected. b) (17)*

7.1 Does your household own a toilet?

- a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)
b) Pit latrine with slab (concrete, earth, wood)
c) Other specify: _____

7.3 Does your household have a Dish rack

- a) Yes
b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/patn
g) Other specify: _____

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes	2. No
--------	-------

8.2 Are you aware that there are Sexually Transmitted infections (STIs)?

1. Yes	2. No
--------	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
b) Abstinence
c) Stick to one faithful partner
d) Other specify: _____

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
b) No

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a) To get water for farming
b) To get drinking water and water for domestic use
c) Fishing
d) Other
(Specify) _____

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a) Yes
b) No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

✓ Farming, People go collect water for irrigation at their farm
✓ Fishing on some small fish

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, saltiness etc.)

Shall know it since land

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances

I haven't seen

9.7 What are some of the birds along the riparian, and their significance to the community?

Hawk hawk, feed on smaller snakes which may be poisonous to humans.

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

Crocodile helps scare other aquatic organisms and other smaller animals away from water.

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, tsetse flies or snails

Diarrhea was felt sometimes.

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet – Mulot Water Supply and Sanitation Project a worthwhile investment in your community

- a. yes
b. no

8.2 Please explain your answer

It will help us to get domestic water. School children will have easy time accessing water, hence health education.

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

- a. Yes
b. No

If no, please indicate your reason below

12. What positive socio-economic and environmental impacts do you anticipate during the construction stage of project?

One or two can be employed to do some work, compensation of cost destruction on pipe two roads.

13. What positive socio-economic and environmental impacts do you anticipate during the operation stage of the project?

Employment of our frustrated youth can be found, distribution of water can give you time to do other things like farming & animal keeping.

14. What negative socio-economic and environmental impacts do you anticipate during the construction stage of the project?

Can relocate our crops, Damage pipes can spread our farm.

15. a. What negative socio-economic and environmental impacts do you anticipate during the operation stage of the project?

— Destruction of fence on route by M.P.
— Destruction of loan fall in pipes line
— Crop displacement on route.

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

— Use thin & strong pipes especially iron

17. Do you have any other comments about the proposed project?

The project is a welcome idea & should be started as soon as today.

Gender issues


a) Resource access and control profile (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land	✓			
Financial capital/credit	✓			
Water	✓			
Production tools (equipment for farming, cattle/poultry breeding)	✓			
Production inputs (for farming)	✓			

cattle/poultry breeding)		✓		
Labor				
Market as a buyer	✓			
Market as a seller	✓			
Transport		✓		
Education services		✓		
Health services		✓		
Training		✓		

b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work		✓		
In agriculture productive work	✓			
Self-employment		✓		
Wage work/employment		✓		
Access to urban and rural markets		✓		
B. Reproductive work				
Fetching water	✓			
Fetching wood	✓			
Preparing food	✓			
Child care	✓			
Sanitation	✓			
Health care for the sick	✓			
C. Socio-cultural activities				
Participation in village meetings		✓		
Participation in religious meetings	✓			
School meetings		✓		
Participation in funeral & other ceremonies		✓		

Name of Respondent <i>Bernard Koech</i>	
Name of Organization or Village <i>Chellegelt</i>	
Phone number <i>0712170050</i>	
Signature or stamp 	Date: <i>14/01/2019</i>

- e) Traditional healer
f) Others (specify): -----

5.2 How far is the Health Facility/Health Centre/Dispensary in Kilometers from your household?

- a) Less than 1km
b) 1-5Km
c) 6-10km
d) 10-120km
e) Over 20 km

6. Water

6.1 What are the main sources of water in your household?

- a) River / stream / spring
b) Rainwater harvesting
c) Piped tap in the homestead
d) Water kiosk
e) Dam / pond
f) Water vendors /Boozers
g) Other specify: -----

6.2 How far (in Kilometers) is the water source from your house?

- a) Less than 1km
b) 0-5 km
c) 6- 10 km
d) 11-20 km
e) More than 20 km

6.3 How Much do you pay for water in a month?

- a) Kshs0- 50
b) 51-100
c) Kshs 001- 200
d) Kshs 201- 500
e) Kshs 501- 1000
f) Above Ksh 1000

6.4 How do you ensure that the water you access is safe for drinking?

- a) Nothing
b) Sieve
c) Add chlorine
d) Wait for the water to settle
e) Others indicate

Q:5 Are you willing to pay for the water if

7. Sanitation Connected to the world

7.1 Does your household own a toilet?

- a) Yes
b) No

7.2 If Yes, what type of toilet is it?

- a) Water Closet (Flush toilet)

b) Pit latrine with slab (concrete, earth, wood)

c) Other specify: -----

7.3 Does your household have a Dish rack

- a) Yes
b) No

Are you willing to pay if connected for water? (a) Yes (b) No

7.4 How do you dispose-off your household waste or garbage, which cannot be recycled or re-used?

- a) Composite Pit
b) Bury or burn in the ground
c) Collected by the municipal county
d) Collected by private garbage disposers
e) Throw behind house
f) Dispose by the roadside/path e.g. dirt water
g) Other specify: left over of vegetables are fed to cows.

8. HIV/AIDS Knowledge and prevention

8.1 Have you ever taken a HIV test?

1. Yes	2. No
--------	-------

8.2 Are you aware that there are Sexually Transmitted infections (STIs)?

1. Yes	2. No
--------	-------

8.3 What methods would you say are mostly used to protect oneself from getting STIs in your area?

- a) Condom use
b) Abstinence
c) Stick to one faithful partner
d) Other specify: -----

9. Community use of Nyangores river

9.1 Are you aware of the Bomet Mulot water supply Project?

- a) Yes
b) No

9.1.1 If yes where did you get information about the Project?

- a) Through the chief
b) Through the baraza
c) Through church
d) Through Neighbors
e) Others indicate

9.2 In what ways do you use Nyangores River?

- a) To get water for farming
b) To get drinking water and water for domestic use
c) Fishing
d) Other (Specify) -----

9.3 Do you know of any other projects that have intakes or project activities on Nyangores River?

- a) Yes
b) No

9.3.1 If Yes, please list their names below.

9.4 What are some of the other activities that take place along the Nyangores River riparian zones?

- Getting water for farming.
- Getting some income from by washing cars, motorcycles etc.

9.5 What are some of the challenges faced while using water from Nyangores river (odour, solid wastes/trash, sickness etc.)

Sattinos - Drinking water contains a lot of rats particles that may cause health problems.

9.6 Is there any area or feature of cultural significance within/along the river? Name their significances.

During a transition period there are things where there.

9.7 What are some of the birds along the riparian, and their significance to the community?

Eagles and chepkunguana dirt water by throwing some water to water here endangering people's health.

9.8 What are some of the reptiles and amphibians in the river, and their significance to the community?

They are for food. Some time hippopotamus are present hence endangering the community.

9.9 Have there been any health issues due to the river? i.e. associated with mosquitoes, ice/ice flies or snails

Yes. Sometimes Malaria when there are many mosquitoes.

10. Perception of the proposed water supply and sanitation project.

10.1 Do you consider the Proposed Bomet - Mulot Water Supply and Sanitation Project a worthwhile investment in your community

- a. yes
b. no

8.2 Please explain your answer

- To be nearness to a clean water source no more going to fetch water in the river

11. If the proposed project pipeline location route fell on your land or property would you be willing to give up your land to the project?

- a. Yes
b. No

If no, please indicate your reason below

12. What positive socio-economic and environmental impacts do you anticipate during the construction stage of project?

Employment to people in the community

13. What positive socio-economic and environmental impacts do you anticipate during the operation stage of the project?

Employment and interaction with different people hence bringing unity.

14. What negative socio-economic and environmental impacts do you anticipate during the construction stage of the project?

- Some people could accept the passage of pipelines to pass to their land.

15. a. What negative socio-economic and environmental impacts do you anticipate during the operation stage of the project?

- Oil spillage may affect neighbouring farms produce
- Property destructions like farm structures and fences

16. How do you think the Proponent can avoid or minimize the negative impacts you have highlighted above?

- To apply alternative options that may not destroy farm structures
- To compensate the local communities in case destruction of his/her property occurs.

17. Do you have any other comments about the proposed project?

No just waiting for the project to plan.

Gender issues

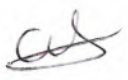
a) Resource access and control profile: (Tick where applicable)

	Access		Control	
	Men	Women	Men	Women
Land				
Financial Capital/Credit	✓	✓	✓	✓
Water				
Production tools (equipment for farming, cattle/poultry breeding)	✓	✓	✓	✓
Production inputs (for farming)	✓	✓	✓	✓

cattle/poultry breeding)	✓	✓	✓	✓
Labor				
Market as a buyer	✓	✓	✓	✓
Market as a seller	✓	✓	✓	✓
Transport				
Education services	✓	✓	✓	✓
Health services	✓	✓	✓	✓
Training	✓	✓	✓	✓

b) Gender Activity and income profile. Who does the following: (Tick where applicable)?

Activity	Adult Female	Adult Male	Female Child	Male Child
A. Productive Work				
In agriculture productive work				
Self-employment	✓	✓		
Wage work/employment	✓			
Access to urban and rural markets	✓	✓	✓	✓
B. Reproductive work				
Fetching water	✓		✓	✓
Fetching wood	✓		✓	✓
Preparing food	✓			
Child care	✓			
Sanitation	✓	✓		
Health care for the sick	✓	✓		
C. Socio-cultural activities				
Participation in village meetings		✓		
Participation in religious meetings	✓	✓		
School meetings	✓	✓		
Participation in funeral & other ceremonies	✓	✓		

Name of Respondent VIOLET ANNA	
Name of Organization or Village MWANA VILLAGE	
Phone number	
Signature or stamp 	Date: 14/11/2019

Appendix D. Hydrological study report

2019

**HYDROLOGICAL ASSESSMENT FOR BOMET MULOT WATER SUPPLY PROJECT
– AMALA-NYANGORES RIVER**

Prepared

By



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For

CRVWWDA/LVSWWDA

28/03/2019

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1.0 INTRODUCTION

1.1 General

The two rivers Amala and Nyangores are tributaries of Mara River. They are targeted to supply water for the Bomet-Mulot area of Narok County.

The locations and coordinates of the proposed intakes (Table 1 and Figure 1) are as follows:

Table 1 Location of the two proposed intakes

River on which intake is located	Latitude of intake	Longitude of intake	Catchment Area (km ²)
Nyangores	-0.700561°	35.443459°	355.49
Amala	-0.775294°	35.561397°	483.70

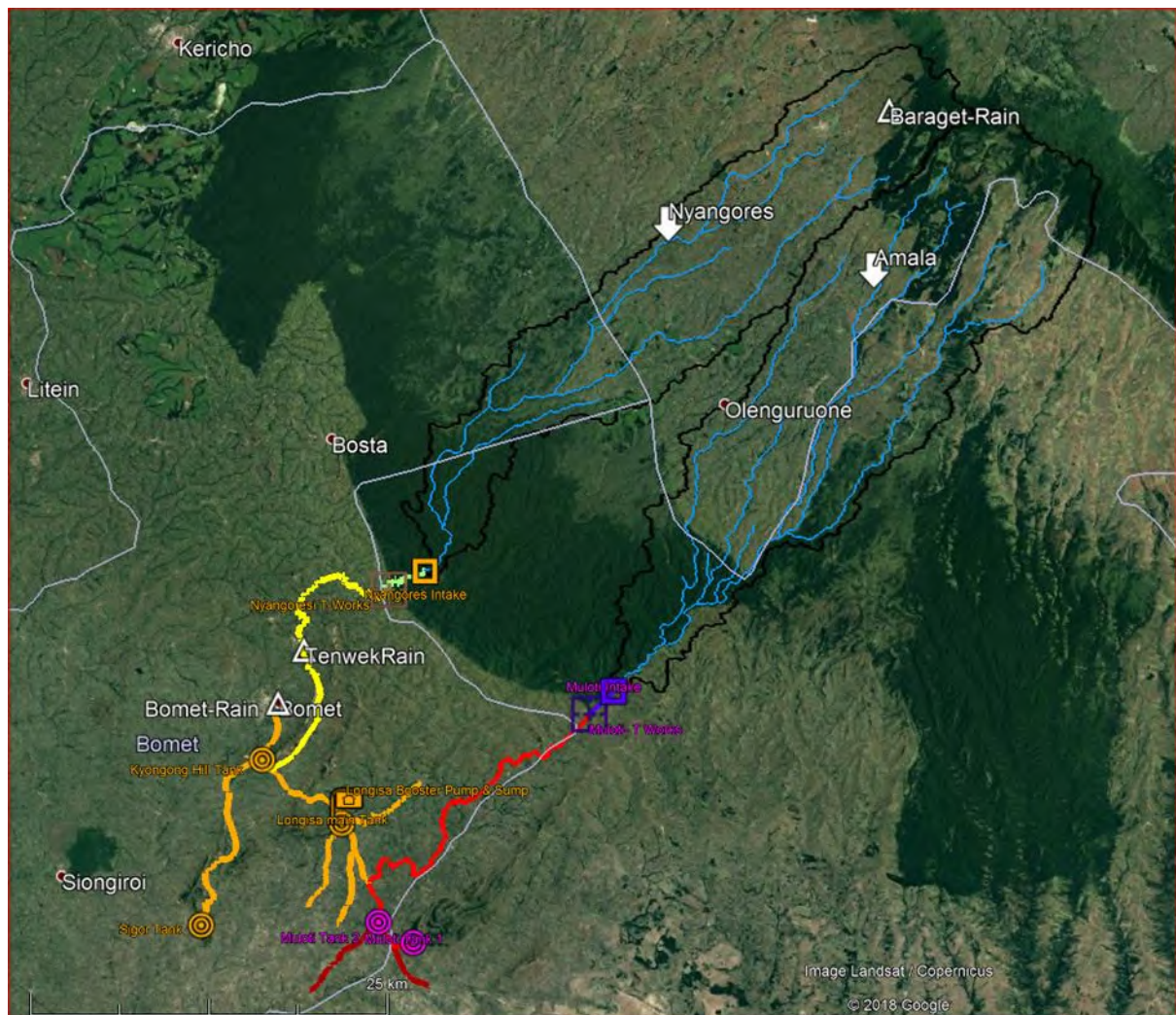


Figure 1 Location of the two intakes and catchments on Nyangores and Amala rivers

1.2 Objectives

The scope of services is as follows:

The Sub-consultant shall carry out hydrological studies and prepare report which will recommend the maximum quantity of water that can be abstracted from the identified intake works locations on rivers Nyangores and Amala taking cognisance of required environmental flow for each river as well as approved abstraction by licenced downstream users.

2.0 DESCRIPTION OF CATCHMENT UPSTREAM OF THE PROPOSED INTAKES

1.3 Climate

Climate of the two sub-catchments is humid.

Estimated mean annual rainfall is for Kuresoi South, which covers upper half of the sub-catchments is 1320 mm/year (see Figure 2). Rainfall is bimodal with two peaks in April and August. We therefore expect the flows will exhibit a similar pattern with peaks lagging a few weeks after rainfall peaks.

Evaporation is estimated at 940 mm/year.

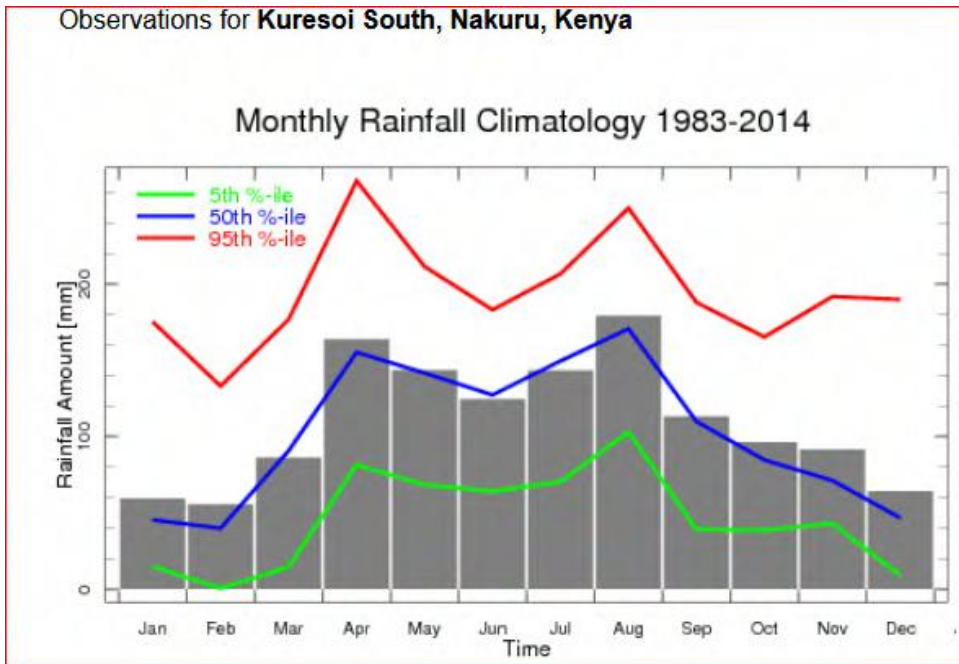


Figure 2 Mean monthly rainfall and temperature of the catchments of Nyangores and Amala rivers (source: <http://kmddl.meteo.go.ke:8081/maproom/Climatology/>)

1.4 Physical Description of Catchment

The land cover map and the topographical maps are shown in Figure 3 and Figure 4. The two sub-catchments are very similar in terms of area, land cover and topography and are expected to have similar hydrological behaviour.

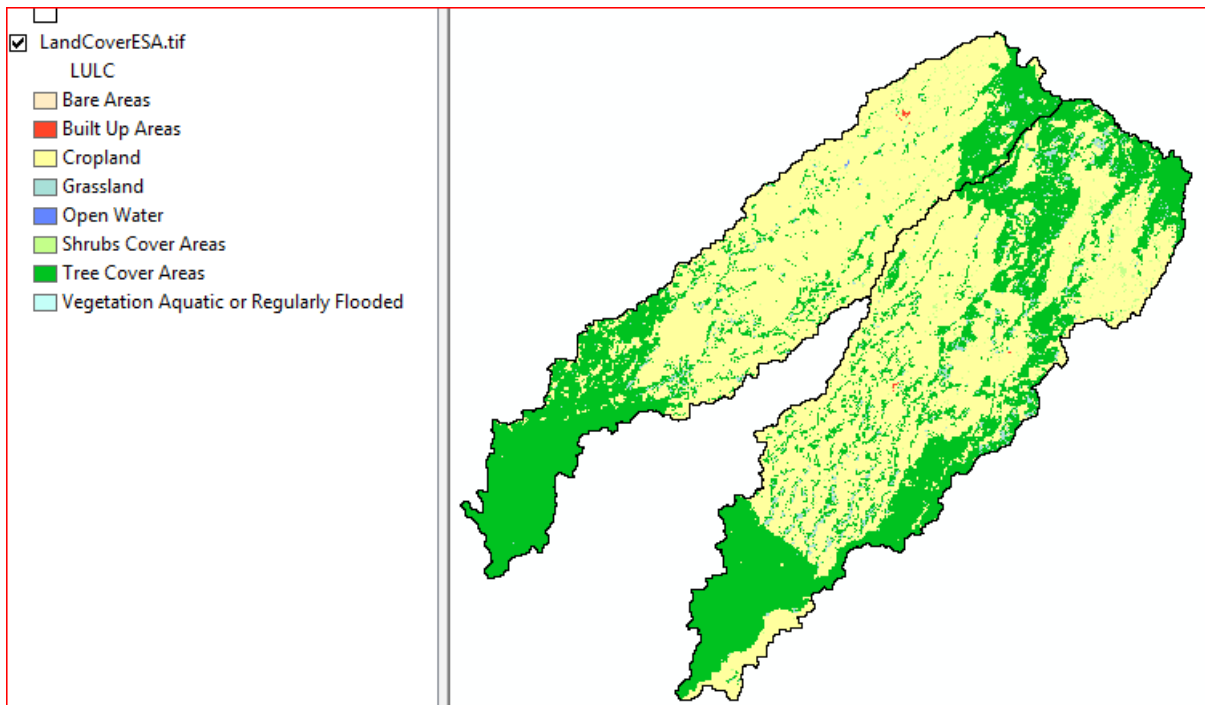


Figure 3 Land cover map of the area upstream of the proposed intakes based on the 2016 ESA land cover product

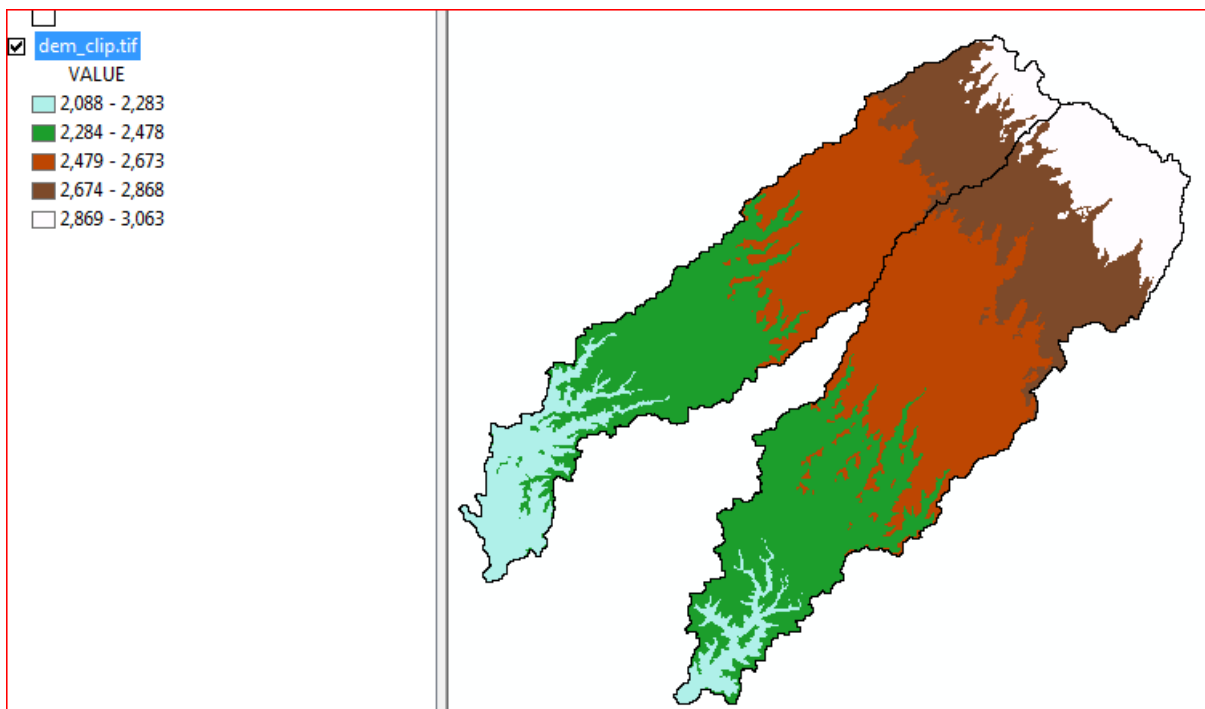


Figure 4 Elevation map of the area upstream of the proposed intakes

3.0 HYDROLOGICAL ANALYSIS OF EXISTING DATA

1.5 Analysis of stream flow data

Streamflow data was obtained for the two river gauging stations 1LA03 on River Nyangores and 1LB02 on River Amala (Figure 5). Daily flow data from 1955-2017 for River Amala and 1963-2018 for River Nyangores was analyzed. The areas upstream of the RGS and the intakes is given in Figure 6. The catchment area upstream of 1LA03 and 1LB02 is 694 km² and 696 km² respectively. The catchment areas upstream of the intakes on Nyangores and Amala is 356 km² and 484 km² respectively. The mean flow at Amala RGS 1LB02 is 6.539 m³/s and at Nyangores RGS 1LA03 is 9.444 m³/s. The specific discharges are 0.0094 m³/s/km² at Amala and 0.0136 m³/s/km² at Nyangores. Given the similarities of the two gauges in terms of topography, rainfall, land cover and soils, it is not clear why the differences in specific discharge and runoff coefficient arise (Table 2).

Table 2 Flow characteristics at the river gauging stations on Amala and Nyangores

River	Area (km ²)	Qmean (m ³ /s)	Specific discharge (m ³ /s/km ²)	Runoff coefficient (assume mean annual rainfall 1320 mm)
Amala	696	6.486	0.0093	0.30
Nyangores	694	9.866	0.0142	0.42

The data used for River Nyangores was from 1963-2018 and had 15% missing values. The quality was very good as can be seen in Figure 6. The Flow Duration Curve is shown in Figure 8. The period of data used for River Amala was from 1955-2017. The missing data was 32%.

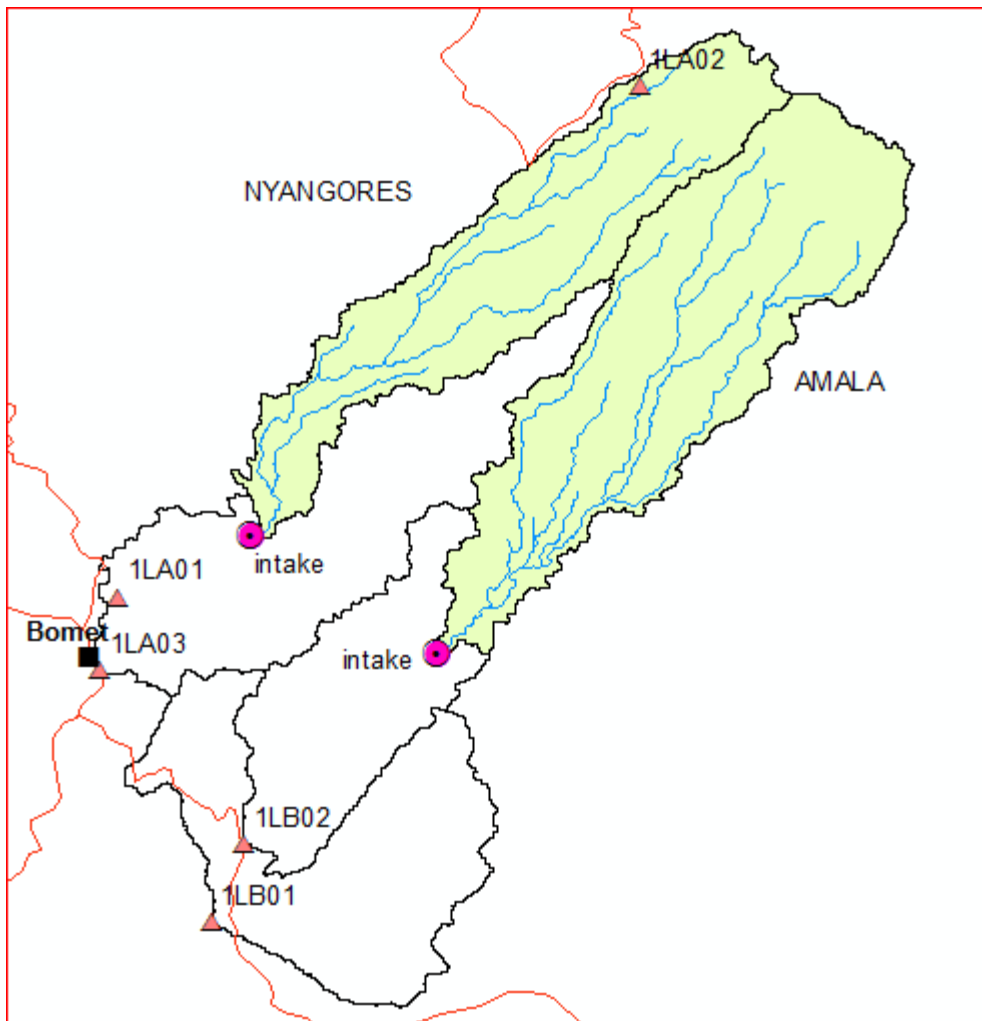


Figure 5 The river gauging stations and intakes on rivers Nyangores and Amala

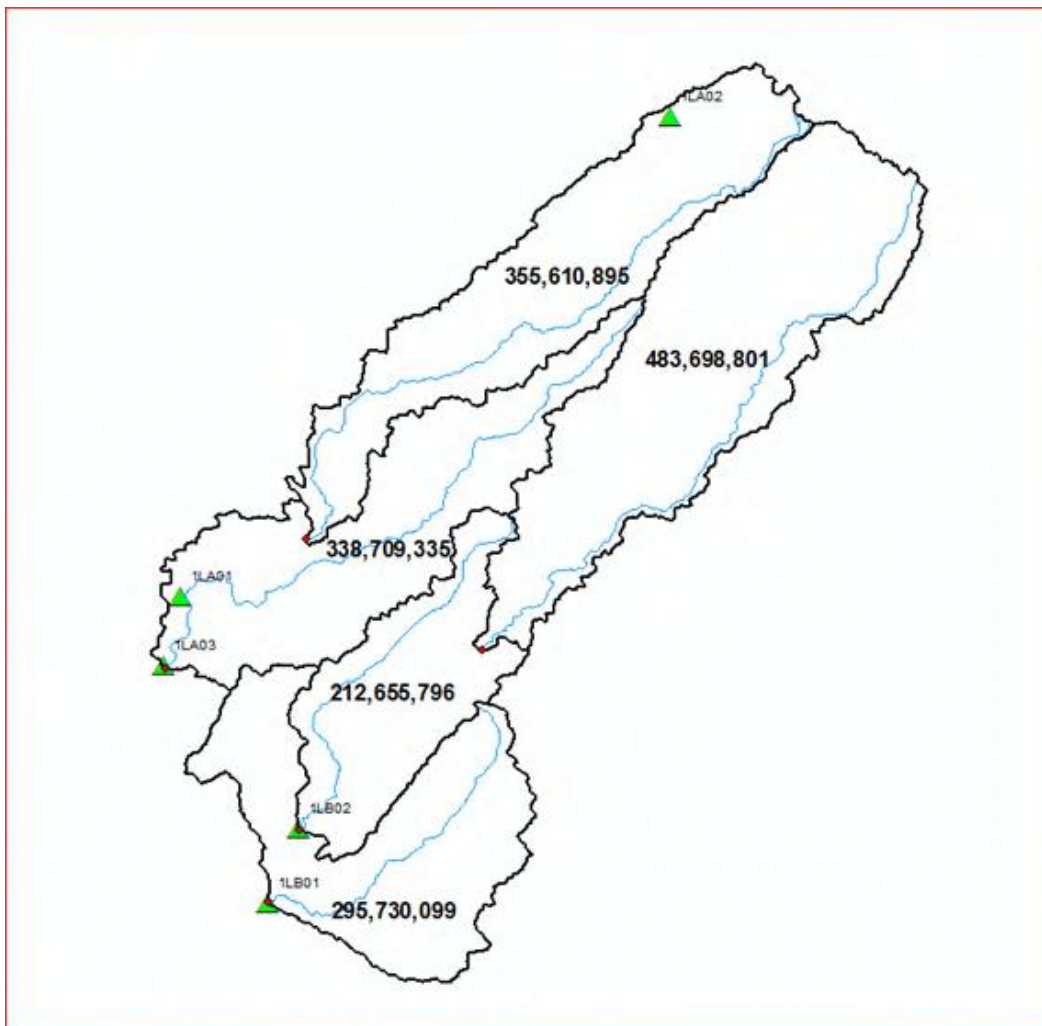


Figure 6 The location of the river gauging stations and proposed intakes and catchment areas upstream



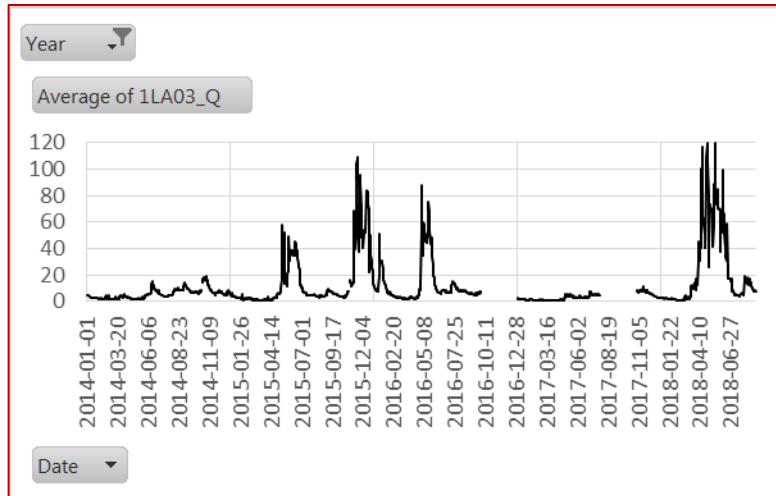


Figure 7 Observed streamflow at RGS 1LA03 on River Nyangores from 1964-2018

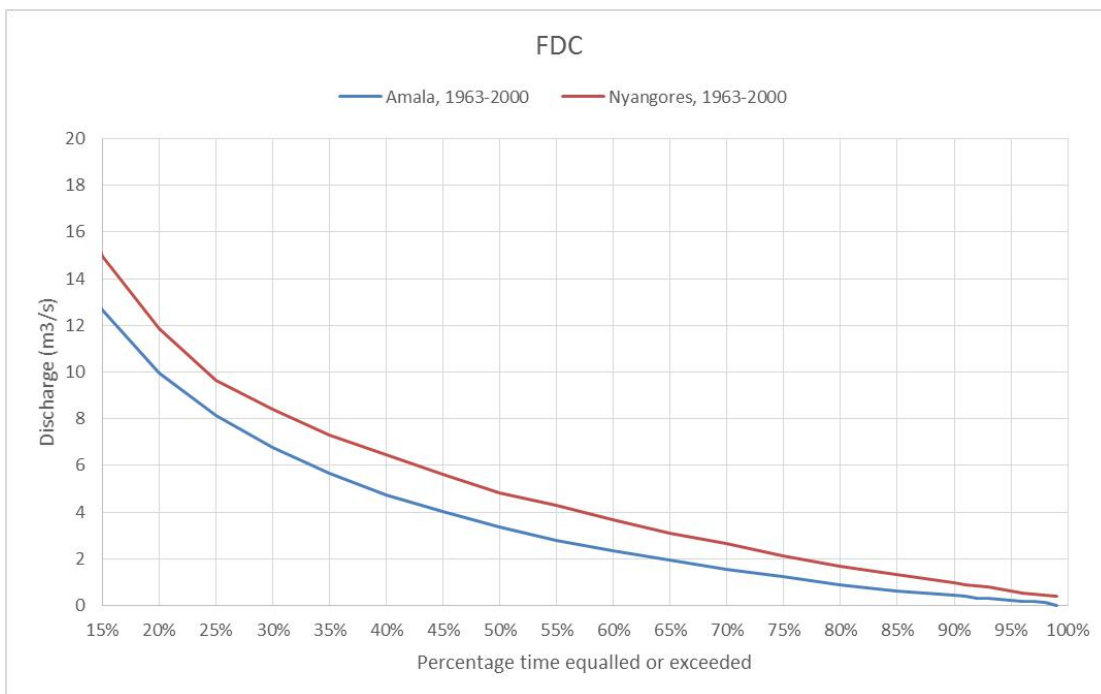


Figure 8 Flow Duration Curve at RGS 1LA03 on River Nyangores and 1LB02 at River Amala

1.6 Permit Data and Allocable Water for River Nyangores and Amala

The WRA permit database highlights the legal abstractions documenting the allocated volumes permitted for domestic, irrigation and commercial demands. The permit database shows that about a third of the abstractions are from Amala tributary with the rest coming from Nyangores tributary. The abstraction works in the catchment include dams, canals, pump and pipeline and weirs. It is worth noting that all the abstraction permits as per the database have expired, but we however suspect abstractions are still on-going.

The allocations for Mara river in the permit database total to 1,680,769 m³ per day, when accounting for return flows the actual abstractions total to 23,597 m³ per day. The domestic water demand allocated from normal flows is a total of 307 m³ per day while public water supplies are allocated 491,890 m³ per day but 490,900 m³ per day is returned leaving 990 m³ per day as actual abstraction. Hydropower is a non-consumptive use and negates to zero while irrigation water demand from flood flows remains at 22,300 m³ per day. The abstraction categories for the two tributaries (1LA and 1LB) are shown in Table 3 and Table 4.

Table 3 All abstractions in 1LA and 1LB

	Normal flows, m ³ /day	Flood flows, m ³ /day	Return flows, m ³ /day	Actual Abstraction
Domestic water supply	307			307
Public water supply	491,890		490,900	990
Hydropower (all in 1LA)		1,163,289	1,163,289	
Irrigation		22,300	-	22,300
	492,197 (1,297)	1,185,589 (22,300)	1,654,189	23,597

Note: numbers in brackets depict the total actual permitted abstractions by flow category. Disaggregating the abstraction by river tributary shows that catchment 1LA has most of the abstractions from normal flows for domestic water supply, all hydropower abstractions are in this catchment as well. Abstractions for irrigation purposes from, flood flows, are common in catchment 1LB.

Table 4 Actual Abstractions by River

	RGS 1LA, Nyangores		RGS 1LB, Amala	
	Normal flows, m ³ /day	Flood flows, m ³ /day	Normal flows, m ³ /day	Flood flows, m ³ /day
Domestic water supply	307			
Public water supply	990			
Irrigation		27		22,273
	1,297	27		22,273

Since abstraction survey reports were not available, it was not possible to determine the actual abstractions on the ground. There may be illegal abstractions taking place.

1.7 Analysis of Available Normal Flow and Safe Water Yield at the intakes

Yield is used to characterize the capacity of a water resource to serve as a long-term water supply. It is a fundamental water-supply planning concept, and an understanding of its attributes is critical for water supply planning. Safe yield or firm yield in the context of surface water is defined as the maximum quantity of water which can be guaranteed during a critical dry period.

According to the Design Manual for Water Supply in Kenya (Min of Water and Irrigation, 2005), the safe yield for principal towns and urban centres with a population over 10,000 is determined using the 96% - probability daily low flow of a river. The flow frequency analysis is made by using the lowest recorded daily flow of each calendar year for which records are available for the dry season.

The safe yield for rural areas including urban centres with a population under 10,000 and rural, market and local centres is determined using the 96% probability monthly low flow of a river. The flow-frequency analysis is made by using the recorded lowest average flow during one calendar month for each year for which records are available for the dry season.

The ninety-five percentile low flow Q95 is commonly used to describe low flows. It is the flow exceeded 95% of the time. The mean annual n-day minima, derived from daily flow time series by selecting the n-day lowest flow each year can be subjected to frequency analysis. The durations (n) commonly used are 1, 7, 10, 30 and 90 days. In temperate climates, the mean annual 7-day minima is numerically similar to Q95 for most flow records (WMO, 2008). In Kenya, FDC are often used for estimating the water available at low flows.

In the analysis of low flows at 1LA03, the Flow Duration Curve of 55 years of daily data from 1963 to 2018 was used. The percentage of missing data was 15%. The frequency analysis of low flows using minimum daily flows at RGS 1LA03 for daily discharge data from 1963 to 2000 was done. A Log-Pearson Type III distribution was found to be most appropriate (Figure 8).

Based on the areas in Figure 6, the area upstream of the Nyangores Intake is 51% of the area upstream of RGS 1LA03. The area upstream of the Amala Intake is 70% of the area upstream of RGS 1LA03. Since the hydrological characteristics of these areas are very similar, we can use these ratios to calculate the flow parameters at the two intakes based on the flow at the intakes.

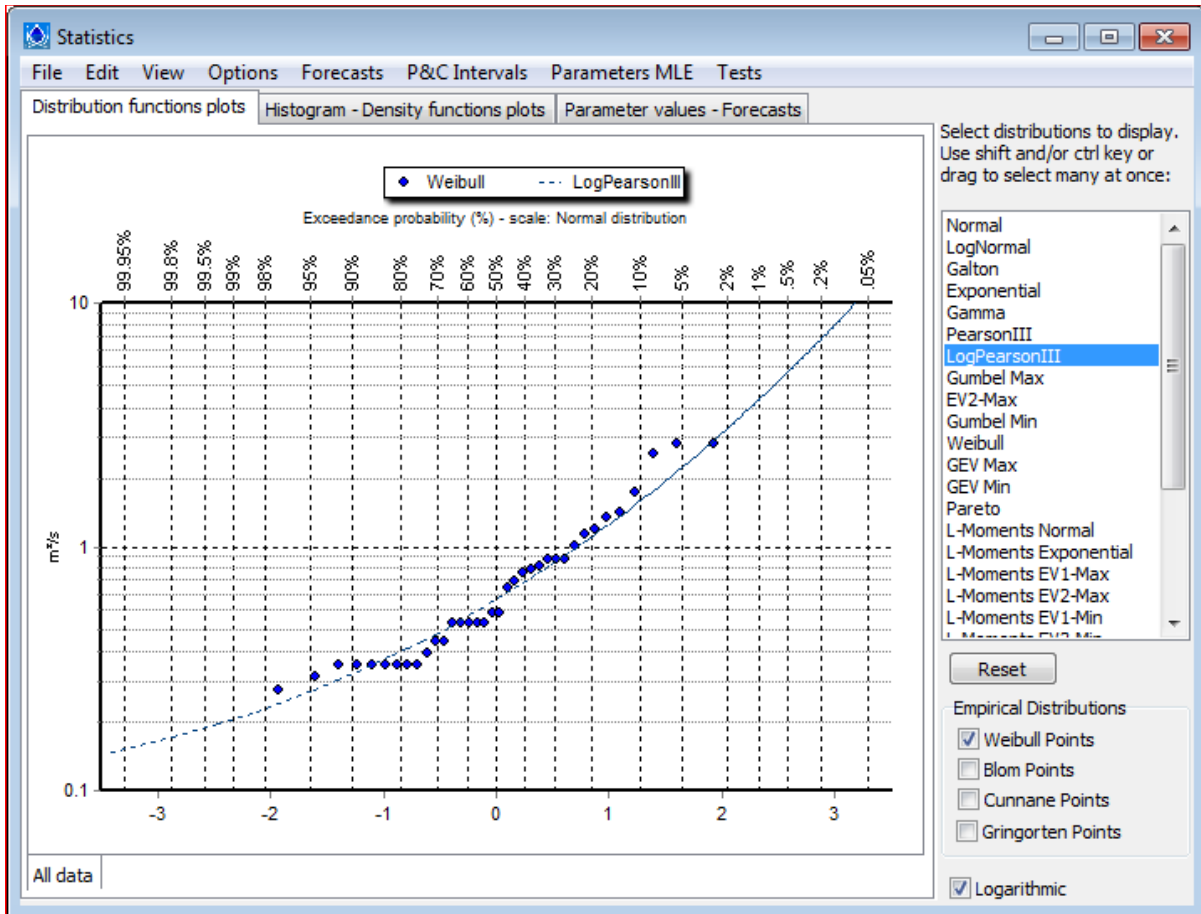


Figure 9 Low flow frequency analysis at RGS 1LA03 on River Nyangores to determine safe yield

Table 5 Available normal and flood flows at the two intakes on Nyangores and Amala

Using the daily discharge data from 1963-2000 at 1LA03 (Nyangores) and 1LB02 (Amala), the values of Q95, Q80 and Q50 were calculated. From the water permit data, it is not possible to know the actual abstractions upstream of the river gauging stations of these two rivers because the data on the locations of the abstraction site is not adequate. It is also not clear which abstractions were active over the period of the flow data because the timing of the start and end and variations over the time is not accurate. However the magnitude of the permitted normal and flood flow abstractions (without accounting for abstractions like hydropower which return water back to river) are much smaller compared to what is available based on analysis of river flow with the data as given. The total permitted normal flow abstraction is 1,297 m³/day and this value is much smaller compared to values of available normal and total permitted flood flow abstraction is 22,273 m³/s. With the proposed abstraction of 12,400 m³/day from each of the intakes, the demand will not be met in the two months of February and March at Amala intake and March at Nyangores

intake if the abstractions are run-of-the river (i.e. without storage). Considering the values of the safe yield in Table 8, it is noted that for the proposed abstraction of 12,400 m³/day, there will be challenges attaining the safe yield at the two intakes since the estimated safe yield is about 10,000 m³/day.

Table 6 Values of Q95, Q80, Q50 and available normal and flood flow at the proposed Amala intake site

AMALA AT PROPOSED INTAKE					
Month	Q95	Q80	Q50	Q80-Q95 Normal flow	Q50-Q80 Flood flow
Jan	5,200	19,952	51,868	14,751	31,917
Feb	7,057	15,352	45,036	8,295	29,684
Mar	6,000	12,891	54,059	6,891	41,169
Apr	8,615	45,117	154,544	36,503	109,427
May	41,112	167,771	382,649	126,658	214,878
Jun	36,340	117,107	269,794	80,767	152,687
Jul	29,017	115,141	320,914	86,123	205,773
Aug	82,880	260,255	467,644	177,374	207,389
Sep	107,184	256,591	485,651	149,407	229,060
Oct	39,239	96,704	243,410	57,465	146,706
Nov	42,831	75,403	142,026	32,572	66,623
Dec	22,780	45,144	96,704	22,364	51,560

Table 7 Values of Q95, Q80, Q50 and available normal and flood flow at the proposed Nyangores intake site

NYANGORES AT PROPOSED INTAKE					
Month	Q95	Q80	Q50	Q80-Q95 Normal flow	Q50-Q80 Flood flow
Jan	35,158	53,101	91,032	17,943	37,931
Feb	20,242	37,265	76,600	17,023	39,335
Mar	17,028	27,301	73,807	10,272	46,507
Apr	27,301	65,753	188,830	38,452	123,077
May	63,205	220,112	447,671	156,907	227,559
Jun	119,454	196,038	367,297	76,584	171,259
Jul	150,766	204,978	297,993	54,212	93,015
Aug	150,766	230,234	377,655	79,469	147,420
Sep	173,264	247,574	414,827	74,310	167,253
Oct	91,032	147,162	274,676	56,131	127,513
Nov	71,095	122,776	213,245	51,680	90,469
Dec	50,724	85,134	161,850	34,410	76,716

Table 8 Values of Safe Yield (1-day Q96%) at the proposed Nyangores intake sites

Intake site	Safe Yield (m ³ /s)	Remark
Nyangores	10,752	Calculated from 1-day lowest flow each year
Amala	10,000	Estimated from Nyangores value

4.0 OPTIONS TO SUPPLY WATER FOR PROPOSED PROJECT

Three options to supply water needed for this project were considered:

- OPTION 1: Abstract 18,000 m³/day from River Amala only,
- OPTION 2: abstract 12,400 m³/day from each of the proposed intake sites (Amala and Nyangores),
- OPTION 3: Abstract 18,000 m³/day from River Nyangores only.

For the three options, the scenarios will be as follows:

OPTION 1: 18000 m ³ /day from Amala intake				
Month	Available normal flow (m ³ /day Q80-Q95)	Proposed abstraction (m ³ /day)	Prior permitted normal flow abstractions (m ³ /day)	Balance in Amala river (m ³ /day)
Jan	14,751	18,000	0	-3,249
Feb	8,295	18,000	0	-9,705
Mar	6,891	18,000	0	-11,109
Apr	36,503	18,000	0	18,503
May	126,658	18,000	0	108,658
Jun	80,767	18,000	0	62,767
Jul	86,123	18,000	0	68,123
Aug	177,374	18,000	0	159,374
Sep	149,407	18,000	0	131,407
Oct	57,465	18,000	0	39,465
Nov	32,572	18,000	0	14,572
Dec	22,364	18,000	0	4,364

OPTION 2: 12,400 m ³ /day from each of Amala and Nyangores intakes						
Month	Available normal flow Amala (m ³ /day Q80-Q95)	Proposed + Prior abstraction from Amala (m ³ /day)	Balance in Amala river (m ³ /day)	Available normal flow Nyangores (m ³ /day Q80-Q95)	Proposed + Prior abstraction from Nyangores (m ³ /day)	Balance in Nyangores river (m ³ /day)
Jan	14,751	12,400	2,351	17,943	13,697	4,246
Feb	8,295	12,400	-4,105	17,023	13,697	3,326
Mar	6,891	12,400	-5,509	10,272	13,697	-3,425
Apr	36,503	12,400	24,103	38,452	13,697	24,755
May	126,658	12,400	114,258	156,907	13,697	143,210
Jun	80,767	12,400	68,367	76,584	13,697	62,887
Jul	86,123	12,400	73,723	54,212	13,697	40,515
Aug	177,374	12,400	164,974	79,469	13,697	65,772
Sep	149,407	12,400	137,007	74,310	13,697	60,613
Oct	57,465	12,400	45,065	56,131	13,697	42,434
Nov	32,572	12,400	20,172	51,680	13,697	37,983
Dec	22,364	12,400	9,964	34,410	13,697	20,713

OPTION 3: 18,000 m ³ /day from Nyangores intake				
Month	Available normal flow (m ³ /day Q80-Q95)	Proposed abstraction (m ³ /day)	Prior permitted normal flow abstractions (m ³ /day)	Balance in Nyangores river (m ³ /day)
Jan	17,943	18,000	1,297	-1,354
Feb	17,023	18,000	1,297	-2,274
Mar	10,272	18,000	1,297	-9,025
Apr	38,452	18,000	1,297	19,155
May	156,907	18,000	1,297	137,610
Jun	76,584	18,000	1,297	57,287
Jul	54,212	18,000	1,297	34,915
Aug	79,469	18,000	1,297	60,172
Sep	74,310	18,000	1,297	55,013
Oct	56,131	18,000	1,297	36,834
Nov	51,680	18,000	1,297	32,383
Dec	34,410	18,000	1,297	15,113

5.0 CONCLUSIONS

A larger part of the demand will be met in all three options. There are deficits over the months of January, February and March. However there is sufficient flood flow in the wet months and this would meet the shortfall if it is stored.

6.0 REFERENCES


1. Ministry of Water and Irrigation, MOWI (2005) Design Manual for Water Supply in Kenya. Nairobi, Kenya
2. World Meteorological Organization, WMO (2008) Manual on Low-Flow Estimation. WMO, Geneva.
3. Kenya Soil Survey (1982) Exploratory Soil Survey Report number E1. Nairobi, Kenya.
4. Water Resources Management Authority, WRMA (2016) Thika River Abstraction Survey Report.

7.0 APPENDICES

Appendix 1 Summarized water permit data

PERMIT NO.	NAME	COUNTY	RIVER	DA	CLASS	ISSUE	EXPIRY	DOM NORMAL FLOW	PUBLIC NORMAL FLOW	IRRIG FLOOD FLOW
4244	Keringet Estate (Molo)	Nakuru	Amala	1LB	Private	13-Jul-77	31-Dec-83			
4245	Keringet Estate (Molo)	Nakuru	Amala	1LB	Private	17-Jul-57	31-Dec-83			
29581	Ndakini Farm Limited	Narok	Amala	1LB	Private	18-Aug-04	18-Sep-04			22,273
28984	Mogombet Water Project	Bomet	Nyangores	1LA	Private					
26196	Joseph C.A.Tonui & partners	Bomet	Nyangores	1LA	Private					
22899	Samuel Cheruiyot Kerich	Bomet	Nyangores	1LA	Private	08-Oct-85	05-Mar-90	1		27
24878	Kaptilolwo Women Group	Bomet	Nyangores	1LA	Private	05-Oct-92	05-Oct-94	152		
14463	(Chepalungu Water Scheme)	Bomet	Nyangores	1LA	Public	13-Dec-78	17-May-97		990	
4736	Tenwek Hospital	Bomet	Nyangoris	1LA	Private	03-Aug-90	07-Apr-12	118		
16587	Kenya Highland Bible College	Bomet	Nyangoris	1LA	Private	15-Jul-80	24-Sep-00	36		

Appendix 2 Hydrologist licence


REPUBLIC OF KENYA
(THE WATER ACT)

Form WRP 002
Reg/Licence No. **WD/WRP/145**

Prof. J. M. Gathenya,
P.O. Box 261-01001, Kalimoni

LICENCE
QUALIFIED WATER CONSULTANT

Dear sir, Rule 134

I have the honour to inform you that the Ministry of Water and Irrigation has given you a licence to operate as a Qualified Water Professional in the following category:

DETAILS OF QUALIFIED WATER PROFESSIONAL:

Name (Surname first): **GATHENYA JOHN MWANGI**

Town: **Kalimoni**

Post Office box : **261-01001**

Pin Number: **A001240065D**

Telephone Contact (Landline): *********

Telephone Contact (Mobile): **0723667602**

Email: Contact **mgathenya@yahoo.com**

Fax: **XX**

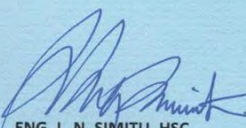
DETAILS OF LICENCE:

Panel IV – HYDROLOGIST (See back page of licence).

CONDITIONS OF LICENCE:

1. This licence is issued subject to payment of fees for renewal/annual gazettelement;
2. The licence can be upgraded on application with proof of experience.

Yours Faithfully,

Signature: 

Name: **ENG. L. N. SIMITU, HSC**

Position: **DIRECTOR WATER SERVICES**
CHAIRMAN, MINISTERIAL TECHNICAL ADVISORY COMMITTEE

Date: **14th June, 2011**

*This licence is issued without any erasures whatsoever. [Please see guidelines at the back of licence].

Appendix E. Stakeholder Engagement Plan



ATKINS

Member of the SNC-Lavalin Group

Bomet - Mulot Water Supply Project

Stakeholder Engagement Plan

Rift Valley Water Works Development Agency

27 April 2020

5161008

Notice

This document and its contents have been prepared and are intended solely as information for Rift Valley Water Works Development Agency and use in relation to stakeholder engagement for the Bomet - Mulot Water Supply Project

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This document has 23 pages including the cover.

Document history

Document title: Stakeholder Engagement Plan

Document reference: 5161008

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Rev 1.0	For Client review	BWG	SW	LO	OBO	27/04/2019

Client signoff

Client	Rift Valley Water Works Development Agency
Project	Bomet - Mulot Water Supply Project
Job number	5161008
Client signature/date	

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List of abbreviations

RVWWDA	Rift valley Water Works Development Agency
LVSWWDA	Lake Victoria South Water Works Development Agency
BOMWASCO	Bomet Water and Sanitation Company
KTWSSP	Kenya Towns Sustainable Water Supply and Sanitation Programme
AfDB	Africa Development Bank
OS1	Operation Safeguard 1
RoW	Right of Way
CBO	Community Based organisation
Aoi	Area of interest
PAP	Project affected persons
RAP	Resettlement action plan
CLO	Community Liaison Officer
ESIA	Environmental and Social Impact Assessment
FPIC	Free Prior Informed Consultation
GMC	Grievance Management Committee
GO	Grievance Officer
ICP	Informed Consultation and Participation
MCA	Member of County Assembly
MP	Member of Parliament
NEMA	National Environment Management Authority
NET	National Environment Tribunal
NLC	National Land Commission
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment

1. Introduction

Access to safe and clean water in Bomet County is still low, and access to piped water is currently at 25%. Majority of the population draws water from rivers, water pans and springs. Rain water harvesting is also practiced by the households that have corrugated iron roofs. The existing water supply infrastructure is inadequate to meet the existing demand and is also expensive to maintain mainly due to high energy costs in pumping.

Rift Valley Water Works Development Agency (RVWWDA) on behalf of Lake Victoria South Water Works Development Agency (LVSWWDA) intends to implement the Bomet-Mulot water supply project to improve access to clean water in Bomet, Silibwet, Longisa and Mulot towns and their environs.

The Project entails abstraction of water from Nyangores River to serve the entire project area and is comprised of a run-of-river intake on Nyangores river; a 5km raw water gravity main; a full 18,000m³/day conventional water treatment works; 117km of treated water transmission pipelines; two pumping stations; and storage tanks. The scheme would provide mainly gravity water supply with pumping in two areas to overcome topographical challenges.

1.1. Need for stakeholder engagement

Stakeholder engagement and public consultation are an integral aspect of successful decision making in the ESIA process and implementation of projects, plans and programmes. It is central to all other aspects of environmental and social performance. It is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts.

Poor stakeholder relations present risks to the successful implementation of projects, while constructive engagements offer benefits of improved risk management and better outcomes on the ground.

The process of engagement presupposes that the relevant stakeholders and interested public have access to timely and accurate information on the environment and the proposed development and are therefore able to offer informed views on the proposals.

Public consultation also forms a useful component for gathering, understanding and establishing likely impacts of projects, determining community and individual preferences and selecting alternatives.

The stakeholder engagement strategy should be scaled relative to the risks and impacts a project is likely to create. For the proposed Bomet Mulot water supply Project, stakeholder engagement mainly focused on project information disclosure, communication on project construction and operation impacts and mitigation measures, and collection of stakeholder's comments and recommendations.

1.2. Objectives of this SEP

The overall objective of this SEP is to explain how the Project Proponents will engage with stakeholders throughout the development and operation phases of the proposed water project. Specifically, the SEP aims to:

- Understand the stakeholders to work with and rely on in the different phases of the project;
- Establish a better way to work together and maintain a healthy relationship;
- Provide guidance to the project stakeholders;
- Build relationships. Relationships lead to trust and where there is trust stakeholders work together easily, effectively, increases confidence, minimizes uncertainty and accelerates problem solving and decision making;
- Establish an acceptable baseline among stakeholders with different priorities and expectations;
- Understand the stakeholder/community's understanding and measure of success in the context of the project;
- Establish and clarify the stakeholders' roles, responsibilities and influences in the proposed water supply project; and
- Identify and agree on the channels or media of engagement.

Ultimately, the SEP will present how the stakeholder engagement activities are to be implemented, as well as an updated set of activities for future engagement during construction and operation phases

2. Policy, legal and regulatory framework

2.1. The national policy and legal framework

The following sections outline Kenyan policy and legal requirements on public consultation and participation, and stakeholders' engagement:

2.1.1. The Constitution of Kenya 2010

Chapter Four – The Bill of Rights, and other provisions in the Constitution have a direct impact on rights of all individuals to be protected. Article 10 on national values and principles of governance include among others commitment to human dignity and human rights including non-discrimination and protection of the marginalized. Specifically:

Article 10 (2) indicates that public participation is among the national values and principles of governance.

Article 33 guarantees the freedom of expression including the freedom to seek, receive or impart information or ideas. Hence, every person should feel constitutionally empowered to share information and ideas during public participation processes.

Article 35 provides for the right to access information and guarantees every citizen the right to access information held by the state. This includes information required for effective public participation to take place.

Article 69 (1) (d) provides that the State shall: "Encourage public participation in the management, protection and conservation of the environment.

Article 174(c) reiterates that the powers of self-governance to the people can derive direct benefit from meaningful public participation as this contributes to better informed decision-makers armed with additional facts, values and perspectives obtained through public input.

2.1.2. The County Government Act, 2012

The legislation is based on Chapter Eleven of the constitution: Provides for county government powers, functions and responsibilities. The legislation provides for public participation, access to information and protection of minorities and vulnerable individuals and groups.

Part VIII on citizen participation provides the principles and requirements for inter alia development, decentralization and implementation of citizen participation.

2.1.3. The Land Act, 2012

This Act is the substantive law governing land in Kenya and specifies the manner for determination and the award for compulsory acquisition to be served on the persons determined to have interest in the affected land. According to Section 128 of the Act, any dispute arising out of any matter under the Act, which involves compulsory acquisition process, should be referred to the Land and Environmental Court for determination. Sections 107-133 of the Land Act specify the procedure to be followed in the process of compulsory land acquisition. Section 134 of the Act creates a Settlement Fund for land acquisition to provide shelter and livelihoods to people who are involuntarily displaced. In managing public land, the Commission is further required in section 10(1) to prescribe guidelines for the management of public land by all public agencies, statutory bodies and state corporations in actual occupation or use. In these guidelines, management priorities and operational principles for management of public land resources for identified uses shall be stated.

This means that the Commission shall take appropriate action to maintain public land that has endangered or endemic species of flora and fauna, critical habitats or protected areas. As well the commission shall identify ecologically sensitive areas that are within public land and demarcate or take any other justified action on those areas and act to prevent environmental degradation and climate change.

2.1.4. The National Land Commission Act, 2012

The Act creates the National Land Commission (NLC) whose mandate is drawn from the National Land Policy of 2009, Constitution of Kenya 2010, National Land Commission Act, 2012, the Land Act 2012 and the Land Registration Act of 2012. Pursuant to Article 67(2) of the Constitution, the functions of the Commission shall be — on behalf of, and with the consent of the national and county governments, alienate public land and carry out compulsory acquisition as may be necessary.

2.1.5. The Environment and Land Court Act, 2012

The Act enacts Article 162(2) (b) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to land, and to make provisions for its jurisdiction, functions and powers, and for connected purposes. It has power to hear and determine disputes relating to;

- Environmental planning and protection, climate issues, land use planning, title, tenure, boundaries, rates, rents, valuations, mining, minerals and other natural resources;
- Compulsory acquisition of land;
- Land administration and management of public, private and Community land and contracts, choices in action or other instruments granting any enforceable interests in land; and
- Any other dispute relating to environment and land.
- It shall be an important institution in case of grievances and other issues that cannot be solved through the proposed grievance redress systems.

2.1.6. The Environmental Management and Coordination Act, 1999

The EMCA Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003 provide for public participation during the process of conducting an environmental impact assessment.

2.2. International standards

2.2.1. African Development Bank operational safeguards requirements

The **operational safeguard 1 – environmental and social assessment** requires a project proponent to carry out meaningful consultations (i.e., consultation that is free, prior and informed) with communities likely to be affected by environmental and social impacts, and with local stakeholders, and ensure broad community support (BCS).

The safeguard requires that consultation be based on stakeholder analysis and be preceded by disclosure of adequate project information and environmental and social information to ensure that participants are fully informed. Consultations shall start at the early stages of project identification and shall continue throughout the project life cycle i.e. during Project Design, Environmental and Social Assessment (ESA), Implementation (Construction and Operation), and Decommissioning phases.

The consultations shall be:

- Free: consultation shall be free of external manipulation, interference, intimidation or coercion;
- Prior: consultation shall be timely in relation to the assessment process, allowing sufficient time to access and understand the information and prepare appropriate responses.
- Informed: consultation shall be grounded in the provision of relevant, understandable and accessible information, in the appropriate language, and in advance.

Additionally, consultations shall be open, accessible, transparent, sensitive, inclusive, fair and even-handed, and effective.

The stakeholders to be consulted shall include but not limited to affected communities; local and national government agencies; traditional leaders; NGOs and community-based organizations; and vulnerable groups. Consultations may be in form of focus group discussions (FGDs), community meetings, key informant interviews (KIs) or household surveys.

The **operational safeguard 2 – Involuntary resettlement: land acquisition, population displacement and compensation** requires open, inclusive and effective consultations with local communities where resettlement is being considered. Appropriate notice shall be given to all affected persons, and public hearings shall be carried out on the proposed plans and alternatives. Other requirements for meaningful consultations include:

- Effective advance dissemination by the authorities of relevant information, including land records and proposed comprehensive resettlement plans specifically addressing efforts to protect vulnerable groups;
- A reasonable time period for public review of, comments on, and/or objection to any options of the proposed plan; and

- Public hearings that provide affected persons and/or their legally designated representatives with opportunities to challenge the resettlement design and process, and/or to present and discuss alternative proposals and articulate their views and development priorities

The safeguard provides that when displacement cannot be avoided, the Project Proponent must consult in a meaningful way with all stakeholders, particularly the people affected and the host communities, and involve them at all stages of the project cycle in a clear and transparent manner—in designing, planning, implementing, monitoring, and evaluating the Resettlement Action Plan.

The Proponent should consult the affected people about their preferences pertaining to resettlement and should give them genuine choices among technically, economically, and socially feasible resettlement options. They should be given the opportunity to participate in the negotiation of compensation packages, and in decisions on resettlement assistance. Consultations should also extend to decisions on eligibility requirements, the proposed resettlement timings etc.

Special attention should be given to consultations with vulnerable groups such as women, the aged and other social groupings so that these can participate with confidence and ease.

3. Stakeholders engagement program

3.1. Basis of identification

The first step in the process of stakeholder engagement is stakeholder identification to determine the project stakeholders, their key groupings and subgroups. Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively.

Mapping of stakeholder groups was enabled by definition of the impact zone of the project, i.e. from the intake, treatment works, pipeline alignment, settlements traversed and the target population, and the type of environmental and social impacts anticipated.

The following questions provided guidance in mapping and identifying the stakeholders:

- Who is critical to engage with first and why?
- What is the optimal sequence of engagement?
- Who will be adversely affected by the potential environmental and social impacts in the water supply project's area of coverage and influence?
- Who are the most vulnerable among the potentially impacted, and is special engagement necessary?
- At which stage of the project will the stakeholders be mostly affected (i.e. construction, operation or decommissioning phase of the project)?
- Which stakeholders might help enhance the project design?
- Who strongly supports or opposes the changes that the project will bring?

3.2. Categories of identified stakeholders

The Table below identifies the categories of stakeholders and describes their interest/relationship with the Proposed Project.

Table 3-1 Categories of identified stakeholders

Stakeholder category	Stakeholder	Connection to the project
Government	<ul style="list-style-type: none"> • Ministry of Interior and Coordination (Office of the County Commissioner – Bomet County, DCCs, ACCs, Chiefs, Ass. Chiefs) Bomet County Commissioner • Kenya Forest Service (KFS) • Water Resources Authority (WRA) • Ministry of Environment and Forestry • Ministry of Water and Sanitation, and Irrigation 	National government agencies are of primary importance in terms of establishing policy, granting permits or other approvals for the Project, and monitoring and enforcing compliance with Kenyan law throughout all stages of the Project life cycle.
	County Government of Bomet including the relevant ministries and departments	The county government will also grant relevant permits and will take over the operations of the project during implementation
Communities	<ul style="list-style-type: none"> • Project affected communities including: <ul style="list-style-type: none"> - Registered and customary landowners whose property will be affected - Residents who neighbour project sites and will be receptors of certain impacts 	These will be directly or indirectly affected by the proposed project positively and/or negatively

	<ul style="list-style-type: none"> - People who depend on Nyangores River for their water needs and livelihoods - People who will benefit from water supply 	
	<ul style="list-style-type: none"> • CBOs such as <ul style="list-style-type: none"> - Nyangores Water Resource Users Association - Nyangores Community Forest Association 	Members of community deriving particular benefits from natural resources in the project area and might be affected in one way or another by the project
	<ul style="list-style-type: none"> • Vulnerable groups including: <ul style="list-style-type: none"> - Women headed households - Children headed households - Elderly, physically, mentally disabled - Youth - Low-income households 	They may be inordinately affected by the project due to their disadvantaged status
Civil society e.g. Non-governmental Organisations (NGOs)	Kenya Red Cross Society (KRCS) AfDB	Organisation with direct interest in the proposed Project, and its social and environmental aspects and that are able to influence the Project directly or through public opinion. Such organisations may also have useful data and insight and may be able to become partners to the proposed Project in areas of common interest.

3.3. Previous stakeholder engagement

3.3.1. Project design and ESIA phase engagement

3.3.1.1. Workshops

These were organised with the institutional and government stakeholders in project conceptualization and design stages. The workshops provided an opportunity for these stakeholders to provide feedback and inputs in the concept and preliminary designs of the project. A total of 3 workshops were held to discuss project alternatives and agree on the project's concept designs.

3.3.1.2. Public meetings

These meetings were organised with the purpose of disclosing project information to communities and seeking their views and concerns in implementing the project. Five public meetings were held at various location along the pipeline route. These were at Mulot, Ndarawetta, Cheboin, Longisa, Sigor, and Mugango areas. A cumulative total of 432 people attended the meetings.

Table 3-2 Public meetings held

Meeting date	Description of engagement
11/11/2019	Community meeting with residents of Mulot town
12/11/2019	Community meeting with residents of Ndarawetta
12/11/2019	Community meeting with residents of Cheboin
13/11/2019	Community meeting with residents of Longisa
13/11/2019	Community meeting with residents of Sigor
07/01/2020	Community meeting with residents of Mugango

The following issues emerged from previous engagements

Table 3-3 Key issues raised by the community

Stakeholders	Concerns/comments/proposals
Mulot Town	<p>The community wants assurance that water will be distributed to households;</p> <p>Locals should be given first consideration in employment opportunities arising from project implementation;</p> <p>The Project proponent should come up with a CSR programme that will benefit the community besides the water project;</p> <p>There may be moral decadence with the influx of migrant workers looking for job opportunities;</p> <p>There is potential for increase in sexually transmitted infections (STIs) such as HIV/AIDS as the project is implemented;</p> <p>Measures should be taken during construction to minimize pollution e.g. oil spillages and dust, and environmental degradation from loss of vegetation; and</p> <p>There is need for adequate maintenance of the pipelines to prevent failures that would result in environmental damage</p>
Ndarawetta	<p>Locals should be given priority in employment opportunities. The community has highly educated youth and should be employed according to their qualification;</p> <p>The land along the pipeline alignment is utilised by farmers in planting of trees and irrigated farming along Nyangores River;</p> <p>The community is concerned about how people without title deeds will be compensated considering that most land title holders have since died, and the land has been subdivided multiple times among siblings, without title deeds</p> <p>There is expectation that valuation of affected land and assets will be undertaken in their presence to ensure that the trees and crops along the corridor are properly documented.</p> <p>There is concern about compensation rates and the process of valuation;</p> <p>The Project proponent should identify and implement a suitable CSR activity that will benefit the community. The Ndarawetta community would like to have tree planting activities in schools;</p> <p>Influx of foreigners seeking employment opportunities may cause conflicts with the locals;</p> <p>There is likelihood of the rise in social ills such as early pregnancies and HIV/AIDS infections from interactions with project workers</p> <p>There is likelihood of destruction of the forest during construction of the pipelines causing loss of indigenous trees.</p> <p>Dry weather flows of Nyangores River may reduce significantly when the project is implemented</p> <p>Construction activities may also cause pollution of the river e.g. spillage of oils and other hazardous chemicals</p> <p>The project needs to ensure that water is supplied to the area and that the community gets enough supplies of water</p>
Cheboin	<p>The community hopes/expects that the project will resolve the water shortage problem of the area</p> <p>There is expectation that the community – particularly the youth, will benefit from jobs created</p> <p>Where private land is required for the project, compensation will be necessary. There is also need for a clear process to identify and compensate the land and crop owners</p> <p>The proponent should identify other corporate social responsibility (CSR) activities to implement for the community's benefit</p> <p>Tirotto and Merigi areas need to be supplied with water as a priority</p>

	<p>There is likelihood of influx of people seeking employment, and this would cause a rise in insecurity in the area. Additionally, the contractor should employ adequate security around project sites during construction</p> <p>There is potential for environmental damage from construction activities, and adequate mitigation measures are necessary to avoid or minimise the damage</p>
Longisa	<p>The local community should be given priority in any employment opportunities created by the project</p> <p>Adequate compensation is necessary where private land is acquired for the project. Compensation should be at market value of the affected property/assets or economic activity on the land</p> <p>There is also need to compensate those without land ownership documents</p> <p>Institutions in the area should be supplied with water by the project</p> <p>Influx of foreigners will cause conflicts with the local community lead to spread of HIV/AIDS among other moral problems</p> <p>Project components such as water pipelines need to be properly maintained</p>
Sigor	<p>The local community should be given priority for casual jobs during construction.</p> <p>Prompt compensation should be made for private land acquired for the project</p> <p>There is likelihood for increase in moral decadence with the influx of people into the area due to project activities</p> <p>The proponent should distribute water to schools as a CSR activity</p> <p>The downstream community is dependent on Nyangores River for irrigated farming and the project would cause reduced flows in the river and cause resource-use conflicts</p>
Mugango	<p>There is scarcity of water in the area and the project should ensure adequate supplies to the area</p> <p>The community should benefit from the employment opportunities created by the project</p> <p>The proponent should participate in some of the activities being undertaken by the community forest association (CFA)</p> <p>Crops, tea bushes and trees would be lost along the pipeline alignment during construction.</p> <p>Use of the land on top of the pipeline would also be limited after construction activities are complete</p> <p>Compensation for losses should be made before construction commences</p> <p>Restoration by planting trees along riparian areas should be carried out when construction is complete</p>

3.3.1.3. Key Informant Interviews (KII)

One-on-one interviews were conducted with individuals with specific knowledge on aspects of the project area to obtain their expert opinion. Below is a summary of the interviews with various Key Informants:

Table 3-4 Summary from the KII

Name	Institution	Comments
Geoffrey Amoding	The County Commissioner, Bomet	<p>The project will be beneficial to the community;</p> <p>Expressed concern that flows in Nyangores River have reduced significantly due to destruction of Mau Forest;</p> <p>Prefers smaller projects with lesser impacts as opposed to mega projects such as the proposed Bosto Dam project;</p>

		Project team should ensure extensive consultations with the relevant bodies responsible over natural resources such as Nyangores River and Mau Forest
Micah Koech	CEC - Public Health, County Government of Bomet	<p>Sufficient supplies of clean water will ensure that the community is safe from waterborne diseases such as typhoid, and diarrhoea;</p> <p>The vulnerability of some areas such as Sigor to health and sanitation problems is high and this is because of lack of clean water</p> <p>The community needs to be properly sensitised on the importance of using clean water use to improve sanitation</p>
Paul Milgo	Public Health Officer, County Government of Bomet	<p>The community should be sensitised on HIV/AIDS continually throughout the project phases.</p> <p>The department can offer support to the team in sensitization if needed</p>
Mr Paul Rono	Nyangores WRUA	<p>The community needs to be informed appropriately about the project.</p> <p>Abstraction of water from Nyangores River will reduce the downstream water flow. There are also several other projects abstracting water from Nyangores River, meaning that the impact will be enhanced</p> <p>The project should have a catchment conservation component in order to reduce adverse impacts on the river regime</p>
Joseph Kemei	Kenya Forest Service	<p>The project is worthwhile and will bring benefits to the community</p> <p>The project team should ensure consultations are held with the community in Masese- Mugango adjacent to the forest</p> <p>Authorisation to enter and develop project components in the forest must be obtained from the Headquarters.</p>
Community Forest Association (CFA) committee	CFA Nyangores	<p>The project should ensure that Masese area also benefits from water supply</p> <p>The local community should be given priority in available employment opportunities</p>

3.3.1.4. Questionnaire administration

Questionnaires were also used to obtain personal views from residents in Masese, Ndarawetta, Cheboin, Sigor, Longisa and Mulot Locations on the proposed Project. A structured questionnaire was administered to a total of 130 households which sought to establish the respondents' socio-economic characteristics, their views on the impacts that are likely to arise from the project, their concerns and recommendations for mitigation of potential adverse impacts.

3.4. Planned engagement in the subsequent phases of the Project

3.4.1. Engagement prior to construction phase

This will entail consultations related to Right of way (RoW) and land acquisition, valuation of project affected properties and Resettlement Action Plan (RAP) activities. This will entail holding sensitization meetings with the affected landowners and farmers to inform them on the RAP process including census, valuation of affected assets, the cut-off date, grievance mechanisms etc.

3.4.2. Engagement during the construction phase

Stakeholder engagement during the construction phase will relate to all activities including civil works, and establishment, operation and decommissioning of the construction camp and other facilities. The stakeholders will be engaged in monitoring of the impacts identified during the ESIA. The following activities will be undertaken.

Table 3-5 Engagement during construction phase

Activity	Information to be relayed	Engagement strategy
Notifying local stakeholders of construction activities and any changes to already laid schedule	<ul style="list-style-type: none"> Project start date and duration Potential impacts Who to contact in cases of concern 	<ul style="list-style-type: none"> Print media Local vernacular radio Informal meetings
Involving the stakeholders in monitoring of anticipated impacts Reporting to the stakeholders on the progress of implementation of the ESMP	<ul style="list-style-type: none"> Emerging issues during monitoring of the ESMP Success of mitigation plans 	<ul style="list-style-type: none"> One on one meetings Public barazas Formal meetings
Resolution of grievances	<ul style="list-style-type: none"> Measures taken to resolve grievances 	<ul style="list-style-type: none"> One on one meetings Public barazas
Management of risks to stakeholder relations from contractor(s)	<ul style="list-style-type: none"> Contractor's obligations to the community during construction 	<ul style="list-style-type: none"> Public barazas
Industrial labor relations	Unrealized expectations if any	Informal meetings (Baraza)

3.4.3. Engagement during the decommissioning of construction camp and facilities

Completion of construction works will be characterized by downscaling of the construction activities. The anticipated impacts include; loss of local employment, general decline in the local economic activities. It is imperative to engage with stakeholders well before these events take place. This will ensure effective rehabilitation of the material sites and borrow pits and develop worker retrenchment programs.

Table 3-6 Engagement during decommissioning phase

Activity	Information to be relayed	Consultation method
Notification on construction completion and downscaling of activities	<ul style="list-style-type: none"> Scaling down of management presence Termination of casual employment contracts and other lease agreements Closure of outstanding issues Site restoration/rehabilitation plans 	<ul style="list-style-type: none"> Formal meetings between contract parties Public barazas

3.4.4. Engagement during operation phase

During the operation phase the numerous impacts associated with civil works decrease but the transition brings with it many changes which require to be managed to ensure continuity in stakeholder relationships. There will be a reduction in overall employee and contractor workforce, and the number of grievances and frequency of engagement with stakeholders will decrease. The following activities will be undertaken:

Table 3-7 Engagement during operation phase

Activity	Information to be relayed	Consultation method
Managing transition from construction to operation including the changes in staff	<ul style="list-style-type: none"> Introductions of in-coming teams to local communities The changes that are to be expected and what impacts this might have, on local residents 	<ul style="list-style-type: none"> Public barazas Informal meetings

Establishment/evaluation of internal systems and functions	Departmental plans, procedures, functions and management systems	<ul style="list-style-type: none"> • One on one meetings • Round-table discussions
Disclosure, consultations and reporting to stakeholders	<ul style="list-style-type: none"> • Status of implementation of the project's commitments to stakeholders • Emergency preparedness and response plans • Resolution of grievances 	<ul style="list-style-type: none"> • Public barazas • Informal meetings • One on one meetings
Environmental and social audit of the project's performance	Overall environmental and social performance	<ul style="list-style-type: none"> • One on one meetings • Public barazas

3.5. Engagement strategy for special stakeholders

Any special groups identified in the project locality will require special consideration and prioritization in engagement. These groups may include: the youth; women; widows; people living with disabilities; and the elderly. The following principles will be applied to accord them a fair and equal opportunity for participation in the stakeholder engagement process:

- Information, consultation and participation for all on issues affecting special stakeholder groups;
- Employment equity – deliberate effort will be put in place in form of quotas or special preference for members of these categories;
- Committee representation – deliberate effort will be made to include the members of vulnerable groups in committees;
- Inclusivity in a culturally appropriate manner; and
- Respect of the culture, knowledge and preferences of the vulnerable members.

4. Grievance redress mechanisms

During the life of the proposed water supply project, it is inevitable that complaints will arise among the affected people over contentious issues. The purpose of a Grievance Mechanism is to offer stakeholders an effective avenue for expressing themselves and achieving resolution for their concerns.

The purpose of this section of the SEP is to define the community grievance management procedure, specifically the process of receiving, acknowledging and registering, reviewing, investigating and resolving grievances submitted by individuals, families, groups and/or communities and other local stakeholders' resident within the project affected areas.

The Grievance Mechanism seeks to:

- Provide an equitable and context-specific process which respects the confidentiality of all parties, protects all parties from retaliation and builds trust as an integral component of broader community relations activities;
- Provide a predictable, accessible, transparent, and legitimate process to all parties, resulting in outcomes that are seen as fair, effective, and lasting; and
- Enable more systematic identification of emerging issues and trends, facilitating corrective action and pro-active engagement.

The procedure governs how the Project Proponent will receive grievances pertaining to project activities. It will capture grievances arising from actual project impacts, as well as issues that are simply perceived to be related to the Proponent, irrespective of whether they derive directly from the Proponent or contractor activities.

Grievances shall be investigated and resolved through a defined series of steps as outlined in this procedure. This process allows for three stages of resolution. Specifically:

Tier 1 (Entry level) procedures define the means through which community-level grievances may be (i) received, acknowledged and registered by the project; and (ii) how field-level investigation and resolution of grievances will occur.

Tier 2 procedures allows for unresolved grievances to be escalated for further review at the field level.

Tier 3 grievance management, which allows for the grievant to proceed to court if the grievance cannot be resolved to the satisfaction of the grievant and the project, will remain outside the scope of this procedure.

4.1. Minimizing grievances

The following measures are proposed to minimise grievances during project implementation:

Information disclosure: The Proponent will ensure that there is continued flow of accurate information regarding the project activities. This will cut down on complaints that mostly arise from misinformation.

Transparency by the Proponent especially regarding Job opportunities: The Proponent should ensure there is transparency in terms of available vacancies, qualifications and modes of selection to avoid grievances around employment from the locals;

Accessibility of the Proponent's CLO to the community: An active Community Liaison Officer who may also serve as a Grievance Officer (GO) is both the face of the Proponent on the ground, and an available link between communities and the Proponent. He ensures any issues that arise are resolved before they become too serious.

Locally constituted Grievance Management Committee (GMC): The members of the GMC will be elected by the community within which the project is located.

Continued engagement throughout the Project life: This encourages the Proponent and host communities' collaboration, and positively impacts project implementation and sustainability.

4.2. Grievance mechanism principles

The Proponent is committed to operating in line with international best practice for the environmental and social management of its projects. This grievance mechanism has been designed in line with the following principles:

- **Proportionality:** the mechanism is scaled in line with the level of risk and adverse impacts on affected communities;

- Community appropriateness: taking into account culturally appropriate ways of handling community concerns;
- Accessibility: providing a clear and understandable mechanism that is accessible to all segments of the affected communities at no cost;
- Transparency and accountability: to project affected stakeholders at field (operational) level; and
- Appropriate protection: prevents retribution and does not impede access to other remedies.

4.3. Community grievance management procedure

The Grievance Mechanism is based on a step-by-step procedure for receiving, acknowledging and registering, reviewing, investigating and resolving complaints and grievances from all project affected stakeholders' resident in the area of operations.

Figure 4-1 Key steps of the Tier 1 (entry level) grievance management process



4.3.1. Tier 1 (entry level) grievance capture and management

4.3.1.1. Receipt

The First Tier of the grievance management procedure captures all grievances or complaints at the field (operational) level as an entry level method of receipt. Grievances may be received through a variety of channels:

- The Proponent's dedicated grievance hotline and/or email address;
- The Proponent's Community Office;
- The Proponent's staff who hold responsibility for stakeholder engagement and who visit the communities within the project area of operations on a regular basis; and
- The Proponent's GO or the GMC.

4.3.1.2. Register

When a grievance is presented, the GO will note and record the grievance onto a **Grievance Registration and Acknowledgement Form** and check the content with the grievant. If appropriate, the GO could take pictures related to the issue to substantiate the claim. Where relevant, GPS coordinates shall also be noted.

If the grievant is unable to present the complaint in writing, the GO will complete the appropriate forms. All forms will be signed, or thumb printed by the grievant, a witness (if necessary) and the GO.

Each grievant should receive a copy of the Grievance Registration and Acknowledgement Form, which has a reference number.

If possible, grievances will be addressed immediately through dialogue with the Grievant. As noted above, the details of the grievance will be recorded from respondents and witnesses contacted during the grievance review and will be detailed on the Grievance Registration and Acknowledgment Form. If accepted, the agreed resolution will be documented on the Grievance Resolution Form, the latter signed by the complainant, witnesses and/or any other individuals who choose to make comment with regard to the particular grievance.

If further review is required, the GO will describe the process and the timeline for further review to the grievant/complainant.

A sample of the Forms to be used in recording of grievances is attached in **Appendix A** of this SEP.

4.3.1.3. Review

In the case of a grievance that has not been resolved at the time of registration, the GO will investigate the grievance to determine its validity and where appropriate ensure appropriate redress as part of the process of closing out the grievance.

4.3.1.4. Investigate

The GO is responsible for determining how to investigate a grievance. The aims of the investigation are:

- To determine the validity and truthfulness of the grievance;
- To verify the claims made by the Grievant, and evidence provided to substantiate the claims; and
- To determine appropriate redress where required.

Investigation should seek to examine the event leading to the grievance and to verify the impact thereof. Investigation may involve visiting the location of the event leading to the grievance; photographs of the scene; engagement with other stakeholders in the field (i.e. triangulation) to confirm reliability of the account; and other evidence as appropriate.

Potential redress options include an apology, compensation of the aggrieved or any other resolution option within the limits and capacity of the field staff.

If investigation and resolution cannot be achieved within 5 days, a letter will be sent to the Grievant informing them that their grievance is being investigated, setting out the reason for the delay and advising the Grievant of anticipated closure date.

4.3.1.5. Resolve and close

It is the responsibility of the GO to communicate the outcome of the review to the aggrieved person in writing through the **Grievance Resolution Form** and verbally if requested by a Grievant.

This response will be either:

- The outcome of the grievance review; or
- Notification that the company needs additional time to examine the issue further.

The GO shall have two (2) copies of the Grievance Resolution Form; one for the Grievant and one to be signed for company records.

If the Grievant is not satisfied with the outcome of the review, alternative resolutions should be considered and discussed among field operational management and with the Grievant before the case is escalated to the Second Tier (field level Grievance Management Committee).

Where resolutions have been approved and agreed upon by the complainant, the GO ensures that the administrative process for redressing the grievance is immediately initiated. The resolution details and target timeframe should be updated in the Complaint/Grievance Register.

In cases where the complainant “walks away” without signing the Grievance Review Outcome Form, the grievance can only be closed out following agreement by site management after it is determined that everything reasonable has been done to resolve the case.

4.3.2. Tier 2 grievance management (field Grievance Management Committee)

The Second-Tier process is for grievances that cannot be resolved directly between the GO and the complainant and requires involvement by a Grievance Management Committee (GMC), which may also include appropriate external representation to resolve the complaint. In the event that a grievance is escalated from the First Tier to the Second Tier, the GO should sign off that appropriate measures have been taken to resolve the grievance through the Entry Level (First Tier) process. The need to include an appropriate third party on the GMC will be determined on a case-by-case basis.

The Second-Tier process is used when First Tier procedures are not acceptable to one or more parties for the situation of concern; there are disputes of fact or conflicts about data; or the parties have been unable to reach a voluntary resolution. In such cases:

- The Grievant can contact the GO in the first instance to seek further clarification if for any reason he/she is dissatisfied with the explanation of the review (not for further negotiation);
- The GO points out the next level resource mechanisms available to the complainant (i.e. use of the GMC to review and offer resolutions for the case; use of a third party);
- In the event that a case is referred to an approved third party or subject specialist, rather than utilising the GMC, the GO will report on the status of the case on a bi-weekly basis to the Proponent until closure; and

- To demonstrate good faith, that the Proponent will within reason, attempt to comply with the requirement of the third party if one is used.

Where resolution cannot be reached through the Tier 1 or Tier 2 community grievance management procedures, the grievant/complainant can refer the issue to official agencies or statutory judicial processes for resolution. Such agencies include the National Environment Management Authority (NEMA); the National Environment Tribunal (NET); and Land and Environment Court and should be considered as a last resort for grievance redress.

5. SEP monitoring

Monitoring and evaluation of the stakeholder engagement program is critical for ensuring that stakeholder engagement activities do not simply occur in isolation, but that they support the objectives of the proposed project and occur in an on-going coordinated manner across and between functions with responsibility for stakeholder engagement.

A monthly summary of engagement activities carried out will be produced. The information produced will inform stakeholders of project activities, the environmental and social performance, outcomes of engagement activities carried out, and grievances and their resolution.

The stakeholder engagement program will be reviewed periodically and may result in updating of the SEP.

Appendices

Appendix A. Grievance Forms

Form 1 _____ Grievance Form	
Reference:	Date received:
Complainant/ site details	
Name:	
Address:	
Telephone/ other contact details:	
Work location	
Statement of Grievance (<i>the nature and facts of the grievance: who was involved, when did it occur, where did it occur, what happened, why is it a grievance</i>)	
Remedy sought (<i>What action by the contractor will resolve the grievance</i>)	
Disposition of the grievance (<i>what happened</i>)	
Follow up actions (<i>any follow up required</i>)	
Form Completed by:	
Name:	
Location/ Organization:	

Form 2: Grievance Tracking Form

Grievance ID	Date Reported	Grievant	Issue	Resolution / Actions Required	Status	Date Resolved

BG
Atkins Consulting Engineers Limited
The Address, 13th Floor
Muthangari Drive
Off Waiyaki Way
Westlands
Nairobi

Tel: +254 20 2592441/2592424

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Appendix F. Approved ToRs for the Study



NEMA/TOR/5/2 167.....

Date: 17/03/2020.....

RIFT VALLEY WATER
WORKS DEVELOPMENT
AGENCY
.....

RE: ACKNOWLEDGEMENT AND APPROVAL OF TERMS OF REFERENCE
(TOR) FOR ENVIROMENTAL IMPACT ASSESSMENT

We acknowledge the receipt of TOR for the above subject.

Pursuant to the Environmental Management and Coordination Act CAP 387,
the second schedule and the Environmental (Impact Assessment and Audit)
Regulations 31 and 25, your terms of reference for the Environmental Impact
Assessment (EIA) for the proposed BOMET - MULOT

WATER SUPPLY PROJECT
.....
.....has been approved.

You shall submit ten (10) copies and one electronic copy of your report
prepared by a registered expert to the Authority

REAGAN AWINO
FOR: EIA SECTION HEAD

Appendix G. Registration certificates for Experts

FORM 7

(r.15(2))



**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT**

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

License No : NEMA/EIA/ERPL/11434

Application Reference No: NEMA/EIA/EL/15420

M/S ATKINS CONSULTING ENGINEERS LIMITED
(individual or firm) of address

P.O. Box 30156 - 00100, NAIROBI

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts**
registration number **610**

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

Issued Date: 1/2/2020

Expiry Date: 12/31/2020

Signature.....

(Seal)

Director General
The National Environment Management
Authority



FORM 7

(r.15(2))



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/11432

Application Reference No: NEMA/EIA/EL/15417

M/S **Simon Nguru Wandeto**
(individual or firm) of address

P.O. Box 10154-00100, Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **0885**

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

Issued Date: **1/2/2020**

Expiry Date: **12/31/2020**

Signature.....

(Seal)

Director General
The National Environment Management
Authority



SNW
Atkins Consulting Engineers Limited
The Address, 13th Floor
Muthangari Drive
Off Waiyaki Way
Westlands
Nairobi

Tel: +254 20 2592441/2592424

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