



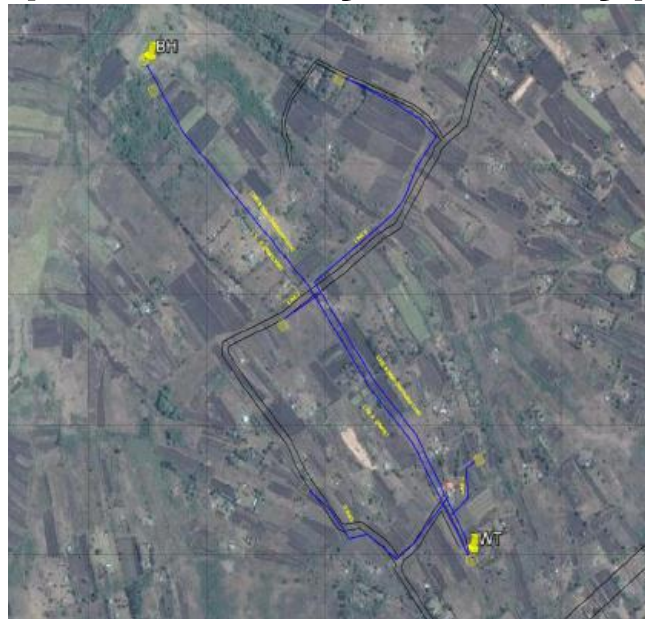
Lake Victoria North Water Services Board



Lake Victoria South Water Services Board

PROPOSED DROUGHT MITIGATION BOREHOLES FOR LAKE VICTORIA SOUTH WATER SERVICES BOARD (LVSWSB)

Proposed Nyamila Borehole (Homa Bay County)



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (PROJECT REPORT)

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Assignment: Undertake ESIA Project Report Proposed Nyamila Borehole in Homa Bay County

Report Title: Environment and Social Impact Assessment Project Report

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Acronyms

dBa	Decibels
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
GOK	Government of Kenya
NEMA	National Environmental Management Authority
NGO	Non Governmental Organization
PPE	Personal Protective Equipment
EHS	Environmental Health and Safety
EMMMP	Environmental Management Mitigation and Monitoring Plan
LAU	Limits of Acceptable Use
LUZ	Low Use Zone
OHS	Occupational Health and Safety
M	Metres

Executive Summary

Introduction

The Government of Kenya (GoK) has received credit from the World Bank through the International Development Association (IDA) towards the cost of Water and Sanitation Improvement Project Additional Financing (WaSSIP-AF). The Additional Financing includes a drought mitigation and response component that will include preparation of detailed medium-term drought response and mitigation strategies in Lake Victoria North, Lake Victoria South and Rift Valley Water Service Boards. The LVNWSB, as the WaSSIP Project Implementing Board, Lake Victoria South Water Services Board (LVSWSB) to implement the drought response measures. The proposed borehole project is one of the drought mitigation measures financed by a grant from the World Bank under the Kenya Water and Sanitation Services Improvement Project - Additional Financing (WaSSIP-AF) through Lake Victoria South Water Services Board.

The Project

The proponent intends to develop a borehole water supply project with the objective of enhancing sustainable access to clean and safe drinking water for use by Nyamila community. The objective of this ESIA study is to evaluate the potential impacts of equipping of the borehole and develop mitigation measures that aim at minimizing the negative impacts of the project while optimizing the positive impacts. It involved largely an understanding of the project background, the project design and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the site areas, public consultations with members of the community in the project areas, desktop research, and discussions with the Proponent.

Nyamila Water Project is located in Pundo Village, Kalanya-Kanyango Sub-location in East Kanyada Location, Homabay County. The borehole is located 665101mE and 9931641mN by UTM coordinates by GPS. This scheme should provide water for multiple uses and address effects of drought in the area by catering for a population of about 1240 people. Nyamila Borehole was drilled between 21st and 22nd July 2016 to a total depth of 78m. The tested average yield of the borehole is 3.0m³/hr. Water from the borehole will be pumped to a ground storage tank powered by a solar system on a higher ground to facilitate water flow by gravity to consumer points in the five villages

ESIA Justification

Due to the unprecedented rate of environmental degradation in Kenya, the government realized the need to curb the same and this led to the enactment of the Environmental Management and Coordination Act, 1999. The Act requires among other things that an Environmental Impact Assessment (EIA) study must be conducted on various categories of projects as outlined in the Second Schedule and section 58 of the Act. The Water Act 2002 gives the Water Resources Management Authority (WRMA) specific mandates to develop instruments for groundwater management. This is also related to Environmental Management and Coordination Act (1999), the legislation that coordinates all environmental issues in Kenya. The most significant environmental issues concerning water supply project include contamination of water sources related to poor land

use planning, damage to water infrastructure, over pumping of ground water aquifers and improper commissioning and rehabilitation of boreholes. EIA should be applied to all water abstraction projects particularly boreholes since their scale of impacts require mitigation measures to be planned and implemented.

EIA Objective and Scope

The objective of the study is to assess the impacts that may arise from Equipping of the borehole, construction of the associated facilities, operational and decommissioning phases of the proposed development. These include noise, dust and smoke onto the natural environment, occupational hazards, health and safety aspects, loss of vegetation cover, waste management during the construction and operational stages and the project's impact on socio-cultural and economy of the environment during its operational stages, etc.

The scope of the project was to identify at an early stage what the key receptors, impacts and project alternatives to consider, what methodologies to use, and who to consult. It included review of existing data, topographical, maps and existing studies and borehole site investigations in the area. Also reviewed were hydrological reports and maps. Consultation with the proponent and the surrounding community was necessary. Following the scoping process, anticipated impacts were evaluated on each of the environmental issues.

General Findings

The ESIA study team established that main source of water in Kalanya-Kanyango sub location area are some unprotected Shallow wells. The water level of the shallow wells fluctuate a lot and nearly dries during the dry season. One major source of water in the area is Obambo well located a short distance from the drilled borehole. The well is not safe both to the children and livestock as the top is left open. Water from the wells are treated using traditional home methods such as clothe filtration, boiling and of late using decanting chemicals. The average distance to the main source is 0.5km – 1km during wet season and 1km – 2.0km during dry season and it takes between 10mins to 30mins to collect water during wet season and 30min to 1hrs during dry season. Most household do not buy water and therefore their expenditure on water is minimal. They mainly pay for drinking water at KShs. 3.00 per 20l container i.e. for those who can afford to pay. The Shallow well is unreliable and unprotected, it's therefore not safe but they use it both for domestic and livestock. Additionally, water collection falls disproportionately to girls who miss hours of class daily walking to and from the wells, either balancing water containers on their heads or lugging them in their arms. With the borehole at Pundo Village, the pupils will get to spend more time in school.

This ESIA reveals that the project does not have significant negative environmental impacts and that most impacts are positive. The following are the anticipated significant impacts identified and the proposed mitigation measures;

Table 1: Summary of project impacts

Potential Impact	Suggested Mitigation Measures
Vibration, Noise, air pollution and dust generation by traffic	<ul style="list-style-type: none"> ✓ Strict control under construction contract to limit these impacts to acceptable levels ✓ Watering to be enforced to keep dust levels low ✓ Exercise shall be carried during normal working hours
Material, oil and gasoline for machinery storage	Strict control by Supervising Engineer to ensure acceptable storage practices
Workforce accidents by unsafe working practices	<ul style="list-style-type: none"> ✓ Periodic awareness workshops for workforce on safe working practices, ✓ Workers to be provided with proper PPEs. ✓ Strictly follow the EMP
Pipeline leakage / bursting	Ensure that pipeline connections and joints are regularly checked
Soil erosion and compaction	<ul style="list-style-type: none"> ✓ Develop soil erosion management measures ✓ Limit the circulation of heavy machinery to minimal areas
Increased Water Demand	<ul style="list-style-type: none"> ✓ Install a master meter on the borehole to monitor water usage ✓ Observe the Water Act 2007
Solid waste management	<ul style="list-style-type: none"> ✓ Disposal to be done by authorized refuse handlers ✓ Regular collection of wastes to avoid accumulation at the site
Water Quality	<ul style="list-style-type: none"> ✓ The chemical and bacteriological quality tests to be done regularly ✓ The community should disinfect the water before use.

Conclusions

- (i) The proponent intends to supply clean and safe water to the community to mitigate the effects of draught. Ground water exploitation in the area is low due to high costs and depths. It is, however, considered clean and free of contamination hence meeting the expectations of the communities.
- (ii) There is a general acceptability of the project by the local community arising from the long term challenges they have faced on accessing clean water. From this EIA process, the social and economic rating of this project is highly positive.
- (iii) The location of the borehole and the water supply accessories falls on private and public lands (road reserves) and appropriate consent letters signed.
- (iv) The project is low level and has limited rural coverage. In addition, the ESIA reveals that this project does not have adverse negative environmental impacts and for the impacts identified, adequate mitigation measures have been spelt out in the EMP.

Recommendations

- (i) From the detailed environmental and socio-economic analysis the proposed project, the experts are of the opinion that this is a viable project, and hence recommends that NEMA approves it and issues an EIA license.
- (ii) It is further recommended that the Proponent and Contractors implement the recommendations in the environmental management plan and those in the health, safety and accident prevention action plan. This is to ensure that the potentially affected environment is well managed and that accidents are prevented in the course of project implementation. The Proponent is expected to comply with the relevant legal and policy requirements with regard to project implementation.
- (iii) Abstraction of water from the borehole should be within the allowable conditions of the WRMA permits,
- (iv) With the necessary environmental management in place, it is safe to say that the project is economically feasible, environmentally sound, and socially acceptable. The design of the project is sound from the environmental and economic point of view and should be implemented. Recommendations for the prevention and mitigation of adverse impacts are as follows: -
 - ✓ Implementation of the project should await the finalization of the EIA process and issuance of an EIA license
 - ✓ Any unforeseen environmental impacts should be reported to the environmental experts and NEMA as soon as possible for prompt remedial action
 - ✓ The borehole water to be tested regularly to ascertain quality

Chapter 1: Project Background

1.1 Introduction

The Government of Kenya (GoK) has received credit from the World Bank through the International Development Association (IDA) towards the cost of Water and Sanitation Improvement Project Additional Financing (WaSSIP-AF). The Additional Financing includes a drought mitigation and response component that will include preparation of detailed medium-term drought response and mitigation strategies in Lake Victoria North, Lake Victoria South and Rift Valley Water Service Boards. The LVNWSB, as the WaSSIP-AF Project Implementing Board, will assist Rift Valley Water Services Board (RVWSB) and Lake Victoria South Water Services Board (LVSWSB) to implement the drought response measures. In that respect, LVNWSB will procure services, goods and works on behalf of RVWSB and LVSWSB.

Interventions under WaSSIP-AF channeling resources through LVNWSB, is focused into assisting the communities living in the target project areas in LVNWSB, LVSWSB and RVWSB to access water for domestic and livestock needs during the dry conditions. The proposed boreholes are being developed through the established procedures under the Water Resources Management Authority as well as the provisions under EMCA (Amendment 2015). LVNWSB is, therefore, responsible for all facilitation and logistical support of this ESIA and RAP studies.

The proposed drought boreholes under WaSSIP-AF programme are designed to intervene on the challenges facing the target communities during the dry weather conditions. In addition to the time spent fetching water from long distances, it is expected that improvements on community sanitation and hygiene will be realized effectively reducing cases of water borne illnesses and livestock deaths during the drought conditions.

In accordance with the Population Census Report of 2009, the population densities of the beneficiary counties vary from one to another. Target Counties in LVSWSB are fairly high potential with high population densities engaged mainly in economic land use activities ranging from livestock keeping in parts of Narok, Homa Bay, Migori and Bomet counties in the south to agricultural activities in Kericho, Transmara, Muhoroni and Siaya counties in the central and northern zones of the Boards jurisdiction. The considered benefits of the project are anticipated to be high arising from the notable person-hours saved from fetching water and expenditure on medical services.

1.2 Lake Victoria South Water Services Board

Water Services Boards are mandated with ensuring efficient and economical provision of water and sewerage services within their areas of jurisdiction. The Boards are provided through a license from the Water Services Regulatory Board (WASREB). The boards, however, contract service provision to other agents as provided for in the Water Act 2002. Direct provision of water and sewerage services is undertaken by Water Service Providers (WSPs) who are the Board's agents. However, in the event that for either economic or social reasons it is not possible to establish a WSP, the Boards are mandated to undertake service provision. The functions of WSBs as provided in Section 53 of the Water Act 2002 are hereunder:

- (i) Efficient and economical provision of water services as authorized by license;
- (ii) Custodian of water services provision assets;
- (iii) Contracting, monitoring and enforcing agreements with WSPs, in accordance with the regulations set by WASREB in the licenses; and
- (iv) Maintaining and acquiring assets, planning, development and management.

Lake Victoria South Water Services Board (LVSWSB) is a state corporation under the Ministry of Environment Water and Natural Resources. It was established under the Water Act 2002 through Gazette Notice No. 1714 of 12th March 2004 with the mandate of ensuring efficient and economic provision of Water and Sanitation Services in its area of jurisdiction. Lake Victoria South Water Services Board started its operations in 2004 in administrative counties within Nyanza Province and the Southern part of Rift Valley Province.

Lake Victoria South Water Services Board is among the 8 Water Service Boards established all over the country. The board's area of operation covers Ten (10) Counties namely: Kisumu, Siaya, Homabay, Migori, Kisii, Nyamira, Kericho, Bomet, parts of Nandi and Narok County. The core functions of the Board are as summarized below:

- (i) To plan and develop water services infrastructure
- (ii) To own and manage water and sanitation related assets
- (iii) Develop and license Water Service Providers (WSPs) as agents responsible for actual provision of water and sanitation services to consumers
- (iv) Build capacity of Community Based Organizations (CBOs) engaged in water provision to access funding from Water Services Trust Fund (WSTF) and other Agencies
- (v) Collaborate with all stakeholders both within and outside water sector to mobilize finances and provide related social infrastructure, which include health and hygiene.
- (vi) Regulate activities of other actors in the water and sanitation sector in LVSWSB region.

1.3 The Project

The proposed projects targets areas within the respective water services boards that are faced with serious drought challenges during the dry weather conditions. The beneficiary areas do not have surface water sources and residents have to walk long distances to access water for their domestic requirements and livestock watering needs. Appropriate boreholes sitting has been carried and the drilling undertaken. However, the water abstracted will have to be transmitted to the consumer points.

Once each borehole is equipped, the water will be pumped to an elevated storage tanks from where it will reach the user points by gravity. The extent of distribution and the number of user points is being determined by the borehole yields among other factors. Among the boreholes, have very low yields (some have turned out to be dry) and so no adequate water to satisfy the community needs. The initial principle was to provide communal points (water kiosks or standpipes) for every target village but may be expanded later to households or institutions.

For administration purposes, the target beneficiary communities have been advised to constitute community water users association to ensure fair and equitable access to the water resources. This

would be necessary considering that inadequate production for a majority of the boreholes would not provide water to all at the same time and at least not for agricultural uses. In view of the above, the projects will comprise the following basic components;

- (i) Equipped boreholes
- (ii) Transmission pipelines as per designs
- (iii) Elevated storage tanks (structural platform structures OR on raised grounds) on pre-identified land parcels
- (iv) Operations offices (preferably at the storage tank)
- (v) Distribution pipelines OR water transmission lines to the user points
- (vi) Water user points (water kiosks, standpipes, cattle troughs, etc. as the community may request) to the extent that the source can support.

The proponent intends to develop a borehole water supply project with the objective of enhancing sustainable access to clean and safe drinking water for use by the Nyamila Community in Homa Bay County. The objective of this ESIA study is to evaluate the potential impacts of equipping of the borehole and develop mitigation measures that aim at minimizing the negative impacts of the project while optimizing the positive impacts. It involved largely an understanding of the project background, the project design and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the site areas, public consultations with members of the community in the project areas, desktop research, and discussions with the Proponent.

The water supply will be from Nyamila Borehole that was drilled between 21st and 22nd July 2016. The borehole was drilled to a total depth of 78m. The tested borehole yield is 3.0m³/hr. In addition to the time spent fetching water from long distances, it is expected that improvements on community sanitation and hygiene will be realized effectively reducing cases of water borne illnesses and livestock deaths during the drought conditions. The project is expected to create short term employment to a number of residents in the area.

1.4 EIA Justification

Due to the unprecedented rate of environmental degradation in Kenya, the government realized the need to curb the same and this led to the enactment of the Environmental Management and Coordination Act, (Amendment 2015). The Act requires among other things that an Environmental Impact Assessment (EIA) study must be conducted on various categories of projects as outlined in the Second Schedule and section 58 of the Act. The Water Act 2002 gives the Water Resources Management Authority (WRMA) specific mandates to develop instruments for groundwater management. This is also related to Environmental Management and Coordination Act (Amendment 2015), the legislation that coordinates all environmental issues in Kenya. The most significant environmental issues concerning water supply project include contamination of water sources related to poor land use planning, damage to water infrastructure, over pumping of ground water aquifers and improper commissioning and rehabilitation of boreholes. EIA should be applied to all water abstraction projects particularly boreholes since their scale of impacts require mitigation measures to be planned and implemented.

1.5 Terms of Reference

The TOR of this study is to assess the impacts that may arise from the Equipping of the borehole, construction of the associated facilities, operational and decommissioning phases of the proposed development. These include noise, dust and smoke onto the natural environment, occupational hazards, health and safety aspects, loss of vegetation cover, waste management during the construction and operational stages and the project's impact on socio-cultural and economy of the environment during its operational stages, etc. The terms of reference include:-

- (i) Provision of baseline and background information;
- (ii) Project and site description;
- (iii) Identification of environmental impacts of the proposed development in the various phases and their level of significance;
- (iv) Impact of the project on existing infrastructure;
- (v) Evaluation of alternatives;
- (vi) Stakeholder participation viz social survey of views from neighbours;
- (vii) Identification of possible conflicts;
- (viii) Suggest mitigation measures for identified negative impacts; and
- (ix) Prepare a comprehensive environmental management plan.

1.5.1 EIA Objectives

The main objective of environmental and social impact assessment associated with development of the proposed drought mitigation boreholes would be to comply with the current requirements of international financing agencies (including the World Bank) in addition to the EIA regulations of 2003 as established under the EMCA, 1999. The EIA/EA Regulations provides a clear guideline on basic considerations for harmonized impacts studies for projects undertaken in Kenya. On the global level, the World Bank environmental and social safeguards that target potential interactions of the project with environment and social settings such as to include physical environment forest, biodiversity cultural and indigenous peoples among others.

Environmental impact assessment studies are designed to identify the positive and negative impacts and establish appropriate mitigation measures. The process is also meant to develop environmental and social management plans (ESMP) as a handbook for integration of environment and social aspects into the project as well as relevant monitoring plan as a technical tool to implement the ESMP. The Environmental and social impact assessment study is being undertaken to ensure that the project benefits are enhanced while negative impacts are mitigated or eliminated altogether.

1.5.2 Scope of EIA

The scope of ESIA study is aimed at providing guidelines for integration into the project design and implementation for mitigation of the anticipated adverse environmental and social impacts. The scope of ESIA study, therefore, will cover the following key areas;

- (i) Provide a description of the environmental, social and economic issues associated with the proposed boreholes projects,
- (ii) Undertaking public and stakeholder consultations in the process through interviews and meetings with stakeholders and the affected members of public,
- (iii) Identification of anticipated environmental and social impacts with particular focus on social, economic and natural resources aspects.
- (iv) Development of mitigation measures and an environmental management plan for identified environmental and social impacts.
- (v) Preparation of ESIA project report for submission to NEMA.
- (vi) Obtain appropriate EIA Licenses from NEMA

1.6 EIA Methodology

1.6.1 Environment Assessment

Due to environmental and social challenges associated with ground water resources development and management activities, including water supply projects, comprehensive Environmental and Social Impact Assessment Study (ESIA) study is necessary. This involves evaluation the current environmental and social status (baseline conditions), establish potential impacts, establish the potential for social and economic benefits and estimate the project cost, obtain opinion of the stakeholders and the local communities and develop appropriate mitigation and remedial actions for integration in the project design and implementation.

According to the Environmental Management and Coordination Act (EMCA), (Amendment 2015), section 58 requires that all projects falling under the second schedule of the Act must undergo comprehensive environmental and social impact assessment studies. ESIA study should also comply with the EIA Regulations of 2003 on the minimum and other convectional environmental guidelines. ESIA studies are adopted as integrated approach where desk documentary reviews, field investigations, consultations as well as interviews and discussions with stakeholders and affected communities are considered.

1.6.2 Stakeholders Consultations

Ownership of the projects by the local communities is critical for a successful implementation. While appreciating the preliminary contacts during the design stage, the beneficiaries also need to be sensitized on the impacts and linkages of the projects. This will be equipping the people with the capacity to strengthen the benefits while coping with any negative impacts. This justifies the stakeholders' forums.

The project coverage extents are fairly small and low numbers of affected persons. For this reason it may not be time and cost effective to make more than one trip to any site. To achieve this desire, the Consultant will liaise with Lake Victoria North Water Services Board for public consultation logistical

purposes, the respective Boards for coordination purposes and the respective County Directors to schedule focus group meetings such as to coincide with the site assessment. The Area Chiefs will be called upon to convene the focus group meetings.

Alongside the focus group meetings, the Consultant will also hold discussions with the County Executives in-charge of water in each County as well as the respective area MCAs. Among the key areas of discussions will include among others;

- (i) Current sources of water in the areas
- (ii) The need for the proposed project
- (iii) Water demand and uses
- (iv) Project locations and ownership
- (v) Conflicts resolution mechanisms
- (vi) Resources management structures
- (vii) Land ownership and acquisition for the projects

1.6.3 Field Assessment

Other than desktop studies, this study has been carried out through field investigations. During the field investigations, reconnaissance survey was conducted to collect information on biophysical and socio-economic aspects of the area and its environs. The consultants conducted a public meeting at Nyamila SDA Church compound, about 500m from the borehole site, to discuss the proposed project. In conducting this environmental impact assessment study, the team has complied with the requirements of the Environmental Management and Co-ordination Act, (Amendment 2015) and NEMA guidelines from their legal notice no. 101, The Environmental (Impact Assessment and Audit) regulations 2003.

1.6.4 Reporting

This Environmental and Social Impact Assessment Report was compiled in accordance with the guidelines issued by NEMA. It was submitted to the project proponent for perusal, and approval. The consultant will submit ten hard copies of the report and a soft copy to NEMA for review. The report includes copies of acceptance letter for those whose pieces of land are to be used in construction of the associated facilities and hydro-geological survey report of the domestic water. This report also contains copies of the borehole designs. This report lays out an identification of impacts of the project on the environment, both positive and negative and mitigation measures to minimize or eliminate the negative impacts. An Environmental Management Plan forms part of the recommendations for future monitoring and management of the impacts identified. The output of the study was;

- (i) Draft ESIA Project Report for review by the Client
- (ii) Final ESIA Project Report for endorsement by the Client and submission to NEMA

1.7 ESIA Team

The Environmental Impact Assessment was undertaken by the following team of experts

- (i) Lead EIA Expert/Team Leader
- (ii) Sociologist
- (iii) Design Engineer
- (iv) Field Support.

Chapter 2: Project Description

2.1 Project Location

The proposed Nyamila Borehole water Project site is located within Pundo Village Kalanya – Kanyango Sub-Location in East Kanyada Location of Homabay County. The borehole site Coordinates are on Latitude 00° 37' 09.83”S and Longitude 34° 28' 58.66”E. The borehole site is about 3km from Rodi Kopany Market Centre and 2km off Rodi Kopany – Sori tarmac road. The site is easily accessible through a tarmac road from Rodi Kopany before turning right onto an access road leading to the borehole site.

Figure 1: Site Location Map



Figure 2: The Site Location



Rodi Kopanyi – Sori Road



Access Road to the Site



The Borehole Site

The borehole site is on a private land belonging to Dominic Owaga. Water pipelines will pass through private and public lands. The pipelines will however be laid along the road to ensure minimal land take. Water Kiosks, Caretakers office will be constructed on private lands. Individuals whose lands will be used for construction of the projects components have given their written consents for use of their land. The consent forms are attached in the annexes of this ESIA project report.

2.2 Existing Situation

Kalanya – Kanyango Sub location where the project falls has a population of 14,527 persons with a total of 3188 households and a density of 480 persons per square kilometer (2009 Population and Housing Census). The population growth rate in the proposed project is expected to continue rising. Currently, the main sources of water in the project area are unprotected Shallow wells, Water levels of the Shallow well fluctuates a lot and nearly dries up during the dry season. Water from the wells are treated using traditional home methods such as clothe filtration, and of late using decanting chemicals.

Distance to the main water source; the average distance to the main source is 0.5km -1 km during wet season and 1km – 2.0kms during dry season and it takes between 10mins to 30mins collect water during wet season and 30min to 1hr during dry season. Most household do not buy water thus their expenditure on water is minimal. They mainly pay for drinking water at KShs. 3 per 20l container i.e. for those who can afford to pay. The Shallow well is reliable and unprotected it's not safe but they use it both for domestic and livestock.

The project's ultimate water demand for the project area is 67.03m³/day against the allowable abstraction and maximum borehole yield of 50.40m³/day and 72m³/day respectively it is proposed to design the supply system for a demand of 50.4m³/day. The tested average yield of the borehole is 3.0m³/hr. The proposed project areas have abundant sub-surface water resources. This is evidenced by the occurrence of underground water at shallow levels of less than 10m deep. A large proportion of the community accesses water from unprotected spring and shallow wells some of which dry up during the dry season. Some households and institutions practice rainwater harvesting, but due to small storage capacities, the water it is unreliable and prone to contamination.



2.3 Project Background

The proposed Nyamila Borehole project under WaSSIP-AF programme is designed to intervene on the challenges facing the target community during the dry weather conditions. In addition to the time spent fetching water from the shallow wells, it is expected that improvements on community sanitation and hygiene will be realized effectively reducing cases of water borne illnesses and livestock deaths during the drought conditions.

The drought mitigation interventions measures desires to provide a dependable source of water (the borehole) and a designed transmission system of the water to a strategically located storage tank from where water would flow by gravity to preselected public consumption locations comprising of water kiosks, cattle troughs. The project, financed by the World Bank through the WaSSIP-AF under the facilitation of Lake Victoria North Water Services Board (LVNWSB), is partly being undertaken for identified Counties in Lake Victoria South Water Services Board (LVSWSB) including Kisumu, Migori, Bomet, Kericho, Narok and Siaya Counties.

The proposed borehole project will benefit the surrounding community with water kiosks located at strategic places namely: Obambo, Nyandhindo, Nyamila, Kibuo, and Radienya. The Community Water project will seek registration from the attorney general's office, to operate and maintain project. The water Act sets framework for licensing of Water Services Provides. The service providers are licensed by the relevant Water Services Boards to undertake the provision and management on behalf of the boards, water and sanitation services. The WSPs are required to ensure that water services and associated works and facilities are provided, maintained and progressively improved.

The community project will be expected to set up a water user's association with a proper management and technical units for proper management and operation of the system. The WUA will require technical assistant from Lake Victoria South Water Services Board (LVSWSB) during the initial period in order to establish organization structures that are based on best practices. It would also help to recruit and train suitable management and technical staff. It would further enable sound management practices in the critical aspects of customer service, billing and revenue collection, effective maintenance, water loss reduction etc. The water supply will be met from Nyamila borehole that was drilled between 21st and 22nd July 2016. The borehole was drilled to a total depth of 78m. The tested borehole yield is 3.0m³/hr.

Nyamila Water Project is located in Pundo Village Kalanya – Kanyango Sub Location in East Kanyada Location of Homa Bay County. The project area has a total population of 1,240 people. The proposed water supply project targets 4 Villages in two sub location which are Pundo and Wiobiero in Kalanya – Konyango Sub-location and Gogo Katuma and Kijawa in West Kanyada Location.

2.4 Proposed Interventions

The proposed Nyamila Borehole Project under WaSSIP-AF programme is designed to intervene on the challenges facing the target community during the dry weather conditions. In addition to the time spent fetching water from long distances, it is expected that improvements on community sanitation and hygiene will be realized effectively reducing cases of water borne illnesses and livestock deaths

during the drought conditions. IDA has approved funding to meet the Board's proposal for equipping the borehole and constructing associated civil works such as elevated tank, water kiosk, pipelines, caretaker's house/store and other site works as part of the drought response activities.

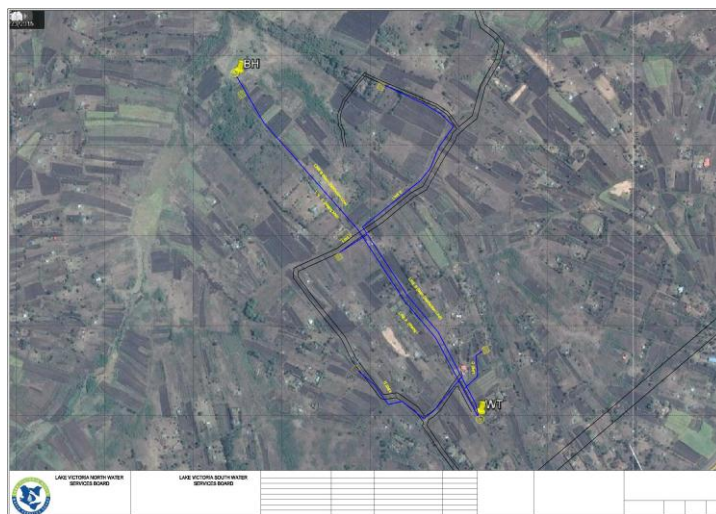
The tested borehole yield is 3.0m³/hr. An elevated Water Storage Tank up to 3m will be constructed on a higher ground some 1.17km from the borehole site. The tank will be fed from a solar powered borehole pump. Water from the elevated tank will flow via gravity to water kiosks to be located at five different locations within the Village. Water taps will be installed at the water point where the community will draw water.

2.5 The Project Components

Nyamila Borehole had already been drilled at the time of the public consultation. The project component is designed for the ultimate water demand in one implementation phased. The project components include:

- (i) Borehole development and Equipping
- (ii) Construction of 25m³ Masonry Storage Tanks.
- (iii) Construction of a distribution System to five Water kiosks in the lower Supply areas comprising Obambo, Nyandhindho, Nyamila, Kibuon, and Radienya
- (iv) 5No water Kiosks
- (v) Management office

Figure 2:



2.6 Design Concepts

The proponent contracted a consultant to prepare a detailed design of the water supply. The Consultant incorporated comments from LVSWSB and prepared a detailed design of the water supply in accordance with the Water Design Manual. The World Bank has approved the detailed design report. The design for Nyamila Borehole project has been attached at the annexes of this project report. This phase is the concept of the planned development and the designing of a structure that will fulfill all requirements of a high quality well designed water system.

2.1.1 General

The design of the water supply system shall be carried out on the basis of the following design Codes and Standards, among others:

- (i) WHO Report No. 4 - Selection and Design Criteria for Community Water Supply Projects
- (ii) Ministry of Water and Irrigation – Practice Manual for Water Supply Services in Kenya, 2006
- (iii) BS 5911: Part 100:1988 – Specification for Unreinforced and Reinforced Pipes and Fittings with Flexible Joints;
- (iv) S 06-217 – Specification for uPVC Pipes;

2.1.2 Water Transmission and Distribution

The following criteria are used in proposing the water transmission and distribution system;

- (i) Short length rising mainlines
- (ii) Ensure distribution to the project areas is entirely by gravity
- (iii) Reduce the maximum walking distance to water points to a maximum of 500m
- (iv) Ensure reliable water supply throughout the day

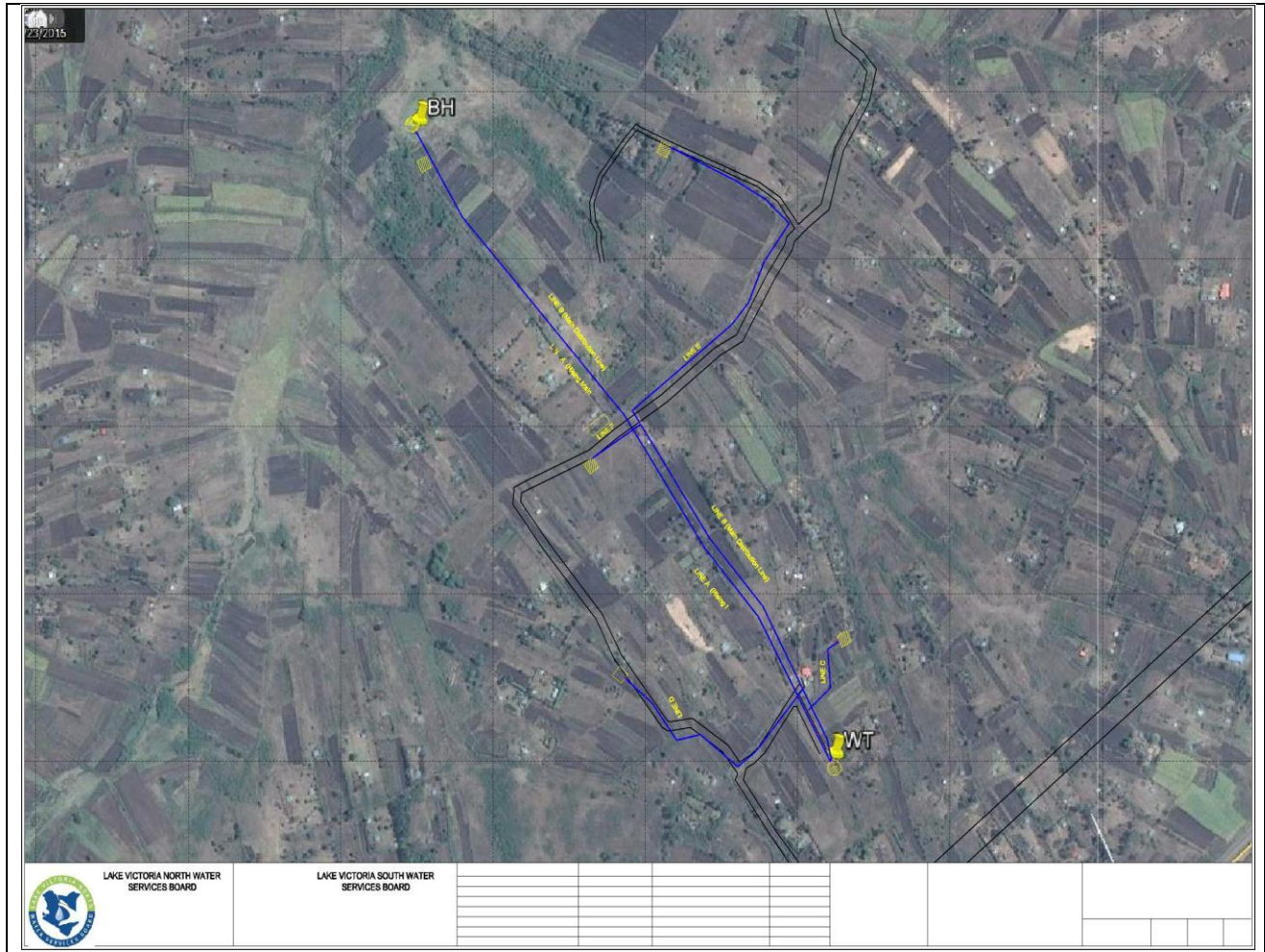
The transmission and distribution system will comprise the following;

- (i) Rising mainline
- (ii) Water storage stank
- (iii) Distribution system of approximately 3.0km long
- (iv) 5No. Communal water points/kiosks

2.1.3 The Pumping System

The proposed system uses pumping to lift borehole water to a high elevated storage tank located 1.17km away. Distribution to water points will be by gravity. The total pumping head from the borehole to the proposed tank site is approximately 120m. Sustainable sources of energy can be explored to power the pumping system. Alternatives include wind power and solar energy. As an alternative to a purely electric pumping, a solar driven borehole pump is proposed. The borehole solar pump will operate for 10-12hours. The solar pump will be powered using 16No. 250W Solar PV Module.

Figure 3: Conceptual Water Distribution Layout Plan



2.1.4 Existing Water Sources

The proposed project areas have abundant sub-surface water resources. This is evidenced by the occurrence of underground water at shallow levels of less than 10m deep. A large proportion of the community accesses water from unprotected spring and shallow wells some of which dry up during the dry season. Some households and institutions practice rainwater harvesting though but due to small storage capacities, the water it's unreliable and prone to contamination. One major source of water is Obambo shallow well which is unprotected. A private borehole has also been drilled along the main Rodi Kopany road where the residents buy water for domestic use.

Figure 4: Sample Community Sources of Water



Obambo Shallow well.



A private borehole

2.7 Alternative Analysis

2.7.1 “NO Action” Alternative

The “no project” alternative would mean further problems in spending more time and money in accessing water for domestic use. This project provides hope for the school children and the community who spend many hours fetching water from natural springs and streams. Dangers of waterborne` diseases such as cholera from will prevail with this alternative. Furthermore, the sanitation situations will deteriorate with negative ramifications on the environment. A ‘no project’ alternative is therefore, a perpetuation of the current status quo and quite undesirable. The No Project Option is the least preferred from the socio-economic and environmental perspective due to the following factors:

- (i) The economic status of the local people would remain unchanged.
- (ii) No employment opportunities will be created for locals who will work at the proposed project
- (iii) Increased problems associated with limited access to clean and affordable water supply.
- (iv) Discouragement for investors planning to invest in water infrastructure
- (v) Development of infrastructural facilities such as health facilities, electrical etc. will not be undertaken

From the analysis above, it becomes apparent that the No Project alternative should not be considered.

2.7.2 Water Sources Alternatives

The community should consider roof catchments of rainwater to augment water supply from the borehole. Harvesting of rainwater will reduce pressure on the grounds and will provide plenty of water for use particularly for the community. The proponent should also install water storage tanks for storing harvested rainwater.

2.7.3 Distribution Alternatives

The proposed project should be implemented using technologies that shall have minimum negative impacts to the environment. The project has considered this by developing a solar pump and gravity-based system as opposed to a pumping system that will be fossil fuel based or will involve incorporation of several other components that might lead to environmental degradation such as generation of Green House Gases (GHG) among other air pollutants. In addition to the gravity, based system the project shall involve developing standby electric pump to be used only during solar pump failures.

2.7.4 Management Alternatives

The water project upon commissioning will be devolved to the overall management of the Homa Bay Sub county Water Officer. The water committee will be in charge of the day-to-day running of the water facility.

Alternatively, the water committee management may contract a company to take charge of the water supply and pay dues as per agreement to the committee.

2.8 Anticipated Challenges

Anticipated challenges include theft and vandalism of the water facilities, Bursting and breakage of water pipes, failure of solar pumps to cover a wider area, and misuse of the water facility by the community. Other challenges include getting consent for landowners where the project components will be constructed.

2.9 Implementation Plan

Upon completion of the construction works, the water project will be handed over to the community through Water Users Association Committee. The management of the facility will be devolved and be under the sub-county water office. The proposed water supply project is conceived as a community water project. The community project will be expected to set up a water user's association with a proper a management and technical units for proper management and operation of the system.

2.10 Cost Estimates

The estimated construction costs for the proposed water supply system are based on the infrastructure provided above. The estimated cost is calculated using the prevailing construction and material unit costs in the country. The estimated construction cost of the proposed options are summarized in the Table below. These are estimates only, and the actual costs will be based on

several factors such as variation in prices between now and the time of tender, and the qualification and efficiency of contractor.

Table 2: Cost Estimates for Nyamila Borehole

Bill No.	Description	Amount (KSh)
1	Borehole Equipping	2,642,180
2	25m ³ Masonry Storage Tank	450,860
3	Distribution Pipeline	2,659,569
4	5No. Water Kiosk	1,978,989
5	Management Office	777,532
	Subtotal	8,509,130
	Add 16% VAT	1,361,461
	Add 10% Contingencies	987,059
	Project Cost	10,857,650

Chapter 3: Policy, Legal Issues and Institutional Framework

3.1 An Overview

Environmental Impact Assessment is a tool for ensuring new projects and programs incorporate appropriate measures to mitigate adverse impacts to the environment and peoples' health and safety as well as enhancing sustainable operations with respect to environmental resources and co-existence with other socio-economic activities in their neighbourhood. Recent Government of Kenya efforts aimed at formulating a clear policy strategy has culminated in the enactment of a new legislation on water management. The Water Act 2002 is aimed at harmonizing and streamlining the management of water resources, water supply and sanitation services (see outline and sample extracts in annex IV). Necessary policies and legislation that ensures annual environmental audits (EA) are carried out on every running project, activity or programme and a report submitted to National Environmental Management Authority (NEMA) for approval and issuance of relevant certificates.

The government has long been concerned with environmental conservation and protection of human health. The Environmental Management provides the framework for sustainable management and protection of the environment and Coordination Act (1999) while the water Act 2002 which provides the framework for the protection of water resources replaced the Water Act Cap 372. EMCA, 1999 was enacted to comprehensively address environmental issues, which were being governed differently by the various sectoral acts in place.

The ESIA process is currently guided by the regulations promulgated in terms of the Environment (Impact Assessment and Audit) Regulation Act, 2003. Others are relevant acts are those that regulate development e.g. Urban planning Act of 1996 and public health and safety (Public Act, 242). The relevance of each of these acts to the proposed project is highlighted in this chapter.

3.2 Policy Provisions

3.2.1 Constitution of Kenya

Article 42 of the Bill of Rights of the Kenyan Constitution provides that 'every Kenyan has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures'. Under Chapter 5 (land and Environment), Part 1 is devoted to land. It requires that land be used and managed in 'a manner that is equitable, efficient, productive and sustainable, and in accordance with the following principles;

- (i) Equitable access to land
- (ii) Security of land rights
- (iii) Sustainable and productive management of land resources
- (iv) Transparent and cost effective administration of land
- (v) Sound conservation and protection of ecologically sensitive areas

Part 2 of Chapter 5 of the constitution is dedicated to Environment and Natural Resources. Article 69 in Part 2 provides that the state shall;

- (i) Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits
- (ii) Work to achieve and maintain tree cover of at least ten per cent of the land area of Kenya
- (iii) Encourage public participation in the management of, protection and conservation of the environment
- (iv) Protect genetic resources and biological diversity
- (v) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment
- (vi) Eliminate processes and activities that are likely to endanger the environment
- (vii) Utilize the environment and natural resources for the benefit of the people of Kenya

Further, Article 70 states that if a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress. The sub-project should ensure compliance with the constitution in so far as equitable sharing of the resources, between the stakeholders. Further, the project should ensure the sustainability of livelihoods and biological resources within the project areas are protected. Any development proposals should also be cognizant of the increased powers under the Constitution given to communities and individuals to enforce their rights through legal redress

3.2.2 Environmental Policy Framework

The National Environment Policy aims to provide a holistic framework to guide the Management of the environment and natural resources in Kenya. It further ensures that the linkage between the environment and poverty reduction is integrated in all government processes and institutions in order to facilitate and realize sustainable development at all levels. This is done in the context of green economy enhancing social inclusion, improving human welfare, creating opportunities for employment, and maintaining the healthy functioning of ecosystem. The main goal of this Policy is “A better quality of life for present and future generations through sustainable management of the environment and natural resources”. This would be achieved through among others promoting and supporting the use of innovative environmental management tools such as incentives, disincentives, total economic valuation, indicators of sustainable development, ESIA Studies and Environmental Audit.

Kenya’s environmental policy is geared towards sound environmental management for sustainable development. This is envisaged in the principle of prudent use, which requires that the present day usage should not “compromise the needs of the future generations”. The policy aims at integrating environmental aspects into national development plans with the following broad objectives:

- (i) Optimal use of natural land and water resources in improving the quality of human environment;
- (ii) Sustainable use of natural resources to meet the needs of the present generations while preserving their ability to meet the needs of future generations;
- (iii) Integration of environmental conservation and economic activities into the process of sustainable development; and
- (iv) Meet national goals and international obligations by conserving bio-diversity, arresting desertification, mitigating effects of disasters, protecting the ozone layer and maintaining an ecological balance on earth.

This EIA study report is geared toward ensuring the proposed project's sustainability.

3.2.3 Kenya Vision 2030

Kenya Vision 2030 is the current national development blueprint for period 2008 to 2030 and was developed following on the successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation which saw the country's economy back on the path to rapid growth since 2002. Gross Domestic Product (GDP) growth rose from 0.6% to 7% in 2007, but dropped to between 1.7% and 1.8% in 2008 and 2009 respectively. The objective of the vision 2030 is to transform Kenya into a middle-income country with a consistent annual growth of 10 % by the year 2030". The 2030 goal for urban areas is to achieve "a well-housed population living in an environmentally-secure urban environment." This will be achieved by bringing basic infrastructure and services namely roads, street lights, water and sanitation facilities, storm water drains, footpaths, and others.

One of the aims of the vision is to make Kenya to be a nation that has a clean, secure and sustainable environment by 2030. This will be achieved through promoting environmental conservation to better support the economic pillar. Improving pollution and waste management through the application of the right economic incentives in development initiatives is critical. The current land use practices in the country are incongruent with the ecological zones. For instance, large portions of land in high potential areas have been subdivided into uneconomic parcels, while some parts of land in the medium and low potential areas are rapidly being converted into agriculture, despite the fragile environment they are located in. Construction and operation of the proposed development will increase the number of rural residents with access to clean water in the area.

3.2.4 National Water Policy

The National Policy on Water Resources Management and Development (Sessional Paper No. 1 of 1999) was established with an objective to preserve, conserve and protect available water resources and allocate it in a sustainable rational and economic way. It also desires to supply water of good quality and in sufficient quantities to meet the various water needs while ensuring safe disposal of wastewater and environmental protection. The policy focuses on streamlining provision of water for domestic use, agriculture, livestock development and industrial utilization with a view to realizing the goals of the Millennium Development Goals (MDGs) as well as Vision 2030. To achieve these goals, water supply (through increased household connections and developing other sources) and improved sanitation is required in addition to interventions in capacity building and institutional reforms.

While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors for promotion of the country's socio-economic progress, it also recognizes the by-products of this process as wastewater. It, therefore, calls for development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. Development projects, therefore, should be accompanied by corresponding waste management systems to handle the wastewater and other waste emanating there from. The same policy requires that such projects should also undergo comprehensive EIAs that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighbourhood and further downstream are not negatively impacted by the emissions.

In addition, the policy provides for charging levies on waste water on quantity and quality (similar to polluter-pays-principle) in which case those contaminating water are required to meet the appropriate cost on remediation, though the necessary mechanisms for the implementation of this principle have not been fully established under the relevant Acts. However, the policy provides for establishment of standards to protect the water bodies receiving wastewater, a process that is ongoing.

3.2.5 The Agricultural Policy

In Kenya the agricultural policy revolves around key areas of policy concern including increasing agricultural productivity, especially for small-holder farmers, emphasis on irrigation, encourage diversification into non-traditional agriculture commodities, enhancing food security, encourage private sector led development and ensure environmental sustainability.

The policy observes that droughts and floods have increased in frequency and intensity in the past three decades resulting in high crop failure and livestock death. Increased land degradation has decreased land resilience thereby exacerbating the effects of drought and floods leading to devastating famine that has taken a toll on human and animal lives. Some of the famine experienced could have been avoided or their impacts significantly mitigated. Inadequate early warning systems, disaster unpreparedness, farming practices that are environmental unfriendly, destruction of rainfall catchment areas mostly as a result of human activities (settlement, farming).

Involvement of women in small-scale agriculture (with over 75% of the labour force) is appreciated as an important factor towards improvement improves agricultural performance. However, despite their contributions women still face a number of hindrances especial limited access to productive resources like land ownership, inputs, extension services and marketing services that need to be addressed.

Environmental degradation and rising poverty is of major concern for agricultural development. The continued scarcity of productive land and increasing poverty levels has led to an increase in agricultural practices that conflict with the environment particularly in the rural areas. Pressure on high potential areas is pushing people to migrate into ASAL lands where they practice inappropriate farming practices leading to environmental degradation and thereby creating a vicious cycle of environmental degradation and poverty.

3.2.6 The Land Policy

Environmental management principles include to restore the environmental integrity the government shall introduce incentives and encourage use of technology and scientific methods for soil conservation and maintain beaches at high and low water marks and put in place measures to control beach erosion. Fragile ecosystems shall be managed and protected by developing a comprehensive land use policy bearing in mind the needs of the surrounding communities. Zoning of catchment areas to protect them from further degradation and establishing participatory mechanisms for sustainable management of fragile ecosystems will also be done. It will also develop procedures for co-management and rehabilitation of forest resources while recognizing traditional management systems and sharing of benefits with contiguous communities and individuals. Lastly all the national parks, game reserves, islands, front row beaches and all areas hosting fragile biodiversity are declared as fragile ecosystems.

Conservation and sustainable management of land based natural resources. The sustainable management of land based natural resources depends largely on the governance system that defines the relationships between people and between people and resources. To achieve an integrated approach to management of land based natural resources, all policies, regulations and laws dealing with these resources shall be harmonized with the framework established by the Environmental Management and Coordination Act (EMCA), (Amendment 2015).

3.3 Legal Framework

3.3.1 Environmental Management and Co-ordination Act (EMCA)

Part II of the Environment Management & Coordination Act, 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. In order to partly ensure this is achieved. Part VI of the Act directs that any new programme, activity or operation should undergo environmental impact assessment and a report prepared for submission to the National Environmental Management Authority (NEMA), who in turn may issue a license as appropriate.

Section 87 sub-section 1 states that no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person, while section 88 provides for acquiring of a license for generation, transporting or operating waste disposal facility. According to section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste, shall apply to the NEMA for a license. Sections 90 through 100 outline more regulations on management of hazardous and toxic substances including oils, chemicals and pesticides

The law is based upon the principle that everybody is entitled to a healthy and clean environment. Part 6 section 39 deals with environmental impact assessment (EIA). The act requires that projects likely to have significant impacts get approval before their commencement. The implementing organ of EMCA is the National Environmental Management Authority (NEMA) which approves and issues an environmental license after it is satisfied that there are no significant impacts of the project identified, and if there are adequate mitigation measures have been put in place. This is also in

compliance with the requirements of the Environmental Management and Coordination Act (EMCA) part VI section 58 (1) and (2) which states:

- (i) Notwithstanding any approval, permit or license granted under this act or any other law in force in Kenya , any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the second schedule to this act, submit a project to the authority in the presubscribed form, giving the prescribed information and which shall be accompanied by the prescribed fee,
- (ii) The proponent of the project shall undertake or cause to be undertaken at his own expense an environmental impact assessment study and prepare a report thereof where the authority, being satisfied , after studying the report submitted under subsection (1), that the intended project may or is likely will have a significant impact on the environment, so directs.

.EMCA (Amendment 2015) provides for the proper management of the environment. The projects to be subjected to EIA/EA are specified in the second schedule of the EMCA. EMCA prevails over all sectoral laws relating to the environment in cases of conflict and contradictions. The Act grants a locus standi to the public in matters of the environment. Communities may have access to the National Environmental Trust Fund (NETF) through awards on exemplary environmental management. The establishment of NETF under section 25 allows NEMA to undertake environmental restorations and mitigate against degradation. NEFT is also responsible for restoring a degraded environment where the perpetrators of such degradation cannot be identified and forced to undertake such restoration.

3.3.2 Environmental Management Regulations

Water Quality Management Regulations, 2006 (Legal Notice No. 120)

These regulations were drawn under section 147 of the Environmental Management and Coordination Act 1999. In accordance with the regulations, every person shall refrain from acts that could directly or indirectly cause immediate or subsequent water pollution and no one should throw or cause to flow into water resources any materials such as to contaminate the water. The regulation also provides for protection of springs, streams and other water sources. This Regulation applies anytime there is a discharge of effluent into the environment without meeting the established standards. This requires all time compliance through the project cycle.

Waste Management Regulations, 2006 (Legal Notice No. 121)

The regulations are formed under sections 92 and 147 of the Environmental Management and Coordination Act, 1999. Under the regulations, a waste generator is defined as any person whose activities produces waste while waste management is the administration or operation used in handling, packaging, treatment, conditioning, storage and disposal of waste. The regulations requires a waste generator to collect, segregate and dispose each category of waste in such manners and facilities as provided by relevant authorities. Regarding transportation, licensed persons shall operate transportation vehicles approved by NEMA and will collect waste from designated areas and deliver

to designated disposal sites. The Regulation will apply on disposal of solid wastes into the environmental without complying with the established standards and procedures. The regulation requires all time compliance.

Noise and Excessive Vibration Pollution Control Regulations, 2009

Part II section 3(l) of these Regulations states that: no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment and section 3(2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual. Part II Section 4 also states that: except as otherwise provided in these Regulations, no person shall (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source. Effects of activities with noise and vibrations in excess of the established standards

Air Quality Regulations

Under the general prohibitions (Part II), section 5 states that no person shall act in a way that directly or indirectly causes immediate or subsequent air pollution. Among the prohibitions are priority air pollutants (as listed under schedule 2 of the regulations) that include general pollutants, mobile sources and greenhouse gases. Odours are also prohibited under section 9 of the regulations (offensive emissions). Emitting activities expected to meet the established minimum levels in the air, particularly in areas habited by human being as well as protected areas.

Biodiversity Regulations

Part II of Regulations, section 4 states that no person shall engage in any activity that may have adverse impacts on ecosystems, lead to introduction of exotic species or lead to unsustainable use of natural resources without an EIA license. The regulation puts in place measures to control and regulate access and utilization of biological diversity that include among others banning and restricting access to threatened species for regeneration purposes. It also provides for protection of land, sea, Lake or river declared to be a protected natural environmental system in accordance to section 54 of EMCA, (Amendment 2015).

3.3.3 County Governments Act

The Act empowers county governments to protect the environment and natural resources with a view to establishing a durable and sustainable system of development. In addition, the county governments are responsible for development planning and control including the county spatial plans. The proponent will work in liaison with Homa Bay County Government to ensure compliance with land use requirements within the county.

3.3.4 The Water Act (2002)

Part II section 18 provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority to demand from any person, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept and the information thereof furnished to the authority on demand.

Section 25 of the Act requires a permit to be obtained for among others any use of water from a water resources, discharge of a pollutant into any water resource. According to section 29 of the same Act, application for such a permit shall be subject to public consultation as well as an environmental impact assessment as per the Environmental Management and Coordination Act, 1999. The conditions of the permit may also be varied if the authority feels that the water so used is causing deterioration of water quality or causing shortage of water for other purposes that the authority may consider has priority. This is provided for under section 35 of the Act. The statute established to coordinate sustainable utilization of water resources including protection of the same from pollution and degradation (abstraction, use and disposal of wastewater thereof).

Section 73 of the Act allows a person with a license to supply water (licensee) to make regulations for purposes of protecting against degradation of sources of water, which he is authorized to take. Under the Act, the licensee could be a local authority, a private Trust or an individual and the law will apply accordingly under the supervision of the Regulatory Board. Section 75 and sub-section 1 allows a licensee for water supply to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing water belonging to the licensee or which he is authorized to take for supply from being polluted. However, if the proposed works will affect or is likely to affect any body of water in the catchment, the licensee shall obtain consent from the Water Resources Management Authority.

Section 76 states that no person shall discharge any trade effluent from any trade premises into sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of the effluent, maximum quantity anticipated, flow rate of the effluent and any other information deemed necessary. The consent shall be issued on conditions including the payment rates for the discharge as may be provided under section 77 of the same Act.

3.3.5 Water Resources Management Rules 2007

One of the outcomes of the water sector reforms has been improved regulatory framework for water resource management and use. In addition to the Water Act 2002, the main document outlining the regulations is the Water Resource Management Rules 2007. The rules set out the procedures for obtaining water use permits and the conditions placed on permit holders. Sections 54 to 69 of the Water Resources Management Rules 2007 impose certain statutory requirements on dam owners and users in regard.

Other sections within the rules imply that WRMA can impose water quality sampling requirements from the water sources and impacts to the hydrology, water chemistry and river morphology downstream basin. Section 16 of the Water Rules requires approval from the Water Resources Management Authority (WRMA) for a variety of activities that affect the water resources, including

the storage of water in dams and pans. Approval by WRMA is conferred through a Water Permit. A permit is valid for five years and must be renewed.

Section 104 of the Water Resource Management Rules requires certain water permit holders to pay water use charges. The intention of the water use charges was to raise revenue for water resource management, raise revenue for catchment conservation activities, improve efficiency of water resource abstraction and provide a system of data collection on water resource usage. This Rules sets the standard procedures and rules to be followed in the utilization of water resources including abstraction controls, modes of use and responsibilities in protection of the resources including effluent treatment standards.

Part II of the Rules requires that any activity that requires approval by Authority (1) Any person intending to or currently undertaking any of the water use activities defined in the Act including the activities listed in the Fifth Schedule shall obtain approval from the Authority to undertake the activity: These approvals in the case of the proposed project are for the drilling of the ground water, permit for the construction of abstraction works and permits for the use of ground water. The Rules indicate the procedures to be followed at each step including carrying out a hydro-geological survey which the proponent has done (see attached hydro-geological report). The proponent has also been awarded an authorization to drill a borehole on the site, and to construct works for the use of water.

3.3.6 Agricultural Act

Part IV no. 48 states that if the Minister considers it necessary or expedient so to do for the purposes of the conservation of the soil of, or the prevention of the adverse effects of soil erosion on, any land, he may, with the concurrence of the Central Agricultural Board, make rules to ensure the preservation of the environment. These rules may include,

- (i) Breaking or clearing of land for the purpose of cultivation is prohibited
- (ii) Control, regulation or prohibition of grazing or watering animals,
- (iii) With this prohibiting rules, the clearing or destruction of vegetation is deemed necessary by the minister for the preservation of soil and its fertility

Under Part IV no. 48(b), the act require the regulating or controlling of;

- (i) The afforestation or reforestation of the land
- (ii) The protection of slopes, catchment areas or areas where rules made under (e) stating- for the maintenance of water in a body of water within the meaning of the Local Government Act
- (iii) Rules made under section 48 may provide for the seizure and forfeiture of any stock de- pastured in contravention of a land preservation order

3.3.7 Public Health Act Cap 242

This Act provides for the impetus for a healthy environment and gives regulations to waste management, pollution and human health. This Act controls the activities of the project with regard to

human health and ensures that the health of the water users are not jeopardized by the activities of the project. The Act demands the adoption of practicable measures to prevent injurious and unhealthy conditions in the site. The Act requires the proponent to enhance effective management of nuisance i.e. noxious matter or wastewater as will be discharged from the proposed project throughout the project cycle.

Part IX section 115 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 and include nuisances caused by accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health.

3.3.8 Forest Act

The Forest Act No7 of 2005 consolidates all forests under the act, and prescribes heavy penalties for damage to forests and trees. Charcoal burning in a forests or farmlands without a license or permit is an offence. Section 52(1) deals with felling, cutting, burning, injuring or removing of any forest produce only cover state, local authority or provisional forest. It sets heavy penalties for damaging trees. This will assist farmers in maximizing benefits from growing trees. Section 40(1) of the act sets to ensure that the forest areas under her management are maintained for biodiversity, cultural or recreational use. In addition it protects the concession area from destruction and encroachment by other persons.

Section 41(1) says that all indigenous forests and woodlands shall be managed on a sustainable Basis for purposes of, Conservation of water, soil and biodiversity, River line and shoreline protection. Cultural use and heritage. Recreation and tourism, Sustainable production of wood and non-wood products, Carbon sequestration and other environmental services Education and research purpose and .Habitat for wildlife in terrestrial forests and fisheries in mangrove forests. The Act puts emphasis on the need to strengthen community-based institutions by creation of Community Forest Associations, which gives the public a greater participatory role to the community in the forest conservation.

3.3.9 Way Leave Act 292

The Act provides guidelines on Government acquisition of land for the development of public infrastructure, even on private land. The proponent of the proposed project has used a private land for the drilling of the borehole and acquired a private land donated by a community member for the construction of other borehole components.

3.3.10 The National Land Commission Act (2012)

Section 5 of the Act, the Commission's functions are to manage public land, recommend national land policy, advise the GoK on a land registration program, conduct research on land use and natural resources, and monitor and oversee land use planning throughout the country. The same section goes on to stipulate that the NLC ensure that state owned land is managed sustainably for future generations.

3.3.11 Physical Planning Act, 1996

Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area may be used. Section 29 of the physical Planning Act gives the county councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development.

Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. At the same time, sub-section 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority.

Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The environmental impact assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA (Amendment 2015). Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to its original conditions.

3.3.12 Work Injury Benefits Act, 2007

This is an Act of Parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes. An employee is a person who has been employed for wages or a salary under a contract and includes apprentice or indentured learner.

3.3.13 Occupational Safety and Health Act 2007

This Act applies to all workplaces where any person is at work, whether temporarily or permanently. It provides for safety, health and welfare of persons employed and all persons lawfully present at workplaces. The duties and requirements of both the employer and the employee are clearly stated in the act.

3.3.14 Public Responsibility and Participation

Part XIII (Sections 140, 142, 143, and 145) of EMCA touches on Environmental Offences relating to standards, pollution, restoration orders, easements and conservation orders. These sections spell out penalties for the various categories of environmental offences and give the public powers (ref. *Locus standi*) to sue environmental offenders and /or seek redress through courts of law. Legal suits could be filled against individual offenders, bodies corporate, partnerships, principals or employers.

3.4 Institutional Structure of the Water Sector

The National Policy on Water Resources Management and Development and the Water Act 2002, presently guides water resources management. The overall goal of the national water development policy is to facilitate the provision of water in sufficient quantity and quality and within a reasonable distance to meet all competing uses in a sustainable, rational and economical way. This policy separates policy formulation, regulation and services provision and defines clear roles for sector actors within a decentralized institutional framework and includes private sector participation and increased community development.

Under the policy, the Ministry in-charge of water resources is responsible for policy development, sector co-ordination, monitoring and supervision to ensure effective Water and Sewerage Services in the Country, sustainability of Water Resources and development of Water resources for irrigation, commercial, industrial, power generation and other uses. The Ministry executes its mandate through the following sector institutions:

3.4.1 Water Services Regulatory Board (WASREB)

The Regulatory Board is responsible for the regulation of the water and sewerage services in partnership with the people of Kenya. The mandate of the regulator covers the following key areas;

- (i) Regulating the provision of water and sewerage services including licensing, quality assurance, and issuance of guidelines for tariffs, prices and disputes resolution.

- (ii) Overseeing the implementation of policies and strategies relating to provision of water services licensing of Water Services Boards and approving their appointed Water Services Providers,
- (iii) Monitoring the performance of the Water Services Boards and Water Services Providers,
- (iv) Establish the procedure of customer complaints,
- (v) Inform the public on the sector performance,
- (vi) Gives advice to the Minister in charge of water affairs.

3.4.2 Water Resources Management Authority (WRMA)

The authority is responsible for sustainable management of the Nations Water Resources;

- (i) Implementation of policies and strategies relating to management of Water resources
- (ii) Develop principles, guidelines and procedures for the allocation of water,
- (iii) Development of Catchments level management strategies including appointment of catchments area advisory committees,
- (iv) Regulate and protect water resources quality from adverse impacts,
- (v) Classify, monitor and allocate water resources.

3.4.3 Water Services Trust Fund (WSTF)

This body assists in the financing of the provision of Water Services to areas of Kenya which are without adequate water services. This shall include providing financing support to improved water services towards;

- (i) Capital investment to community water schemes in underserved areas
- (ii) Capacity building activities and initiative among communities
- (iii) Water services activities outlined in the Water Services Strategic Plan as prioritized by the Government
- (iv) Awareness creation and information dissemination regarding community management of water services
- (v) Active community participation in the management of water services

3.4.4 Water Services Boards (WSBs)

The WSBs are responsible for the efficient and economical provision of water and sewerage services in their areas of jurisdiction. LVNWSB is among the seven catchment Boards established under the Act mandated to;

- (i) Develop the facilities, prepare business plans and performance targets
- (ii) Planning for efficient and economical provision of Water and sewerage services within their areas of jurisdiction;
- (iii) Appointing and contracting Water Service Provider
- (iv) Asset holding of Central Government facilities

3.4.5 Water Services Providers

Water Service Providers are the utilities or water companies. They are state owned but have been commercialized to improve performance and run like business within a context of efficiency, operational and financial autonomy, accountability and strategic, but minor investment. In this respect Homa Bay County Water and Sanitation Company Limited (HOMAWASCO) is tasked with this responsibility.

3.4.6 The National Water Conservation and Pipeline Corporation (NWPC)

NWPC was established under the State Corporations Act in 1988 as an autonomous agency reporting to the Ministry. It is mandated under the Water Act 2002, to contract construction of dams and pans bore holes and rehabilitation of flood canals on behalf of the Ministry.

3.4.7 National Irrigation Board (NIB)

NIB was established in 1966 through an Act of Parliament, Irrigation Act is mandated to develop, promote and improve irrigated agriculture through sustainable exploitation of available irrigation and drainage potential in Kenya. Its key responsibility is development and management of the National Irrigation Schemes in Kenya. In the past, various Acts have mandated different organizations to undertake irrigation and drainage activities resulting in conflicts and duplication of efforts, especially in the public sector. The Irrigation Act (cap 347) needs to be repealed. There are also several other legislations, including those concerning water, environment, land tenure, and Agriculture, which have a bearing on irrigation.

3.5 NEMA Compliance

The government established the National Environmental Management Authority (NEMA) as the supreme regulatory and advisory bodies on environmental management in Kenya under EMCA 1999. NEMA is charged with the responsibility of coordinating and supervising the various environmental management activities being undertaken by other statutory organs. NEMA also ensures that environmental management is integrated into development policies, programmes, plans and projects.

3.6 The World Bank Safeguards

3.6.1 OP/BP 4.01 (Environmental Assessment)

The World Bank has well-established environmental assessment procedures, which apply to its lending activities and to the projects undertaken by borrowing countries, in order to ensure that development projects are sustainable and environmentally sound. Although its operational policies and requirements vary in certain respects, the World Bank follows a relatively standard procedure for the preparation and approval of an environmental assessment study, which;

- (i) Identifies and assesses potential risks and benefits based on proposed activities, relevant site features, consideration of natural/human environment, social and trans-boundary issues

- (ii) Compares environmental pros and cons of feasible alternatives
- (iii) Recommends measures to eliminate, offset, or reduce adverse environmental impacts to acceptable levels (siting, design, technology offsets)
- (iv) Proposes monitoring indicators to implement mitigation measures
- (v) Describes institutional framework for environmental management and proposes relevant capacity building needs.

The environmental assessment evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The assessment takes into account: the natural environment (air, water, and land); human health and safety) social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and trans-boundary and global environmental aspects. Preventive measures are favoured over mitigation or compensatory measures, whenever feasible. This approach is universally applied in many institutional projects.

The World Bank considers environmental impact assessment (EIA) as one among a range of instruments for environmental assessment. Other instruments used by the World Bank include regional or sectoral environmental assessment, strategic environmental and social assessment (SESA), environmental audit, hazard or risk assessment, environmental management plan (EMP) and environmental and social management framework (ESMF). The Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of environmental assessment. Proposed projects are classified into one of three categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts:

- (i) Category A: the proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. For a Category A project, the Proponent is responsible for preparing an EIA report.
- (ii) Category B: the proposed project has potential adverse environmental impacts on human populations or environmentally important areas such as wetlands, forests, grasslands, and other natural habitats - but these are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A projects. Like Category A the environmental assessment examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.
- (iii) Category C: the proposed project is likely to have minimal or no adverse environmental impacts. Beyond screening, no further environmental assessment action is required for a Category C project.

Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental associated with Bank lending operations. The purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable and that potentially affected people have been properly consulted. The magnitude of the proposed borehole and water system falls under category B, being a localized intervention project and hence an ESIA Project would be appropriate.

3.6.2 OP/BP 4.04 (Natural Habitats)

The policy is designed to promote environmentally sustainable development by supporting the protection, conservation, maintenance and rehabilitation of natural habitats and their functions. The policy seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products that natural habitats provide to human society. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water area where most of the native plant and animal species are still present). This project has no significant interaction with natural habitats. This policy is, therefore, not triggered.

3.6.3 OP/BP 4.11 (Physical Cultural Resources)

This policy is meant to assist in preserving physical cultural resources including the movable or immovable (above or below ground, or under water) objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance including sites and unique natural values. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The objective of this policy is to avoid or mitigate adverse impacts on physical cultural resources from development projects. No cultural resources and sites were identified in the area apart from a chance to find scenario whose handling procedures are described under the Chapter on impacts.

3.6.4 OP/BP 4.12 (Involuntary Resettlement)

The policy states that “where large-scale of population displacement is unavoidable, a detailed resettlement plan, timetable, and budget are required. Resettlement plans should be built around a development strategy and package aimed at improving or at least restoring the economic base for those relocated. Experience indicates that cash compensation alone is normally inadequate. Voluntary settlement may form part of a resettlement plan, provided measures to address the special circumstances of involuntary resettled people are included. Preference should be given to land-based resettlement strategies for people dislocated from agricultural settings. If suitable land is unavailable, non-land-based strategies built around opportunities for employment or self-employment may be used”.

Involuntary resettlement is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The objective of this policy is

to avoid or minimize involuntary resettlement, though participation in resettlement planning and implementation and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects. There will be no displacements of people from this project. This policy is not triggered.

3.6.5 OP/BP 4.36 (Forests)

The policy on forest safeguards seeks to realize the potential of forests to reduce poverty in sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Among the principles is to screen as early as possible for potential impacts on forest health and quality and on the rights and welfare of the people who depend on them. The project area is fully habited and intensive social and economic activities. The policy is, therefore, not triggered.

3.6.6 OP/BP 4.10 (Indigenous Peoples)

This policy contributes to the Bank's mission of poverty and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies and cultures of indigenous peoples. For all projects that are proposed for Bank financing and affect indigenous peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation. There are no indigenous peoples identified in this project area.

Chapter 4: Environmental Setting

4.1 Overview

Nyamila village has a gentle slope towards Obambo Valley. The area receives above average amounts of rainfall making sections of Obambo valley to be water logged especially during rainy seasons. Obambo valley forms Obambo stream, which drains into River Arujo which in turn leads to Lake Victoria. Vegetation comprises of grass, forbs, shrubs and woody trees of various species. The surface geology is mainly composed of black cotton clays soils in most areas. Water sources available to the residents are also scarce and residents have to walk long distances to fetch water from the available streams and open shallow wells. The sections below outline the basic environmental setting of the project area and Homa Bay County in general. The proposed Nyamila Borehole Project site is located within Obambo River Valley some 3km from Rodi Kopany Junction. The site that is easily accessible through a tarmac road to Sori before turning onto an access road leading to the borehole site.

4.2 Topography

The general gentle slope of the land ensures a good drainage of the project area. The project area is considered as the lakeshore lowland with its end lies Homa Bay. The bay is skirted by a shoreline stretching for approximately 16.5 km covering parts of Asego and Rangwe Divisions. Homa Bay area has a gently rolling terrain that flattens towards Lake Victoria. It is characterized by various hills standing separately.

The county is divided into two main relief regions namely the lakeshore lowlands and the upland plateau. The lakeshore lowlands lie between 1,163 –1,219 m above the sea level and comprise a narrow stretch bordering the Lake Victoria especially in the northern parts of the county. The upland plateau starts at 1,219 m above the sea level and has an undulating surface which has resulted from erosion of an ancient plain. It is characterized by residual highlands such as Gwasssi and Ngorome hills in Suba, Gembe and Ruri Hills in Mbita, Wire Hills in Kasipul as well as Homa hills in Karachuonyo. Koder forest in Kasipul and the Kanyamwa escarpment that runs along the borders of Ndhiwa and Mbita also form part of the upland plateau. To the west of the county lies the Lambwe Valley where Ruma National park is located. The county is dissected by a number of rivers namely Awach Kibuon, Awach Tende, Maugo, Kuja, Rangwe and Riana rivers, most of which originates from Kisii and Nyamira counties. There are also several seasonal rivers and streams which originate from highlands within the county. The county has 16 islands, some with unique fauna and flora and an impressive array of physiographic features with great aesthetic value as well as breath-taking scenery and forested landscape particularly those around the islands and the coast of Lake Victoria and a peninsula like Sikri of Mbita sub-county

4.3 Geology and Soils

The project area soil is black cotton soil, which is difficult to work upon with simple hand implements. It is also difficult to work on during heavy rains, making farming difficult. The predominant soil type in this subzone is the imperfectly to poorly drained, deep to very deep, very dark grayish brown, mottled,

very firm, cracking clay chromic vertisols The lake shore lowland is dominated by alluvial soils, mainly the sandy loam type which is well drained and suitable for cotton, sunflower, maize, beans, cow peas and vegetable production. Other crops with potential are sugar cane and potatoes. The subcounty is underlain by various rock types, namely, agglomerates, conglomerates, tuff sandstone, granite and other deposits which are useful in the construction industry.

4.4 Water Resources

The proposed project areas have abundant sub-surface water resources. This is evidenced by the occurrence of underground water at shallow levels of less than 10m deep. Currently, the main sources of water in the project area are traditional unprotected Shallow wells. A large proportion of the community accesses water from unprotected spring and shallow wells some of which dry up during the dry season. Some households and institutions practice rainwater harvesting though but due to small storage capacities, the water it's unreliable and prone to contamination. One major source of water is Obambo shallow well which is unprotected. Private boreholes also exist where the residents buy water for domestic use.

Water levels of the Shallow well fluctuate a lot and nearly dries up during the dry season. The average distance to the main source is 0.5km -1 km during wet season and 1km- 2.0kms during dry season and it takes between 10mins to 30mins collect water during wet season and 30 minutes to 1hrs during dry season. Most household do not buy water their expenditure on water is minimal. They mainly pay for drinking water at Kshs 3 per 20 litres container i.e. for those who can afford to pay. The Shallow well is reliable and unprotected it's not safe but they use it both for domestic and livestock.

4.5 Hydrology and Drainage

Though the project area has clay poorly drained loamy soils, there are no incidences of water logging except at the base of Obambo valley. The surface drainage is also efficient. The largest river in the County is Kuja River and its tributaries, which cover the southern half of the County. The river originates at highland areas of Kisii Hills, runs through Homa Bay County and drains into Karungu Bay in Migori County. The second largest river is Awach Tende River, which covers northern half of the County together with its tributaries. The headwaters of the river originate at the northwestern side of Kisii Hills, and then the river starts flowing toward Homa Bay of Winam Gulf through the border with Rachuonyo District. Another important river is Maugo River, a tributary of Awach Tende River. In addition, the District is endowed with rich wetland resources although the size of which are generally smaller than that in Nyando District

4.6 Sanitation and Hygiene

The common mode sanitation in this rural setting includes pit latrines. Every household has pit latrines within their premises. The pit latrines are shallow and some have varying seasonal water levels making it uncomfortable for use. Tradition though do not allow elders share latrines with their daughters implies even where toilets are available, a notable number of the community members still seek alternative sanitation. The combination of shallow pit latrines and open defecation in the bushes poses a major risk to water quality and hence threat to public health in the areas with among infections

being typhoid, cholera, diarrhea, hepatitis B, eye infections, skin diseases and other water borne diseases.

Save for Lake Victoria and other known natural sources such as rivers and springs, the county of Homa Bay has about 2,200 water facilities spread over 211 sub-locations. These facilities include boreholes, water pans and water wells/springs. Overall the county still needs a number of water facilities if the distance to a water facility is to be reduced from an average of five km to below three km for majority of the residents.

The only known water supply schemes that are operational with frequent breakdowns are those in major urban centres such as Homa Bay, Mbita, Kendu Bay and Oyugis. Whereas some investment has been made to deliver water to the other urban centres, the schemes have not been successfully completed. Areas with gravitational capacities are also being explored for investment such as in Suba and Oyugis.

Most urban and trading centres in Homa Bay County lack adequate public health and sanitation facilities such as public toilets, safe water sources and effective drainage and waste disposal facilities. The end result has been high morbidity and greater burden on the health care system. Latrine coverage in Homa Bay County is estimated at 60 per cent.

4.7 Public Health Status

This section gives an overview of the current status of the health sector in the project area and Homa County in general. A number of health facilities are available at Kalanya Kanyango sublocation. These are Miniambo Dispensary near Wiobiero Primary School, Kijawa Dispensary Next to Kijawa Primary School and St. Lawi near Sero Youth Polytechnic. Serious cases of illness are taken to Marindi Subcounty Hospital or Homa Bay County Hospital.

Malaria is endemic in the area and is the main cause of morbidity and mortality in the County. Although for recent years malaria cases seem to decline. This steady increase in malaria cases was not confined to Nyanza province only but it was country wide. The increase can be attributed to several reasons. For example, malaria drugs are now free to the patients at government health facilities, and hence people suffering from malaria tend to appear.

HIV/AIDS is one of the major health problems in this County. Several interventions have been put in place to address the HIV/AIDS pandemic. These interventions have prevention, care and support components and they include Voluntary Counseling and Testing (VCT), Prevention of Mother to Child Transmissions (PMTCT), patient support center that provides Antiretroviral Therapy, Home Based Care and awareness creation and prevention. The government through the National AIDS Control Council has also channeled funds through the Constituency AIDS committee to support community initiatives that address HIV prevention and care to mitigate the effects of the epidemic in the community.

Other major diseases prevalent among adults include HIV/AIDS opportunistic infections, tuberculosis, waterborne diseases, and skin diseases while main illnesses affecting the under-fives are malaria,

measles, pneumonia, diarrhea, skin disease and malnutrition. The main causes of mortality and morbidity in the district are attributed to health conditions that are preventable either through immunization, observing basic hygiene or through environmental manipulation.

4.8 Waste Management

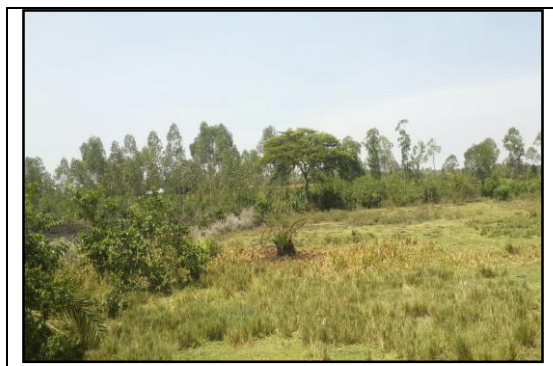
Being a rural set up, waste is not a major challenge in waste generation and management. Domestic wastes are managed at the household levels (mainly papers, cartons, plastics and limited packaging materials. Agricultural wastes including dry plant matter decompose in the farms while livestock wastes are applied as manure in the farms.

4.9 Biodiversity

The proposed project area is endowed with both indigenous and exotic tree species as well as shrubs and forbs. A number of plant species found to be dominating the project area are; *Cassia siamea*, *Croton megalocarpus*, *Psidium guajava*, *Grevillea robusta*, *Eucalyptus saligna*, *thevetia peruviana*, *Sesbania sesban*, *Rhus natalensis*, *Albizia gummifera*, *Acacia specie*, and *Ficus wakefieldii*, and *Vernonia auriculifera*. Forbs observed in the project area include; *Ocimum suave*, *Colens kilimanscharica*, *Conzya banariensis*, *Indigofera erecta*, *Tithonia diversifolia*, *Tagetes minuta*, and *Lantana camara*. The settlement patterns within the county coupled with the high Population density poses as a major constraint to large-scale wildlife conservation. At the time of assessment, there were no endangered fauna and flora at the proposed project site or its vicinity.

Homa Bay County is home to Ruma National Park which is the only park where unique and rare species like the roan antelope can be found. There is, however, potential presence of reptiles (snakes, lizards, crocodiles associated with the Lake ecology) and rodents (rats and moles among others). There is also heavy presence of various types of birds that are associated with the lake and highland ecologies and attracted by the social behaviour. Birds are perhaps the most visible wildlife around the project area.

Figure 5: Typical Vegetation Cover



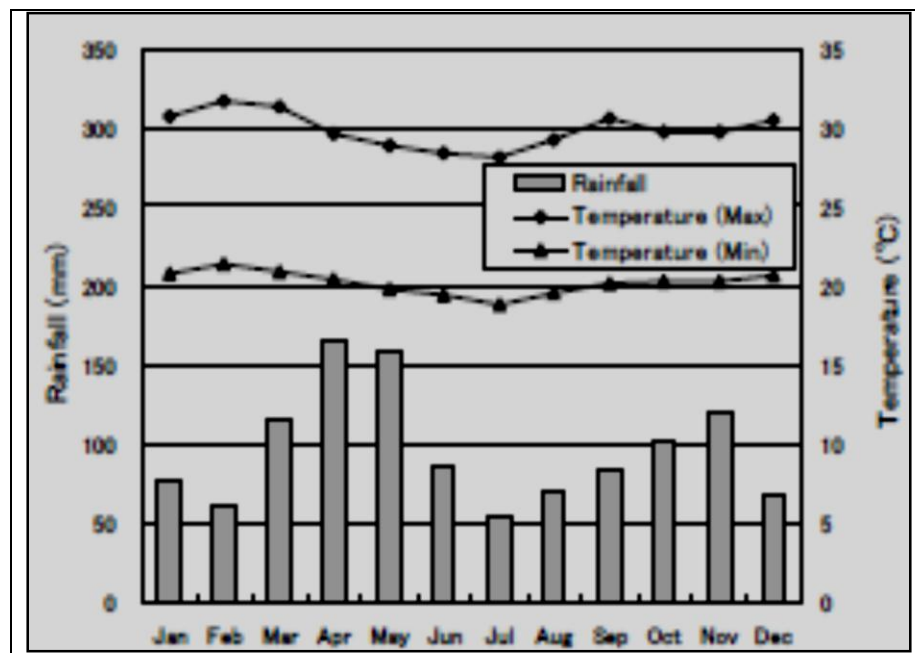
4.10 Climatic Conditions

4.10.1 Rainfall and Temperatures

There are two rainy seasons; long rainy season from March to June and short rainy season from October to February. The mean annual rainfall ranges from 900 mm in lowland areas of the lakeshore to 1,600 mm in highland areas. Figure 10 shows the monthly average rainfall at Homa Bay Agriculture Training Centre together with average daily maximum and minimum temperatures by month. The average annual rainfall at the centre is 1,156 mm. In peak months of the rainy seasons, it experiences more than 100 mm rainfall every month.

In the County, temperature differs according to the elevation. The annual maximum temperature is between 30°C and 35°C in the lowlands while it becomes between 25°C and 30°C in the uplands. The annual minimum temperature tends to change as well as the maximum; it is between 15°C and 20°C in the lowlands and between 10°C and 15°C in the highlands. Figure 10 indicates that February is the hottest month with maximum of 31.6°C and minimum of 21.4°C while July is the coolest with 28.1°C and 18.8°C. It also explains that the monthly change of the temperature is much smaller, which is only about 3°C, than the daily changes, which is 9.7°C on average.

Figure 7: Annual Rainfall and Temperature Trends



4.10.2 Wind

Generalized wind speeds average about 4 m/sec and have certain regularity due to the convection effect of the large water body of the lake that borders the often hot dry land.

4.10.3 Air Quality

Being a rural set up air quality not deteriorated as compared to urban centers. During construction, the proponent will use vehicles and equipment that depend on fossil fuel as their source of energy during project implementation. It is recommended the requirements of the regulation such as periodic vehicle inspection, use of clean fuels among others be implemented in order to eliminate or reduce negative air quality impacts.

4.11 Noise and Vibrations

Noise and vibrations will be experienced during construction works as the machines and vehicles will be on site. The project team should observe the noise regimes for the different zones especially when working in areas termed as silent zones which are areas with institutions, worship places.

Chapter 5: Social and Economic Setting

5.1 Overview

There are various socio-economic activities undertaken by the various households in the greater Homa Bay County to generate income. These include employment in salaried jobs; small-scale farming in maize, millet, horticultural crops, sorghum and beans. A large segment of the population is engaged in informal sector while the rest are involved in small-scale businesses. There is one Sugar Mill in the county that offers employment to the people in the area. The major economic activity is fishing and fish processing with the County being the leading supplier of fresh water fish in the country. This is due to its proximity to Lake Victoria with 80% of its waters in the County. It is also endowed with arable land, livestock, pastures, wildlife and sand.

Other economic activities are farming with maize, millet, cassava and sunflower being the leading agricultural produce. It also has thriving commercial business and a potential for exploitation of minerals such as copper, gold, iron ore, pyrite, nepheline and phosphate.

5.2 Land and Settlements

The settlement pattern of in the project area is scarce although Kalanya Kanyango Sub-location has a population density of 328 according to KNBS Population data of 2009. The area is settled by predominantly Luos. The proposed project area is in an agricultural zone. Land is mainly used for food production, commercial sugarcane growing, and settlement. Due to the continued rise in population and decline in soil fertility there has been encroachment into wetlands and river banks. This prompts the need for proper physical planning to enhance sustainable land use and environmental management.

5.2.1 Land Ownership and Land Use

In Homa Bay town, the land tenure system is such that within CBD there is trust land and leasehold (99 years). Areas of Kalanya and Katuma have a freehold land tenure system, while areas of Kothidha and Kanyadier are community land under a land adjudication programme. Most of the landowners in Homa Bay have land whose size ranges from an eighth to 20 acres. However, most households living in Homa Bay own land ranging between an eighth to 3 acres with the majority, about 23.7% owning a quarter acre. The land has been sub-divided to sizes uneconomical for agricultural activities.

Land is demarcated and owned under freehold systems. The lands have been divided to smaller portions with the increase population and demand for agricultural land. There is practice of subsistence farming and livestock. The community undertakes other economic activities to supplement income from Agriculture. Due to the continued rise in population and decline in farm productivity, there has been progressive encroachment into sensitive land areas such as along riparian areas. There is inadequate integration of land use planning principles in development projects to ensure long-term compatibility and potential conflicts.

5.2.2 Settlements Patterns and Housing Characteristics

The project area can be described as sparsely populated like other sub locations in the Sub-county. The highest populations are found within Homa Bay town and small towns like Rodi Kopany. Most of the project area is generally flat terrain homesteads and farmlands uniformly distributed.

5.3 Demographic Patterns

In the 2009, Kalanya Kanyango Sub-location had a population of 14,527,313 (male-6,965 and female 7,562) with a density of 480 persons per km² spread in 3,188 households. The annual population growth rate stood at 2.1 %. There is a high population growth rate and thus the population in the sub-county is expected to remain high.

Based on projections from the 2009 Kenya Population and Housing Census, Homa Bay County has an estimated population of 1,038,858 persons consisting of 498,472 males and 540,386 females by the end of the year 2012. This population is projected to rise to 1,177,181 persons in 2017. Of this total, 564,843 will be males while 612,338 will be females

The natural growth of Homa Bay is high owing to a number of factors; high fertility rates at 7.1% and low acceptance of family planning, natural increase takes place at high rates because of high fertility rates, low acceptance of family planning, which stands at 35% and decreased mortality rates.

5.4 Economic Activities

The major economic activities in the proposed project areas include crop farming, livestock rearing and small-scale businesses. Agricultural activities are dependent on rainfall. Crops include maize, beans and horticulture. The main cash crop grown in the proposed project area is sugarcane. Most farmers still face the challenge of marketing their produce. Business entrepreneurs licensed in the informal sector include retail shops, welding workshops, bar and restaurant among others. The informal sector is widespread in the project area and it contributes considerably to the growth of the local economy.

5.4.1 Agriculture

The main crops produced in the county include maize, beans, sorghum, millet, kales, sweet potatoes and peas. The vast majority (80 per cent) of the farmers produce maize and beans. This is because maize and beans are considered the staple foods of the county. The main cash crops produced in the county are sugar cane (Ndhiwa), sun flower (Suba), pineapples (Rangwe) and potatoes (Kasipul and Kabondo Kasipul). There exists huge potential for cotton in Mbita, Homa Bay Town, Rangwe and Karachuonyo Sub-counties.

Fishing remains a prominent activity in Homa Bay county engaging upwards of 18,300 people and 3,600 families. The main types of fish harvested include Nile perch, tilapia and clarias (Omena). The county has 151 landing beaches managed by 133 beach management units (BMUs). Of these BMUs, 61 are in Mbita, 33 in Suba, 30 in Rachuonyo North and four in Homa Bay. In the year 2012, 76,710 tonnes of fisheries worth KES 7 billion were captured. Of these Nile perch contributed KES 5 billion and Clarias (Omena) contributed KES 1.7 billion.

The main livestock bred in the county include zebu cattle, the red Maasai sheep, the small East African goat and the indigenous chicken. Most of these livestock are bred for their sentimental value and are used only in emergencies to cover medical and transport costs, pay school fees, entertain guests and pay dowry. There exists very limited commercial development of livestock resources in the county save for promotion of dairy goats by Heifer International and the Southern Nyanza Community Development Project (an IFAD/GOK initiative under the Ministry of Planning in Suba, Ndhiwa, Homa Bay Town and Karachuonyo sub-counties.)

5.4.2 Trade and Finance

According to the 2009 Kenya Population and Housing Census, Homa Bay County has four recognized urban centers namely: Homa Bay, Mbita Point, Kendu Bay and Oyugis. The county has several trading centres with the main ones being Sindo, Ndhiwa, Rodi Kopany, Kosele, Mirogi, Rangwe, Adiedo, Nyangweso, Aora Chuodho, Magunga, Ringa, Kadongo, Chabera, Misambi, Ruga, Nyandiwa, Ogongo and Sena. Some of these market centers are growing fast and could soon graduate to townships going by the volume of development being witnessed.

Today these centers are hosts to most microfinance institutions, wholesale and retail outlets, accommodation and entertainment facilities. Three of them: Ndhiwa, Kosele and Magunga host sub-county headquarters where closeness to government services continues to attract good investments. Others are strategically positioned to benefit from the local transport network as the key points of entry or connection between various busy roads. This category includes Nyandiwa, Rodi Kopany and Sena. The county has 151 landing beaches managed under 118 Beach Management Units. These landing beaches have become influential trading centers in the county especially for fish and forestry products. Examples of landing beaches which have become thriving trading centres include Nyandiwa, Ringiti, Remba, Kwethumbe, Alum, Kaugege, Ndhuru and Sena

5.4.3 Transport and Communication

Homa Bay County has one class A1 (Kisii – Kisumu) road which covers about 30km; one class C20 (Homa Bay – Rongo) road covering about 30Km; two class C19 (Homa Bay – Mbita and Homa Bay – Kendu Bay) roads covering about 71Km and one class C18 (Rodi Kopany – Sori) road covering about 32km. All these class A and C roads are bitumen surfaced except for a 25Km stretch of the Homa Bay – Mbita road which is yet to be tarmacked but work on which is in progress. In all about 168Km of the road surface in the county is under bitumen, including a D221 road of about 5Km linking Kadongo to the county boundary with Nyamira. The rest of the classified road network of about 1,800Km of is not bituminized with 25% under gravel and earth 75% under earth.

The county has witnessed a lot of roads opened in the last 10 years most of which are presently being maintained by the Kenya Rural Roads Authority. More roads, however, will need to be opened and/or improved to enhance access to markets by local producers and to lower the transport costs of doing business in all parts of the county. Homa Bay County has five airstrips, namely: Kabunde, Mfangano, Rusinga, Otange and Otaro. Kabunde is the only one that has the bitumen-surfaced run-way and can

accommodate large aircrafts. Otange and Otaro airstrips are still under construction and were expected to be complete by the end of 2013

Homa Bay County has 10 post offices spread across its vast territory to adequately cater for its posting needs. However, with the emergence of mobile phone-based short message services, increased availability of email facilities and other electronic media the use of post office services has been significantly reduced. The county enjoys mobile phone penetration of 62.7 per cent with all the national telephony operators registering a presence. The popularity of mobile telephony services has been boosted by the electronic money transfer capability especially Safaricom's M-pesa. The use of landline services has virtually ended in the county with most connectivity infrastructure vandalized.

Figure 8: Rodi Kopany Road



5.5 Social Welfare Indicators

The community lack basic amenities to improve the living and health standard. There are still rampant cases of poverty, lack of safe drinking water, poor transport systems, food insecurity occasioned by inadequate and unreliable rainfalls, unemployment and high cases of childhood mortality. Most prevailing condition is, therefore, not favorable to majority of the area residents.

5.5.1 Poverty and Income Levels

Despite the significant efforts by various stakeholders to address poverty, it still remains the greatest challenges facing the area. The local community in the area associates poverty with inability by the individual or household to access basic needs. Vulnerability and multi-dimensional deprivation of basic necessities such as food, health and education are manifestations of poverty. The factors advanced as being responsible for the sustained high levels of poverty are: Landlessness, disability, orphan hood, laziness and unemployment. Attitude related factors include preference for formal employment over those of entrepreneurial nature e.g *Jua Kali* or farming

5.5.2 Education

Homa Bay County has 1,183 Early Childhood Development (ECD) centres served by 1,326 ECD teachers, 905 primary schools served by 5,385 teachers, and 118 secondary schools served by 1,224 teachers. At the tertiary level, the county hosts one public Teacher Training Colleges at Asumbi and one public Technical Training Institute at Mawego. The county is not home to any public university save for two learning centres at Homa Bay Town run by University of Nairobi and Maseno University and one at Nyandiwa TTC run by Rongo University College. Moi University, Maseno University, Mount Kenya University and Bondo University College have proposed to set up full-fledged satellite campuses in the county and are currently looking for suitable sites for the same. Sites so far proposed included Kabunde, Homa Hills, Waondo and Mirogi. Bondo University College has a teaching site at Kosele; University of Nairobi has a learning center in Oyugis at Olando Plaza. Homa Bay County hosts three accredited private colleges and sixteen established public youth polytechnic including Homa Bay, Nyagwethe, Waondo, Sindo, Waiga, Wakiaga, Sero, Oriwo, Kabuoch, Langi, Omiro, Nyakongo, Ndiru, Katieno, Lambwe and Mboga Youth Polytechnics. Kenya Industrial Estates also has an operational centre in Homa Bay town

5.6 Health

Homa Bay County has 211 health facilities including nine tier three hospitals and four mission hospitals. The rest are health centres and dispensaries most of which are connected to community health units. These facilities are manned by 941 personnel mostly nurses with a doctor-population ratio still at 1: 40,000 and nurse-population ratio at 1:1,500. This is way above the national average and measures should be in place to remedy the imbalance and address the consequent lack of quality health care provided in low tier health facilities. It is estimated that the County has a bed capacity upwards of 2,190 in public facilities and 12 in mission facilities. These capacities enjoy over 100 per cent occupancy meaning there exists sharing of beds in health facilities. There is need for further investment in in-patient care services especially wards where more observed care can be provided by trained health professionals such medical doctors, clinical officers and nurses.

5.7 Cross Cutting Issues

This section provides a brief overview of the issues that impact and interact with more than one domain of economic, social and environmental development. The Cross Cutting Issues are not restricted to water supply sector per se; on the contrary, decisions made in other sectors or nationwide scale, strongly influence how water policies perform in specific situations.

The water sector has been a pioneer in understanding that involvement of both men and women in water management is imperative to ensure development opportunities and equitable management. A significant percentage of the world's population falls under the age of 35. The average age of the world population is 28. In many societies, young people make up more than 50 percent of the citizens. There is often very little involvement of youth in decision-making process. Limited access to useful knowledge is the reason of a huge pressure on young people and intensifies the difficulties for them in participating in water management

Until recently, it was rare for water management planning to consider finance. Water advocacy and plans were often inspirational, neglecting to show where the money would come from, how activities would be financed or who would pay for them. This situation is changing, finance is now an essential topic in water management circles. Water governance refers to the range of political, social, economic and administrative systems that are in place in a particular society to manage water and deliver services. How a society manages its water resources determines the health of its people, the success of its economy, the sustainability of its natural environment, and its relations with the neighbours. Good water management brings tangible benefits to a society. Thus, good governance is a cornerstone on how to develop and manage water resources, and the delivery of water services at different levels of society

5.7.1 Gender

In general, of the rural water supply schemes are generally poor on gender representatively on CBO Committees. The traditional role and responsibility of women in managing water on the household level should translate into a greater role in, and responsibility for, the management of water on the larger water scheme scale.

5.7.2 Social and Cultural Setting

The project area is inhabited by the Luo community in which the changing times and attitudes have effected a change in concept, context, and expression of the Luo cultural practices. These changes are due to awareness on human rights, gender equality, and economic pressures. It is also important to note that of all the socio-cultural practices, the few which are still being practiced in the area are practices surrounding birth, wife inheritance, and death.

5.7.3 HIV/AIDS and Other Communicable Diseases

The HIV/AIDS prevalence rate in the area is high. During construction period, the borehole project is likely to bring in a significant population of new people in the project area chances are high that new infection rates may increase.

Chapter 6: Public Consultations

6.1 Overview

Regulations 35-2 of the Environmental (Impact Assessment and Audit) Regulations, 2003 requires that an EA should examine and seek views of the local community and other potentially affected communities. The welfare of human societies and the quality of life is directly linked to sustainable use of natural resources. This has been duly recognized in agenda 21 where it stated that;

“Special attention should be paid to demand for natural resources generated by unsustainable consumption and to the efficient use of these resources consistent with the goal of minimizing depletion and reducing pollution”

The Kenyan government has enshrined the need for human societies’ involvement in project development in the constitution. This has been set out in Environmental (Impact Assessment and Audit) Regulations, 2003 which require the community participation to be part of EA. It has also demonstrated that projects that go through this process will acquire high level of public acceptance and accrue benefits for a wider section of the society.

Public consultation forms a useful component of gathering, understanding and establishing impacts of projects; determine community and individual preferences and selecting mitigations. Furthermore, it makes it possible to enhance project designs and ensure sustainability of projects. This participatory process enabled the participation of the local people in the decision making process. The involvement of the various stakeholders ensured that the affected population and other stakeholders are informed, consulted and allowed to participate at various stages of project preparation.

The engagement was through administering open ended questionnaires and holding a public meeting at Nyamila SDA Church compound, some 400m from the borehole site. The public meeting was held on 11th January, 2017 to discuss the proposed borehole project. The meeting was organized by the water committees and area administration. In attendance were representatives from Lake Victoria South Water Services Board headed by George Ageng’o, in charge of Environment. Also in attendance was the EIA/EA Lead Expert Mr. George Adhoch representing the Consultant. There were also members of the surrounding community and the general public. The list of attendance as well as minutes discussed in the meeting is attached in appendices of this report. The questionnaires administered during public consultation are also attached at the appendices of this ESIA project report.

6.2 Outcome of Consultative Public Participation

The public interviewed welcomed the development and were optimistic that the project will reduce cases of waterborne diseases with the supply of treated water, create employment opportunities stimulate the local and national economy by boosting other sectors of business and lead to better standards of living. There was no major negative issue raised as far as the new development is concerned. The participation from the stakeholders, the public and neighbours were very successful and the participants were very cooperative. The community members were unanimous in their approval of the construction of the borehole and are willing and ready to fully participate in its maintenance and operations. They were also

optimistic that the time wasted in search for water will be reduced. Therefore the project is commendable for approval by NEMA.

Figure 9: Stakeholders Consultation Meeting



6.3 General Views

6.3.1 Employment Opportunities

The residents expect the project to create casual employment opportunities during the proposed project construction. Unskilled labour, for instance, digging of trenches, laying of pipes, construction of water Kiosks, and caretakers office are some of the casual jobs that the area youth will benefit from. Long-term job opportunities are also expected during project's operation phase, for instance, caretakers who will be put in charge of the kiosk. The employment opportunities could be either directly in the project or indirectly through associated businesses.

6.3.2 Improvement of Local and National Economy

The project requires use of locally available materials, namely cement, barbed wire, nails, water pipes, poles, roofing sheets etc. This will translate into contribution towards growth of the economy by contributing to the gross domestic product through improved sale of goods.

6.3.3 Boosting of the Informal Sector

During the construction and operations phases of the proposed borehole project, the residents expect that other businesses in the informal sector will flourish. This will promote the informal sector in securing some revenue and hence improved livelihood.

6.3.4 Improvement of Sanitation

Currently, the residents fetch raw water from the dams and shallow wells. The sources easily are contaminated since they are shared with livestock. This has been exposing the residents to dangers of contracting waterborne diseases. The community is happy that with the water supply, they will be able to access cleaner and safer water for their domestic use hence better living standards.

6.3.5 Time Saving

Kalanya Kanyango Community residents are happy that they will save on time usually lost in travelling to the water sources to fetch the water.

6.4 Fears and concerns

6.4.1 Increased Dust Emissions (Air Pollution)

During construction phase of the proposed water project, the residents fear that there will be undesirable emissions that will be emitted by vehicles bringing materials to the site. Neighbours asked for air pollution control measures to be put in place by the proponent.

6.4.2 Social Concerns

Some respondents thought construction works would attract many people to the area including construction workers. They say many people will come from the neighbouring communities to get clean water. Others complained that construction workers practice immorality with their women and even snatch them.

6.5 Suggestions and Recommendations

In order to enhance high level of ownership and cooperation during and after the project construction, it was suggested that adequate information and awareness be considered throughout the project cycle. Water quality tests to be done regularly to ensure it is safe. The contractor will ensure that his staff behaves in the right manner as per the requirements of the law. He will be responsible for their actions.

Chapter 7: Anticipated Impacts and Mitigation Measures

7.1 An Overview

The environmental impact assessment and analysis was done using a number of methods and tools. While identifying impacts, a checklist was used. This indicated all possible impacts that would accrue from implementation of this project. A weighted matrix was used to examine the level of impact for each particular impact. The proposed intervention project has an overall positive impact to the residents and minimal implications to the environment. While appreciating the benefits associated with improved access to safe drinking water, it would also be necessary to recognize negative impacts so that appropriate preventive measures are integrated into the project during the implementation and operations

7.2 Impacts Criteria

The impacts are examined under two categories i.e. negative environmental impacts and positive environmental impacts. The various impacts in these two categories are then examined in order of their level of importance and significance. They are also examined in categories of their time of occurrence (construction or operational phase). The following possible impacts were determined.

Table 3: Impacts Criteria

Potential Impacts' Aspects	Impacts	Design	Project Stage		
			Construction	Operation	Decommissioning
Air Pollution	Dust and emissions	o	-	o	0
	Noise Levels		-	o	0
Soil Loss	Erosion	o	-	o	-
	Stream Erosion	o	-	o	-
Bio-Diversity	Flora and Fauna	o	-	+	+
	Habitat Alteration		-	+	-
Population	Employment	o	+	+	+
	Quality of Life		+	+	+
	Infrastructure		+	+	+
Water	Surface Flow	o	o	o	o
	Site Drainage		o	-	o
Others	Landscape & Aesthetics	o	o	o	o
	Cultural	o	+	+	+
	Economy	o	o	+	+
	Wastes	o	+	+	+

- Negative Impact + Positive Impact o No Impact

The above checklist identifies potential impacts from the proposed projects' different phases

7.3 Significance Matrix

The weightings of significance within the table below range from 0 – 3 whereby 0 represents no significance, 1 represents low significance; 2 means there will be some significant effect; and 3 represents high environmental significance. Seven (7) environmental attributes were considered against the project activities. A total score of 0 – 7 on any row will represent an activity with negligible or no significance. A score of 8 – 14 will represent activities with significant impacts that will require some intervention to avoid adverse impacts. Aspects ranging from 15 – 21 will have high significance and these would have detrimental effects on the environment if left unchecked. The matrix below conveys the negative impacts of the project activities against identified environmental attributes.

Table 4: Significance Matrix

Impact matrix	Environmental Attributes								
	flora	fauna	population	soil	air	hydrology	landscape	Totals	
									Weighting
									0= not significant
									1= low significance
2= significant									
3= high significance									
Project Activities									
Design phase									
Planning and design	0	0	0	0	0	0	0	0	
Impact assessment	0	0	0	0	0	0	0	0	
Construction phase									
Ground clearing	1	1	0	1	1	1	1	6	
Excavation	2	1	1	2	1	1	2	10	
Civil works	0	0	0	0	0	0	0	0	
Materials transfer									
Construction	0	0	0	0	1	0	0	1	
Waste handling	0	0	0	1	0	0	0	1	
Operation phase									
Resource Use	1	0	2	2	0	3	0	8	
Human movement	1	1	0	0	0	0	0	2	
Traffic flow	0	0	0	0	0	0	0	0	
Waste generation	0	0	0	0	0	0	0	0	
Total	5	3	3	6	3	4	3		

The horizontal sum totals represent the significance level of the project activities on the environment. Not much emphasis will be placed on activities with low or no significance score that are less than 7. The vertical totals depict environmentally sensitive environments. With seven activities on each column, each attribute can have a maximum score of 21. The maximum score would represent a very sensitive attribute that will require some intervention to curb adverse impacts. There are however some positive impacts of the project with regard to economic gains namely savings on

purchases of water; provision of clean, abundant potable water; and reduction of time wasted in searching for water.

7.4 Positive Impacts

The proposed borehole under WaSSIP-AF programme is designed to intervene on the challenges facing the community during the dry weather conditions. In addition to the time spent fetching water from long distances, it is expected that improvements on community sanitation and hygiene will be realized effective reduction in cases of water borne illnesses and livestock deaths during the drought conditions. The project will, therefore, create short-term employment to a number of residents in the area.

The project will require supply of large quantities of project materials most, of which will be sourced locally in the surrounding areas. This shall provide ready market for construction material suppliers such as quarrying companies, hardware shops and individuals with such materials. The large number of construction staff required will provide ready market for various goods and services, leading to several business opportunities for small-scale traders such as food vendors around the project site. The project shall also attract more investments in the area.

It is anticipated that the operations phase of this project will result in:

- (i) Increased number of community members with portable water for domestic use;
- (ii) The health status of the project area is likely to improve as improved water facilities will reduce water borne diseases prevalence;
- (iii) Increase in employment opportunities and development of socio-economic activities in the area.
- (iv) The general socio-economic activities carried out at the communities will also increase due to optimal use of time through continuous engagement in socioeconomic activities.
- (v) Students will now have more time to stay in class and study rather than have to skip school to go long distances to fetch water. This will ensure increased enrolment and performance in primary and secondary schools in the area.
- (vi) Improved hygiene at the family level, especially the women and children who for many years have to rely on the little water obtained from a distance,
- (vii) Saving time spent accessing water (especially by women and children) after the project. The distance covered will also be significant. The time saved will go to other productive use including income generation engagements for the women and studying for the children,
- (viii) Less risks from water borne infections and especially for young children, who are exposed to ailments such as typhoid, diarrhea and skin infections,
- (ix) Women and children (girls) will also be saved from potential injuries (spinal and pelvic complications) arising from carrying heavy burdens of water for long distances,
- (x) Easy access of water by the larger community will contribute towards protection of the rivers and streams from haphazard abstraction of water.
- (xi) Temporary and/or permanent direct increases in employment arising from construction activities and operation;

- (xii) Social inclusion and accessibility to community facilities through the provision of better linkages including access roads;
- (xiii) Stimulation of Local Economy during the construction phase of the project that will stimulate local economic activities through creation of job opportunities for the construction workers and demand for goods and service

7.5 Negative impacts

Improper construction of wells and boreholes can provide short-circuit flow pathways for surface and subsurface contaminants to impact ground-water quality. However, the impact of the borehole on the soils, land use and natural resources of the area is expected to be minimal. The area is clear of any natural vegetation and is mainly stony with sparse vegetation. The construction works will involve minor clearing, minor excavation and minimal site preparation. As such, there will be minimal clearing of trees or shrub vegetation, and hence minimal ground disturbance required for completion of the borehole and therefore, minimal impact to soils and natural resources are expected to occur. The project will incorporate a number of mitigation measures that will ensure minimal adverse impact on the environment and conformity to the various national and internationally accepted guidelines and standards. Specific Impacts and Mitigation measures are briefly described below;

7.5.1 Soil Loss and Compaction

- (i) Excavation for the water transmission pipelines, storage tank construction and water kiosks may lead to soil loss through erosion and wind. This is particularly true along natural drainage and stream crossings. Further soil loss may occur along the access roads to the project areas.
- (ii) Compaction will result due to movement of construction machinery around the proposed site. Compaction has the undesired effect of hindering air and water penetration beneath the soil surface and thus limiting aerobic activities of soil dwelling organisms. This may have negative consequences on soil productivity on a localized scale. Compaction also enhances run-off during the rainy season resulting into soil erosion,
- (iii) There is potential destruction of Physical, environment, removal of vegetation, soil erosion and compaction and slight elevation in nearby streams.

Mitigation Measures

- ✓ Excavations should be undertaken during the dry conditions and the works should be completed before the rains,
- ✓ Strictly control moving machines to ensure that they operate judiciously and over designated areas to reduce soil compaction.
- ✓ Rip off any compacted areas after construction to allow aeration of soil and ease infiltration of water into the soil,
- ✓ Develop soil erosion management measures
- ✓ Develop tree planting Programmes
- ✓ Plan work in sections to avoid opening up areas not earmarked for development
- ✓ Minimize clearance of existing natural vegetation at the site

- ✓ Re-establishing vegetation in whole or part of the disturbed areas through implementation of a well-designed
- ✓ Establish a landscaping programme.

7.5.2 Groundwater Pollution

Borehole construction activities have the potential to introduce contaminants into ground water reservoirs creating a great concern to human and animal health. Protection of groundwater quality during the drilling may have occurred following one or more of the following deficiencies:

- (i) Insufficient or substandard well casing hence drawing contamination from the sub-surface or perched water,
- (ii) Inadequate seal between the well casing and the borehole
- (iii) Poor welding of casing joints
- (iv) Lack of sanitary protection at the wellhead

The effects of the drilling process are covered in the drilling ESIA Project Report. However, there are potential linkages of the borehole water quality during the water abstraction and distribution activities that include among others;

- (i) Installation of the pumping facilities,
- (ii) Car washing and services within vicinity of the wellhead,
- (iii) Proximity of deep pit latrines to the wellhead
- (iv) Land use practices within the borehole area including excessive application of agrochemicals,

Mitigation Measures

Groundwater quality must be safeguarded by an appropriate territorial planning since these are strictly linked to ground water resources. Other measures will include;

- ✓ Ensure that all potential sources of pollution are eliminated,
- ✓ The proponent will adhere to the regulations set by WRMA on the amounts to be extracted from a borehole and the number of pumping hours. This helps to reduce wastage and misuse of this resource as well as ensuring equity in ground water abstractions,
- ✓ Avoid improper land use activities within the proximity of the borehole wellhead
- ✓ Undertake an audit on the integrity of the borehole abstraction piping and associated casings

7.5.3 Groundwater Depletion

Improved water supplies have the potential to increase the number of users and changes in water uses practices. This may place unnecessary demand on the proposed borehole project resulting in excessive abstraction of the water from the borehole i.e. beyond the permitted limit. Test pumping exercise has established the recommended abstraction limits per day to allow for recharge. There is tendency of misuse of water at service points from an attitude that the water comes easily and may

be at no cost. Other avenues of water loss include burst pipes, leaking taps and overflowing storage tanks.

Mitigation Measures

Part of the proposed project is to ensure installation of control facilities including a water meter. These control facilities include the following;

- ✓ The borehole should be installed with a master meter and an Airline/Piezometer to monitor ground water abstractions and to facilitate regular measurements of the static water level in the borehole, respectively
- ✓ The maximum ground water abstraction permitted from the borehole is limited to the authorized volume per day for the domestic/industrial use only subject to availability from 60% of the tested yield for a maximum abstraction period not exceeding ten (10) hours per day
- ✓ Install auto-shut water taps to reduce water wastage
- ✓ Educate and create awareness to the Community on the value of water and water resources for enhanced conservation,
- ✓ Consult on reasonable water tariffs to sustain the water supply as well as creating a sense of value for water to the beneficiary community,
- ✓ Ensure optimum maintenance of the water supply system components including pipelines, valves and consumer taps.

7.5.4 Water Quality and Quantity

Water supplies are designed to improved access to water for the public. However, with increasing population and demand of water resources, more energy goes into enhancing water flow but forgets the management of sanitation and wastewater. This scenario also leads to low attention to water quality and concentrating into increasing the volume.

Mitigation Measures

Following is an outline of the proposed mitigation measures;

- ✓ Observing the Water Act 2002 and associated Water Rules
- ✓ Conduct continuous maintenance of machines, equipment and vehicles
- ✓ Provide project workers with sanitary facilities during the construction period
- ✓ Conduct water sampling at least every 3 months for water monitoring record base on this facility
- ✓ Observe and maintain the limits set by WRMA water abstracting license
- ✓ Encourage rain water harvesting by the public to enhance sustainability and complementation of the borehole outputs

7.5.5 Noise and Vibrations

The noise generated during any construction is at best described as part of a normal occupational challenges faced by that construction workers. Noise levels in construction works are usually below the threshold limit (90dBA) that workers can be exposed in an 8 hours working day and is consequently not of any major concern. However, this project is generally a low noise activity where noise is confined with the excavation equipment and support vehicular traffic. The noise emitted from these equipment, however, will be minimum and within the ambient noise levels. The works will be undertaken during the day time and hence effects to night time noise will not be associated with the construction equipment.

Mitigation Measures

To mitigate excess noise during construction of the water supply infrastructures, the proponent will consider the following measures;

- ✓ Adhere to the Kenya Noise Prevention and Control rule passed in 1996 under legal notice No. 296 as a subsidiary legislation to the Occupational Health and Safety Act (OSHA) of 2007 which requires putting in place measures that will mitigate noise pollution.
- ✓ Consider especially the rule, which states that, “No worker shall be exposed to noise level in excess of the continuous equivalent of 90 dBA for more than 8 hours within any 24 hours duration”.
- ✓ Minimize noise at the site and in the surrounding areas through:
 - ✓ Properly servicing and maintaining pumping to reduce noise generation; and
 - ✓ Placing noisy equipment in sound proof rooms or in enclosures to minimize ambient noise levels,
- ✓ No works during the night to prevent disruption of the neighbouring community sleep

7.5.6 Hazardous Wastes

There are potential emissions of hazardous waste materials that may accidentally spill. These include oil grease spills contaminating the soil and ground water. Others may include oil filters and other engine parts that may arise from the workshop. The construction support offices may generate hazardous materials including printer cartilages, computer parts, old phone sets, etc.

Mitigation Measures

The following mitigation measures should be adopted to limit the impact of hazardous substances on-site;

- ✓ Ensure that oil/grease spills and other oils and associated materials (filters, rags and cans) are immediately removed along with all contaminated material and disposed of at an waste disposal site;
- ✓ Ensure that contaminated materials including used/spilled oils/grease as well as other contaminated materials are stored in a banded area before being disposed off;
- ✓ Ensure that a suitable spill kit is available on site throughout construction period, to be applied to all contaminated areas that will absorb / breakdown the spills. The quantity of such materials shall be able to handle the total volume of the hydrocarbon stored on site; and

- ✓ Repairing and maintenance and greasing of vehicles and construction plants must be carried out off the site (petrol station or garage) to avoid fuels and lubricants spills at the project site and contamination of the water.

7.5.7 Solid Wastes

There will be some solid containers such as cement bags, bentonite residuals and cement bags and other packets with materials and equipment to be used during implementation of the project. However, during the construction phase, there no solid waste anticipated from the water supply system (there is no treatment works component to the system).

Mitigation Measures

The following mitigation options can be adopted;

- ✓ Any remaining waste (paper or polythene containers, cement bags, bentonite, construction debris, etc. should be safely burned and/or disposed in designated waste disposal areas before the project is commissioned,
- ✓ Some of the drilled materials will be used in the borehole construction by back filling the annular space. All excavated material from the draining channel will be used to refill it.
- ✓ Construction crew to be encouraged to dump their personal wastes in designated covered dustbins

7.5.8 Vegetation Clearing, Soil Erosion and Sedimentation

Construction activities including pipelines, water kiosks, and caretaker's office have the potential to clear vegetation and, loosen soils particularly on slopes that can then be washed down into the lower areas (streams and valleys) and soil quality degradation is also likely to occur during construction because of disposal of construction materials on the adjacent lands. The project area was noted not to have rich vegetation cover thus impact on them will be minimal.

Mitigation Measures

- ✓ Excavated materials should be reused as much as possible in backfilling the trenches or for land filling activities. Those to be used later should be stored appropriately to protect against elements of weather such as storm water runoff.
- ✓ Excavation meant for disposal should be deposited in areas defined for their disposal so as to reduce risks of being washed away by elements of weather and spillover effects to neighbouring lands or water bodies;
- ✓ Project implementation plans should be developed such that section excavated are worked on and completed before moving to other areas;
- ✓ Proper channels for waste water drainage should be developed within the project site to reduce washing away of soils and other loose materials;
- ✓ Re-vegetation of exposed areas around the site should be carried out rapidly in order to mitigate against erosion of soil through surface water runoff and wind erosion; and
- ✓ Develop programs for enhancing vegetation cover the project area.

7.5.9 Health and Safety Issues

Potential impacts during construction include exposure to physical hazards from the use of equipment, slips and fall hazards, rock falls/slides in steep areas and exposure to dust and noise. Other injuries or fatalities may result from workers operating equipment without adequate training or with lack of personal protection equipment (PPE&C) or extended exposure to outdoor weather resulting in heat-related lethargy. The public are also potential exposed to risks of safety from the excavated trenches waiting pipe laying, access to the work areas by unauthorized members of public and potential road safety risks from trucks and vehicles accessing the site.

Mitigation Measures

The following mitigation measures are recommended to control effects of health and safety:

- ✓ Ensure all equipments are inspected before use for appropriate safeguards and that the machine operators are trained on machine safety,
- ✓ Ensure the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay,
- ✓ Ensure appropriate road safety signage are strategically placed and drivers adhere to the requirements of such signage,
- ✓ Erect speed breaks where human and vehicular traffic have high interaction opportunities;
- ✓ Provide adequate manual labor to meet the requirements of the tasks, and
- ✓ Each site staff or operative should be supplied with the following safety equipments for working at the landfill site overalls, heavy-duty boots, gloves goggles and dust masks and application of the same enforced.
- ✓ Appropriate signage and information on safety should be provided at all work points interaction with the public,
- ✓ Provide appropriate barriers along the excavated trenches. All construction sites shall be isolated from the public and their livestock. This will be done through temporary fencing and fixing appropriate safety signage and information. Involve the local people for enhanced ownership and management,
- ✓ Ensure that the works takes a short a period as possible. The contractor to ensure the minimal time on site (construction period) in order to reduce potential safety risks to the residents,
- ✓ Upon completion and commissioning of the works, public safety in regard to water quality will be important. Security to be ensured for the borehole and storage tanks. Involvement of the local community will be inevitable in this regard.

7.5.10 HIV/AIDS

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

Mitigation Measures

- ✓ Programs should be developed and integrated into the project implementation for sensitizing the local community and project workers on HIV/AIDS and/or other sexually transmitted diseases (STDs).
- ✓ Review the construction activities to integrate with the HIV/AIDS campaigns;
- ✓ Develop appropriate training and awareness materials for Information, Education and Communication (IEC) on HIV/AIDS;
- ✓ Identify other players (local CBOs, NGOs, and government organizations) on HIV/AIDS for enhanced collaboration;
- ✓ Develop an intervention strategy compatible with the construction programme to address success of the HIV/AIDS prevention and provide peer educators for sustainability in collaboration with other stakeholders; and
- ✓ Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs

7.5.11 Potential Cultural Disruptions

There are no physical cultural and historical sites in direct interaction and/or conflict with the project. However, the traditional lifestyles of the residents is notable as part of the diverse cultural spectrum of Kenya.

Mitigation measures

- ✓ The contractor should sensitize all staff on local cultures and discuss with local community on the same.
- ✓ The contractor should in liaison with traditional leaders and the National Museum of Kenya, develop and implement a chance find procedure in case archaeological sites are found during the construction process.

On the chance to find situations, the procedures below are to be followed;

- (i) If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall;
 - ✓ Stop the construction activities in the area of the chance find;
 - ✓ Delineate the discovered site or area;
 - ✓ Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Ministry in charge of managing cultural heritage and related resources in the country (responsible ministry) take over;
 - ✓ Notify the supervisory Project Environmental Officer and Project Engineer who in turn will notify the responsible local authorities and the responsible ministry immediately (within 24 hours or less)

- (ii) Responsible local authorities and the responsible ministry would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists assigned by the government. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values.
- (iii) Decisions on how to handle the finding shall be taken by the responsible authorities and/or ministry. This could include changes in the layout (such as when finding irremovable remains of cultural or archeological importance) conservation, preservation, restoration and salvage.
- (iv) Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities.
- (v) Construction work may resume only after permission is given from the responsible local authorities or the responsible ministry concerning safeguard of the heritage.

7.5.12 Operations and Maintenance

- (i) There are potential water losses through burst pipes and leakages and if left unchecked will lead to massive water losses (and so revenue) as well as potential for soil loss.
- (ii) Water quality management, especially Fluoride levels in the borehole water, need to constant monitoring during the operations.
- (iii) The cost of the operations for the water supply system will be pegged on the pumping costs. Challenges on the appropriate maintenance of the pumping system would be a major factor in operations

Mitigation Measures

- ✓ The sub-county water office should ensure that pipeline connections and joints are regularly checked.
- ✓ Regular monitoring of fluoride levels to ascertain it is within the required levels. If required the users may require to be guided on the management of the fluoride levels by dilution.
- ✓ The community water committee should be trained on water quality management as well as basics of the system management

7.5.13 Land Acquisition

There are no anticipated displacements of people or settlements by of the project components (implying that all current population will fully enjoy the benefits). However, limited land-take will be affected for the following;

- (i) The borehole site is located on Obambo Valley on a private land. The land owner has, consented to this arrangement for the borehole that will then be fenced out for purposes of the pump-house and on-site tank.
- (ii) The pipeline way-leave from the borehole to the distribution tank as well as the tank locations will be confined to a section of public road. Where the way-leave encroaches

- private land, specific landowners agreed to contribute the way-leave for public good. Consent forms are annexed to this report for reference,
- (iii) There is potential for the PAPs to be incited for personal interests as opposed to the good of the Community. In this regard, adequate sensitization and awareness was recommended to the stakeholders.

Mitigation Measures

- ✓ Complete the Resettlement Action Plan (RAP) such as to address the limited land take issues. It is noted that Landowners voluntarily agreed to donate affected sections of their land for the common good of the community. This is illustrated by the signed consent forms annexed to this report
- ✓ Prepare a clear and workable Complaint Redress Mechanism to provide a tool for dissatisfactions arising from the implementation of the RAP process,
- ✓ The PAPs shall be engaged to release the affected land parcels for the benefit of the common public.

Chapter 8: Environment Management Plan

8.1 Management Plan Principles

The Environmental Management Plan (EMP) involves the protection, conservation and sustainable use of the various elements of the environment. The EMP for the proposed project provides all the details of its activities, impacts, mitigation measures and expected costs during implementation and decommissioning phases of the project. The potential negative impacts of this project on the environment are few and with proper environmental management procedures in place and adhered to there should be minimal negative impact of concern emanating from it.

The project is geared towards enhancing social and economic benefits through sustainable water supply. Development of the proposed Water Supply Project would be expected to comply with the environmental conservation requirements in accordance with the established Kenyan laws and regulations. To realize these goals, acceptability by a majority of the beneficiaries and stakeholders as well as ensuring minimal effects to the physical environment will require to be ensured through participation in the project and continuous consultations, evaluations and review of the design aspects throughout project implementation cycles.

It is also recommended that the environmental management guiding principles specific to this project improvement and water resources management be established to allow integration of environmental management considerations during construction and operations. Among the factors that need to be considered in this particular project implementation will include;

- (i) The design of the water supply system should be ensure low maintenance costs for sustainability,
- (ii) Control of soil erosion and siltation of water sources (rivers and streams), incorporation of project components sustainability and operational provisions and the associated components,
- (iii) Enhancing integration of environmental, social and economic functions in the project implementation,
- (iv) The contractors and other players in the project activities be prevailed upon to implement the EMP through a sustained supervision and continuous consultations
- (v) Involvement of the community in the project implementation to enhance ownership and capacity building for long term operations of the facility,
- (vi) Compensation of any land or property that may be affected by the project in accordance to the laid down regulations and/or agreements with the affected sections of the community,
- (vii) Consult with the beneficiary community and inputs from LVSWSB on determining sustainable tariffs to ensure revenues for maintenance and also instill a sense of value for water to the beneficiaries.

8.2 Management Responsibilities

In order to implement the management plan, it is recommended that an expert be identified to oversee the environmental and social management aspects including the water source conservation, soil erosion control, re-vegetation whenever appropriate, water conservation and equity in distribution, enhanced sanitation and hygiene measures throughout project area to match the water supply initiative. The expert would also be required to coordinate and monitor environmental management activities during construction and post-monitoring audits. Other recommended participants include;

- (i) Lake Victoria South Water Service Board will be responsible for coordination of all the activities and liaisons, particularly the quality control of the works and social issues.
- (ii) Community Project Management Committee will have the responsibility to enforce water quality monitoring and efficient maintenance systems, procedures to minimize interruptions to water supply and ensure accessibility by all consumers. In this regard appropriate capacity building and skills will be necessary,
- (iii) National Environmental Management authority (NEMA) and the Water Resources Management Authority (WRMA) through the County Directors offices shall be responsible of surveillance of environmental and social aspects of the project implementation,
- (iv) The County Government of Homa Bay (the County Executive in-charge of Water and Environment) and the Homa Bay Sub-county Water Office;
- (v) The Contractor;
- (vi) The Supervision Consultant;
- (vii) The local administration,

8.3 Environmental Management Guidelines

The guidelines will include among other areas environmental management programs, standard operation procedures, compliance monitoring schedules and environmental audit schedules as required by the law. Social harmony of the intake, treatment works, storage tanks and associated component will be achieved through the collaborations with the stakeholders or community management committees introduced at various water consumption points. Specifically, the following will promote efficiency;

- (i) Ensure environmental conservation and sustenance to ensure a balanced approach between the development and the ecosystem.
- (ii) Ensure and enhance safety within the development both within the construction and operation phases.
- (iii) Promoting environmental ethics within concerned parties and users

8.4 Environmental Education and Awareness Raising

Components of environmental training should also be incorporated in the water management committee meetings. The training should include among others: keeping a clean environment on site and their respective homes, importance of tree planting, and dust and noise effects and control. This training and awareness creation on environmental matters should also extend to neighboring schools

in simple forms like participating in classes and sponsoring environment related competitions. The committee can also organize environmental displays and exhibits for local communities, to raise their awareness and level of commitment.

Lake Victoria South Water Service Board and the water supply beneficiaries need to understand the basic environmental, water use sanitation and hygiene principles. In this regard therefore the following steps may be considered;

- (i) Creation of liaisons on all matters related to environment, health and safety,
- (ii) Encourage contribution of improvement ideas on specific issues related to the management of the facilities,
- (iii) Establish initiatives that would instill a sense of ownership of the facilities and related components to all beneficiaries,

The contractor will also be expected to incorporate HIV/AIDS programs during construction phase. Awareness, prevention and training on HIV/AIDS and other social diseases is important during project construction and operation phase. The awareness creation should be improved through putting up of banners, posters and training should be facilitated within the project area to the construction workers and the community.

8.5 Decommissioning Process

This involves demolition of the borehole and its associated components and its abandonment after a certain period. There are varied reasons for the abandonment of a borehole; these include inadequate water or drying up of the aquifer due to activities uphill, poor water quality, defective construction and legal implications. During the abandonment period, a lot of caution needs to be observed so that the materials can be reused on another project and to avoid contamination of the remaining water in the aquifer. Effective abandonment of a borehole depends on knowledge of the construction carried out at the source, geology and hydrogeology of the area. The importance of a full characterization increases as the complexity of the borehole yield, site geology and the risk of a aquifer contamination.

Proper records should be maintained during project implementation and later filed with the Water Resources Management Authority (WRMA) as required. Water level and any obstruction around the vicinity of the project need to be identified. Obstructions such as pumps, pipes, wiring must be pulled out and be used in alternative project. Scrap metal such as Iron sheets can be sold to metal scrap for safe disposal.

8.6 Environmental and Social Management Actions Matrix

The matrix below illustrates specific actions to be undertaken during the project implementation by specific responsibilities and focus areas

.

Table 5: EMP Matrix

Issues	Activity and Associated Impacts	Management Actions	Target Areas and Responsibilities	Timeframes and Costs Estimates
Preparatory Activities	<ul style="list-style-type: none"> ✓ Social conflicts generated from inadequate understanding of project ✓ Possible intrusion to the local residents privacy blamed on the project personnel alien to the community ✓ Possible immigration into the project area by construction workforce 	<ul style="list-style-type: none"> ✓ Give prior notification to the community and leaders on expected disruptive activities related to the project, e.g. temporary disruptions of access roads. ✓ Involvement of Administration Office in the project (the Assistance of County Commissioners and Chiefs) ✓ Limit construction works today-time only to minimize social conflicts, 	<ul style="list-style-type: none"> ✓ Tank Locations ✓ Locations for water kiosks and cattle troughs. ✓ Proposed water transmission pipeline corridors ✓ General project site corridor <p>LVSWSB, Homa Bay County Government</p>	<p>Planning Period</p> <p>No direct costs anticipated</p> <p>Allow KShs. 600,000 to manage through environmental and social issues generated by mobilization and demobilization of contractor.</p>
	<ul style="list-style-type: none"> ✓ Limited loss of vegetation and ground cover due to project site clearances ✓ Delivery of construction materials to the work areas leading to limited soil erosion, dust and road obstructions 	<ul style="list-style-type: none"> ✓ Ensure vegetation restoration to counter the limited loss during the sites preparation ✓ Endure minimal disturbance of vegetation during materials sourcing and delivery, ✓ To the extent possible utilize existing material sources and transit routes 		
	<ul style="list-style-type: none"> ✓ Potential risk to safety of the workers generated by inception works and site preparations ✓ Risk to safety of the residents 	<ul style="list-style-type: none"> ✓ Ensure adequate provision of the personal protective equipment, ✓ Ensure regular maintenance of contractors machineries and vehicles, ✓ Provide adequate signage and reflective tapes for restricted zones 		
Construction	<ul style="list-style-type: none"> ✓ Destruction of Physical Environment, removal of vegetation ✓ Soil erosion and compaction ✓ Increased river sediments 	<ul style="list-style-type: none"> ✓ Develop soil erosion management measures such as limit the circulation of heavy machinery to minimal areas ✓ Plan work in sections to avoid opening up areas not earmarked for development ✓ Minimize clearance of existing natural vegetation at the at the site 	<ul style="list-style-type: none"> ✓ Tanks Locations ✓ Transmission Corridors ✓ Water Kiosks Locations <p>Contractor</p>	<p>During Construction period</p> <p>Allow ~KShs. 300,000.00 for rehabilitation</p>

Issues	Activity and Associated Impacts	Management Actions	Target Areas and Responsibilities	Timeframes and Costs Estimates
		<ul style="list-style-type: none"> ✓ Re-establishing vegetation in whole or part of the disturbed areas through implementation of a well-designed landscaping programme 	Supervision Consultant/LVSWSB	
	<ul style="list-style-type: none"> ✓ Waste Generation Management ✓ Degradation of air quality and ambient noise due to excavations operations ✓ Potential soil erosion and siltation to downstream water, ✓ Oil spills from contractors machinery 	<ul style="list-style-type: none"> ✓ Source durable project materials from local suppliers who use environmentally friendly processes in their operations ✓ Construction to be carried out during dry seasons to the extent possible, ✓ Sprinkle water on the excavated sections to abate dust emissions, ✓ Practice soil control measures ✓ Ensure all machines are in good working condition for emissions control ✓ Complying with work place legal requirements of competent work force 	<ul style="list-style-type: none"> ✓ Pipeline corridor ✓ Tank locations ✓ Water Kiosks locations ✓ Supervision Consultant, ✓ LVSWSB ✓ Contractor ✓ Project Committee 	<p>During Construction period</p> <p>Allow ~KShs. 150,000.00 for waste management and pollution control</p>
	Demand of raw material	<ul style="list-style-type: none"> ✓ Ensure accurate material estimation for construction works to minimize potential wastes ✓ Conduct appropriate storage of material to reduce being affected by weather elements such as water runoff, wind among others ✓ Construction materials should be obtained only from sources approved by NEMA 	<ul style="list-style-type: none"> ✓ Construction of tanks, ✓ Water kiosks and ✓ The pump house <p>Contractor Supervision Consultant</p>	<p>During construction</p> <p>No direct costs</p>
	<p>Social and Economic Aspects</p> <ul style="list-style-type: none"> ✓ Economic deterioration from project activities ✓ Loss of land or property ✓ Loss of cultural heritage and related values ✓ Destruction of private property including farm 	<ul style="list-style-type: none"> ✓ Provide employment opportunities and ensure optimization of the local labour (at least 60%), ✓ Recruitment of casual workers be undertaken in conjunction with the County Commissioners Office (Area Chiefs), ✓ Gender balance be observed as per the Constitution, ✓ Avoid damages to property as much as possible, 	<p>Whole project</p> <ul style="list-style-type: none"> ✓ Contractor ✓ Supervision Consultant ✓ Project Committee 	<p>During construction</p> <p>No direct costs</p>

Issues	Activity and Associated Impacts	Management Actions	Target Areas and Responsibilities	Timeframes and Costs Estimates
	produce and other investments	✓ Where private damages are from the works inevitable, involve the client to clear right of way but ensure prompt compensation of damages to property.		
	Concerns – Spread of HIV and STIs	Institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at strategic locations	Whole project ✓ Contractor ✓ Supervision Consultant ✓ Project Committee	During construction Allow KShs. 1M on HIV/AIDS Awareness and Prevention
	Occupation/public Health & Safety concerns; ✓ Public safety risks ✓ Concerns Injuries and accidents to workers ✓ Potential injuries to the operators and visitors, ✓ External security concerns	✓ Provide PPE to workers, risk warning signs in sensitive project sites and train them on first aid, disaster management procedures ✓ Enhance close surveillance by the community, especially those living near the system main tanks. ✓ Sensitize the communities on safety issues associated with the water storage tanks ✓ Provide sanitation facilities for the construction workers.	Whole project ✓ Contractor ✓ Supervision Consultant ✓ Project Committee	During construction Allow KShs. 200,000 for sanitation provisions
	✓ Water degradation, reduced water quality ✓ Spillage of oils from construction vehicles, machines and equipment into surface and ground water	✓ Observe the Water Act 2002 and water rights, ✓ Observe the limits set by WRMA on water abstracting license (80% of the tested yield), ✓ Encourage rain water harvesting by developing programmes to provide resources, ✓ Conduct continuous maintenance of machines, equipment and vehicles to mitigate on oil spillage	Whole system ✓ Resident ✓ Contractor ✓ Local Community,	Throughout Construction No additional Costs – integrated in project costs
	Sanitation and hygiene provisions for construction workers	✓ Conduct water quality monitoring ✓ Avoid washing vehicles and equipment near the borehole site		

Issues	Activity and Associated Impacts	Management Actions	Target Areas and Responsibilities	Timeframes and Costs Estimates
		<ul style="list-style-type: none"> ✓ Provide project workers with appropriate sanitary facilities 		
Operation	<ul style="list-style-type: none"> ✓ Accidental pipeline leakage / bursting ✓ Water contamination 	<ul style="list-style-type: none"> ✓ The sub-county water office should ensure that pipeline connections and joints are regularly checked. ✓ Continuous awareness on project objective and developing capacity building programmes ✓ Regular testing of water to ascertain its quality 	Entire System <ul style="list-style-type: none"> ✓ Project Management Committee ✓ LVSWSB 	Continuous Allow ~KShs. 75,000.00 per year on maintenance
	<ul style="list-style-type: none"> ✓ Potential contamination from construction activities, ✓ Risks from water borne diseases and vectors thrive, ✓ Potential water pollution from the water source and transmission pipeline corridors. 	<ul style="list-style-type: none"> ✓ Ensure regular water quality monitoring and maintenance of the water supply system, ✓ Influence the land-use activities in the catchment areas, ✓ Creation of awareness on water resource management and conservation, 	Entire System <ul style="list-style-type: none"> ✓ Project Management Committee ✓ LVSWSB 	
	<ul style="list-style-type: none"> ✓ Introduction of new economic activities in the service area, ✓ Potential illegal water connections, ✓ Potential vandalism of water pipelines infrastructure, ✓ Potential wastage of water and leakages at consumer points 	<ul style="list-style-type: none"> ✓ Sensitization on water resource management and conservation ✓ Local communities should also participate in water resource management and planning ✓ Impose heavy penalties on illegal water connection and vandalism 	Water user coverage areas <ul style="list-style-type: none"> ✓ Project Management Committee ✓ LVSWSB 	Continuous Allow ~KSh. 75,000.00 per year for sensitization and awareness
	<ul style="list-style-type: none"> ✓ Potential non-compliance with water abstraction regulations, 	<ul style="list-style-type: none"> ✓ Comply with the provisions of the Water Resources Management Authority, 	Water user coverage areas	Continuous

Issues	Activity and Associated Impacts	Management Actions	Target Areas and Responsibilities	Timeframes and Costs Estimates
	<ul style="list-style-type: none"> ✓ Water use linkages among the beneficiary communities 	<ul style="list-style-type: none"> ✓ Organize communities for effective and sustainable utilization of natural resources associated with the water supply system, ✓ Establish a specific monitoring system for the water supply scheme. 	<ul style="list-style-type: none"> ✓ Project Management Committee ✓ LVSWSB 	No direct costs
Post construction	<ul style="list-style-type: none"> ✓ Removal of construction sites (stores, toilets, waste dumps, etc.), ✓ Removal of construction residual material holding sites, ✓ Disposal effects of wastes and construction debris 	Rehabilitate the affected locations to the satisfaction of NEMA and other stakeholders.	<ul style="list-style-type: none"> ✓ Project Management Committee ✓ LVSWSB 	Rehabilitation costs allow KShs. 800,000 for damaged sites rehabilitation
Decommissioning	<ul style="list-style-type: none"> ✓ Remove part of all of the water intake and sedimentation tank ✓ Removal of part or all of the water treatment plants ✓ Removal of the transmission 	<ul style="list-style-type: none"> ✓ The contractor to prepare a decommissioning plan of all construction installations and associated sited at least 3 months prior to end of construction. ✓ Notify NEMA at least one year before the intention to decommission ✓ Undertake a decommissioning audit at least six months before the activity and provide a decommissioning plan, ✓ Undertake the decommissioning following the decommissioning plan and under supervision by NEMA 	<ul style="list-style-type: none"> ✓ Project site and system ✓ LVSWSB ✓ Environmental experts ✓ Water management committee ✓ NEMA 	Costs to be worked out at the decommissioning time

The cost of EMP implementation is estimated at KShs. 3,200,000.00

8.7 Environment Monitoring Plan

The Environmental Monitoring Plan (EMoP) is established to mitigate the identified negative impacts in the ESIA that are significantly adverse and/or the probability of the predicted impact is uncertain due to technical limitations. For this project, focus is on the key adverse impact items alongside the implementation budget listed in the table below;

Table 6: Environment Monitoring Plan

Indicators	Monitoring Actions	Target Area	Responsibility	Frequency	Budget (KShs.)
Land Acquisition Aspects	Verifying availability of the land for the project as promised by the beneficiary communities	<ul style="list-style-type: none"> ✓ Borehole Sites (already drilled) ✓ Water transmission Pipelines ✓ Water Storage Tanks ✓ Water Kiosks 	LVSWSB	Once before the construction works begins	No costs are anticipated
Contractors works plan and camp setting	Confirm appropriateness of construction work plan and suitability of camp settings	The areas selected for construction camps	LVSWSB Supervising Consultant	Upon commencement and monthly thereafter	Allow KShs. 200,000.00 for supervision
Health and Safety	<ul style="list-style-type: none"> ✓ Monitor occupational health and safety audits of the construction workers ✓ Undertake safety audits for the linkages of the public, especially the children and the aged. 	Along water transmission pipeline channels	<ul style="list-style-type: none"> ✓ Contractor ✓ Supervision ✓ LVSWSB 	Continuous	Allow KShs. 200,000.00
Water Abstraction or Water Rights	Ensuring water abstraction is measured by a water meter.	Borehole Site	✓ LVSWSB	Continuous monitoring	Allow KShs. 150,000.00
Hydro-geological Situation	Undertake annual verification of borehole yield		✓ WRMA	Borehole yield verification annually	
Losses at the water user points	Ensure all user points are installed with water meters for monitoring		✓ Borehole Management Committee		
Water Quality	Water quality of borehole to be assessed for pH, SS, E. Coli, TN and TP.	Direct from borehole Storage tanks User point taps	<ul style="list-style-type: none"> ✓ LVSWSB ✓ WRMA ✓ Borehole Management Committee 	Before construction and after the works	KShs. 150,000.00
Potential conflicts on	Convenience of people at source	✓ Accessibility to residents at the source	✓ LVSWSB	Continuous	Allow KShs. 150,000.00

Indicators	Monitoring Actions	Target Area	Responsibility	Frequency	Budget (KShs.)
water accessibility	User satisfaction surveys	✓ Accessibility from the improved water supply system	✓ WRMA		

Total cost of Environmental Monitoring Plan translates to KShs. 850,000.00

Chapter 9: Conclusions and Recommendations

9.1 Conclusions

- (i) The proponent intends to supply clean and safe water to the community to mitigate the effects of drought. Ground water exploitation in the area is low due to high costs and depths. It is, however, considered clean and free of contamination hence meeting the expectations of the communities.
- (ii) There is a general acceptability of the project by the local community arising from the long term challenges they have faced on accessing clean water. From this EIA process, the social and economic rating of this project is highly positive.
- (iii) The location of the borehole and the water supply accessories falls on public and private lands and appropriate consent letters signed.
- (iv) The project is low level and has limited rural coverage. In addition, the ESIA reveals that this project does not have adverse negative environmental impacts and for the impacts identified, adequate mitigation measures have been spelt out in the EMP.

9.2 Recommendations

- (i) From the detailed environmental and socio-economic analysis the proposed project, the experts are of the opinion that this is a viable project, and hence recommends that NEMA approves it and issues an EIA license.
- (ii) It is further recommended that the Proponent and Contractors implement the recommendations in the environmental management plan and those in the health, safety and accident prevention action plan. This is to ensure that the potentially affected environment is well managed and that accidents are prevented in the course of project implementation. The Proponent is expected to comply with the relevant legal and policy requirements with regard to project implementation.
- (iii) Abstraction of water from the borehole should be within the allowable conditions of the WRMA permits,
- (iv) With the necessary environmental management in place, it is safe to say that the project is economically feasible, environmentally sound, and socially acceptable. The design of the project is sound from the environmental and economic point of view and should be implemented. Recommendations for the prevention and mitigation of adverse impacts are as follows: -
 - ✓ Implementation of the project should await the finalization of the EIA process and issuance of an EIA license
 - ✓ Any unforeseen environmental impacts should be reported to the environmental experts and NEMA as soon as possible for prompt remedial action
 - ✓ The borehole water to be tested regularly to ascertain quality

References

1. Kenya Gazette Supplement Acts 2000, Environmental Management and Coordination Act Number 8 of 1999. Government Printer, Nairobi
2. Kenya gazette supplement number 56. Environmental Impact Assessment and Audit Regulations 2003. Government printer, Nairobi
3. Kenya gazette supplement number Environmental Management and Coordination (Emissions Control) Regulations, 2006 Government printer, Nairobi
4. Kenya gazette supplement Environmental Management and Coordination (Water Quality) Regulations, 2006
5. Kenya gazette supplement Environmental Management and Coordination (Waste Management) Regulations, 2006
6. Kenya gazette supplement Environmental Management and Coordination (Excessive Noise and Vibration Control) Regulations, 2009
7. Kenya gazette supplement, Special Issue 51, Legal Notice number 19; Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009 Government printer, Nairobi
8. Kenya Gazette Supplement Acts Building Code 2000 Government Printer, Nairobi
9. Kenya Gazette Supplement Acts Land Planning Act (Cap. 303) Government Printer, Nairobi
10. Kenya Gazette Supplement Acts Local Authority Act (Cap. 265) Government Printer
11. Kenya Gazette Supplement Acts Penal Code Act (Cap. 63) Government Printer, Nairobi
12. Kenya Gazette Supplement Acts Physical Planning Act, 1999 Government printer, Nairobi
13. Kenya Gazette supplement Acts Public Health Act (Cap. 242) government printer, Nairobi

Annexes

Annex 1: Terms of Reference

Terms of Reference Principles

INTRODUCTION

The Government of Kenya (GoK) has received credit from the World Bank through the International Development Association (IDA) towards the cost of Water and Sanitation Improvement Project Additional Financing (WaSSIP-AF). The Additional Financing includes a drought mitigation and response component that will include preparation of detailed medium-term drought response and mitigation strategies in Lake Victoria North, Lake Victoria South and Rift Valley Water Service Boards. The LVNWSB, as the WaSSIP Project Implementing Board, will assist Rift Valley Water Services Board (RVWSB) and Lake Victoria South Water Services Board (LVSWSB) to implement the drought response measures. In that respect, LVNWSB will procure services, goods and works on behalf of RVWSB and LVSWSB. Among the projects to be implemented under the drought mitigation component is the drilling of 10 boreholes and construction of related civil works or water supply infrastructure in the area of jurisdiction of LVSWSB.

GUIDING PRINCIPLES

The guiding principle for the preparation, implementation and monitoring and evaluating resettlement action plan are:

The Constitution of Kenya (2010)

The Constitution of Kenya (2010) has dedicated Chapter 5 on issues of land and the environment. Article 60 of this constitution requires that land be used and managed in a manner that is equitable, efficient, productive and sustainable and in accordance with the following principles:

- (i) Equitable distribution of land
- (ii) Security of land rights
- (iii) Sustainable and productive management of land resources
- (iv) Transparent and cost effective administration of land
- (v) Sound conservation and protection of ecologically sensitive area.

Article 42 of this constitution provides right to clean and healthy environment which includes the right to have the environment protected for the benefit of present and future generations by legislative and other measures. Article 70 of this constitution provides that if a person alleges that a right to clean and healthy environment has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court of law for redress. All projects are required to ensure the following:

- (i) Equitable sharing of resources between the stakeholders.
- (ii) Sustainability of livelihoods and biological resources areas are protected.
- (iii) Development proposals should recognize increased powers under the constitution given to communities and individuals to enforce their rights through legal redress.

WaSSIP AF Environment and Social Management Framework - ESMF

An Environment and Social Management Framework – (WaSSIP –AF ESMF) has been prepared for the WaSSIP Additional Financing and is complemented by two other safeguards instruments: Environmental Assessments (EAs) accompanied by Environmental Management Plans (EMPs) for each subproject identified under WaSSIP AF. This framework has been prepared in accordance to World Bank operational policy OP 4.01 (Environmental Assessment) requiring borrowers to prepare an Environment and Social Management Framework (ESMF), which establishes a mechanism to determine and assess future potential environmental and social impacts of the planned investments/activities under the proposed WaSSIP AF. A Resettlement Policy Framework (RPF) has also been prepared that provides standards and procedures for compensation for any land acquisition, assets, or restriction of access to resources that WaSSIP AF investment may require, in accordance with World Bank OP 4.12 – Involuntary Resettlement. An Indigenous People Policy Framework

(IPPF) has also been prepared in regard to the potential impacts the WaSSIP AF may have on the Sengwer community (LVNWSB area) who are categorized as indigenous.

The Environmental Impact Assessment (EIA) in Kenya is guided by the Environmental and coordination Act, 1999 which requires that an environment impact assessment report or study shall be prepared through in accordance with the environmental impact assessment regulations issued under this act by an individual Lead Experts or firm of experts and submitted to National Environmental Management Authority (NEMA) for approval.

OBJECTIVE OF THE ASSIGNMENT

The main objectives of the study are:-

- (i) To prepare an Environmental and Social Impact Assessment (ESIA) documenting the present condition of the environment (bio-physical and socio-economic) and identifying the positive and negative impacts that may result from the design and construction of the project and in so doing, to address the necessary environmental mitigation and monitoring measures in an Environmental and Social Management Plan (ESMP).
- (ii) To Prepare a Resettlement Action Plan as a separate document, that will record cases of impacts on persons, loss of assets, loss of sources of livelihood and interruption of social networks for the proposed Project.

World Bank Operational Policy (OP) 4.01 on Environmental Assessment and OP 4.12 on Involuntary Resettlement require that an Environmental and Social Impact Assessment and Resettlement Action Plan be undertaken for projects of such nature.

The objective of OP 4.01 is to ensure that Bank-financed projects are environmentally and socially sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental and social impacts. This policy is triggered if a project is likely to have potential (adverse) environmental risks and impacts on its area of influence. It covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and trans-boundary and global environment concerns. The World Bank Operational Policy OP 4.12 on involuntary resettlement envisages that:

- (i) Involuntary resettlement should where possible be avoided or where it is not possible be minimized by exploring alternative project designs.
- (ii) Where avoiding resettlement is not feasible, resettlement activities should be conceived and implemented as sustainable development programmes providing sufficient investment resources to enable persons displaced by the project to share project benefits and to be consulted meaningfully and to be provided with opportunities to participate in planning and implementing resettlement programs.
- (iii) To assist displaced persons in their efforts to improve their livelihoods and living standards to at least equal or better levels before the project implementation.

STAGE I: ESIA STUDY REQUIREMENTS

The ESIA study requirements will include but not limited to the following;

- (i) Recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels and enhance positive impacts.
- (ii) Estimate the impacts and costs of those measures, and of the institutional and training requirements to implement them.
- (iii) Prepare an Environmental and Social Framework Management Plan (ESFMP) including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.

- (iv) Explain how the project would comply with NEMA requirements according to EMCA (1999), including consultation.
- (v) Prepare Contractor's commitment on Environmental policy during project implementation. Organize and undertake stakeholder consultation for the project.

The ESIA report should be organized according to the outline below:

- (i) Executive summary
Concisely discusses significant findings and recommended actions.
- (ii) Policy, legal, and administrative framework
 - ✓ Discusses the policy, legal, and administrative framework within which the ESIA is carried out.
 - ✓ Explains the environmental and social requirements of any co-financiers.
 - ✓ Identifies relevant international environmental and social agreements to which the country is a party.
- (iii) Project description
 - ✓ Concisely describes the proposed project and its geographic, ecological, social, and temporal context, including any offsite investments that may be required
 - ✓ Indicates the need for any resettlement plan.
 - ✓ Includes a map showing the project site and the project's area of influence.
- (iv) Baseline data
 - ✓ Assesses the dimensions of the study area and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences.
 - ✓ Takes into account current and proposed development activities within the project area but not directly connected to the project.
 - ✓ Data should be relevant to decisions about project location, design, operation, or mitigatory measures.
 - ✓ The section indicates the accuracy, reliability, and sources of the data.
- (v) Environmental and Social Impacts.
 - ✓ Predicts and assesses the project's likely positive and negative impacts, in quantitative terms to the extent possible.
 - ✓ Identifies mitigation measures and any residual negative impacts that cannot be mitigated.
 - ✓ Explores opportunities for environmental and social enhancement.
 - ✓ Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specifies topics that do not require further attention.
- (vi) Analysis of alternatives
 - ✓ Systematically compares feasible alternatives to the proposed project site, technology, design, and operation—including the “without project” situation—in terms of:-
 - Their potential environmental and Social impacts
 - The feasibility of mitigating these impacts
 - Their capital and recurrent costs
 - Their suitability under local conditions
 - Their institutional, training, and monitoring requirements.
 - ✓ For each of the alternatives, quantifies the environmental and social impacts to the extent possible, and attaches economic values where feasible.
 - ✓ States the basis for selecting the particular project design proposed and justifies recommended emission levels and approaches to pollution prevention and abatement.
- (vii) Environmental and Social Management Plan
Environmental and social management plan (ESFMP) covers mitigation measures, implementation schedule, monitoring, institutional strengthening, and cost estimates. Content of the ESFMP should

include but not limited to the following elements:

- ✓ A Project *Schedule* comprising of:
 - A chronogram of all project activities, including capacity-building activities;
 - Monitoring and evaluation; and
 - Supervision of implementation of the ESFMP
 - ✓ Project *Operation* that describes how the project would be operated emphasizing, as needed:
 - Overall project operation;
 - Environmental and/or social training that will be given to operators (if needed);
 - Noise levels that may be expected during operation;
 - Management of solid wastes (boxes, plastics, tires, pipes, etc.) and liquids (spent oils, paints and solvents, wastewater);
 - Sources of water for human consumption and project operations;
 - Types and volumes of materials that will be used during project operation, along with information describing where the materials will be obtained (e.g. borrow pits, river extraction; origins and species of timber used)
 - How the materials will be transported to the project site, and proposed sites for construction waste disposal (earth cuts, construction waste);
- (viii) Monitoring Plan
- ✓ Prepare a detailed plan to monitor the implementation of mitigating measures and the impacts of the project during construction and operation.
 - ✓ The plan includes an estimate of capital and operating costs and a description of other inputs (such as training and institutional strengthening) needed to carry it out.
 - ✓ The plan includes a description of baseline environmental and social conditions to enable long-term assessment of project impacts.
- (ix) Appendices
- ✓ The ESIA should contain the following indices:
 - List of ESA report preparers—individuals and organizations
 - References
 - Record of inter-agency and consultation meetings, including consultations for obtaining the informed views of affected people and local non-governmental organizations (NGOs)
 - Specifies any means other than consultations (e.g., surveys) that were used to obtain the views of affected groups and local NGOs and includes attendance lists and minutes of meetings, including responses to stakeholder questions.
 - Tables presenting the relevant data referred to or summarized in the main text.
 - List of associated reports

The consultant will also provide assistance to LVNWSB in submission of findings to NEMA and subsequent discussions with NEMA and other agencies as required during their assessment procedures, and follow up for clearance and issuance of construction license.

The Consultant should include in his cost budget for arranging and conducting stakeholders meeting and putting advertisements in the local dailies as required by NEMA.

STAGE II: RAP PROCESS STUDY REQUIREMENTS

The RAP study shall include but not limited to the following;

Carry out a Census

The consultant will conduct a census to identify the persons who will be affected by the implementation of these projects. The consultant will determine who will be eligible for assistance and discourage inflow of people ineligible for assistance.

Verification documents

The consultant, at his cost, will obtain the relevant Registry Index Maps (RIMs) and official Land searches from the relevant Lands Registry to determine the registered owners of land.

Social Economic census

The Consultant will carry out a social economic census of the PAPs to establish details of the occupants of land and asset to be affected by the projects. The details should include:

- (i) Details of land/asset owners.
- (ii) Whether the PAPs are Eligible for compensation.
- (iii) Baseline livelihood information.
- (iv) Household organization including income from formal and informal sources.
- (v) Employment opportunities.
- (vi) Socio-economic facilities such as Health status, Markets, education and Government offices.
- (vii) Living standards.
- (viii) Land tenure system.
- (ix) Social and cultural characteristics of impacted communities.
- (x) Patterns of social interaction, social networks and support systems and how implementation of these projects would impact these patterns.
- (xi) Information on vulnerable persons who may need special provisions including the elderly, disabled, sick, orphans and children and women led households.
- (xii) Presence of Indigenous and Marginalized communities affected by the project.
- (xiii) Public infrastructure and social services to be affected by implementation of these projects.
- (xiv) Magnitude of expected loss for impacted people(s).

Communication/consultation plan with PAPs

The Consultant in consultation with PAPs and other stakeholders shall prepare a communication/consultation plan with the PAPs and other stakeholders. This plan shall be approved by the PAPs.

Grievance Redress Mechanisms

The Consultant in consultation with PAPs and other stakeholders shall prepare a grievance redress mechanism to be used to resolve disputes arising from the implementation of the RAP and the project. This plan shall be approved by the PAPs

Cut-off date

The Consultant will negotiate with PAPs and other stakeholders to fix the cut-off date for valuation of assets and land. This date will be communicated to the PAPs in prominent places.

Criteria for eligibility for compensation

The consultant will prepare criteria for eligibility for compensation of affected land and assets. The criteria shall be communicated to the PAPs. The criteria shall be based on the World Bank Policy on Involuntary Resettlement resulting from Involuntary taking of land leading in:

- (i) Relocation or loss of shelter, loss of assets or loss of access to assets.
- (ii) Loss of income sources or means of livelihood whether or not the affected persons must move to another location.

- (iii) Involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

Valuing Affected Assets

The Consultant will carry out valuation of land and assets affected by the project that are eligible for compensation. The Consultant shall consult and communicate to the PAPs the cut-off date for carrying out valuation. The Consultant will engage the services of a registered Valuer who shall inspect the affected land and assets in the presence of the PAPs. The Valuer shall prepare an inventory of the affected land and assets which shall be witnessed by the PAPs by appending their signatures. The Valuer shall produce a valuation reports one for each project. Copies of these valuation reports shall be forwarded to the Chief Valuer, Ministry of Lands and Urban Development.

Budget

The consultant shall thereafter prepare an “entitlement matrix” showing for each PAP, the types of losses and the forms and amounts of compensation actions that will be taken for each type of loss.

Preparation of Resettlement Action Plan

The Consultant will prepare a Resettlement Action Plan for all the 10 borehole projects in accordance with the World Bank policy on Involuntary Resettlement (OP 4.12) designed to meet the legal requirements of the Government of Kenya that shall include the following measures to ensure that the displaced persons are:

- (i) Informed about their options and rights regarding resettlement.
- (ii) Consulted on, offered choices among, and provided with technically feasible resettlement alternatives.
- (iii) Provided with prompt and effective compensation at full replacement cost for loss of assets directly to be caused by the implementation of the projects.
 - ✓ Offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living.
 - ✓ Provided with development assistance such as land preparation, credit facilities and training or job opportunities in addition to compensation measures.

Where implementation of these projects will cause physical relocation of persons, the resettlement action plan will include measures to ensure that the displaced persons are:

- (i) Provided assistance during relocation.
- (ii) Are provided with housing and agricultural sites for which a combination of productive potential, locational advantages and other factors is at least equivalent to the advantages of the old sites.

These draft Resettlement Action Plans shall be approved by the Boards and the World Bank. The approved plans shall be deposited in public places to be accessed for reference by the PAPs and other stakeholders.

Obtain consent for Land subdivision and transfer

In determining the magnitude of the land to be affected the consultant shall engage the services of a licensed surveyor who shall survey the affected land in the presence of the relevant PAP. Where only a portion of a PAP land is to be acquired, then the surveyor shall prepare a mutation of the land to be subdivided and the registered land owner shall sign the mutation form to accept the subdivision and assist the land owner (PAP) to prepare an application for land subdivision from the relevant land control Board.

Where the affected land does not include subdivision of land, that is, the whole parcel of land is being acquired for the project, then the Consultant shall assist the land owner (PAP) to prepare an application to the local Land Control Board for consent to transfer land to the project owner.

The consultant shall assist the Boards in obtaining the necessary consents for land subdivision and transfer.

Allocation of new numbers

Where a mutation for subdivision of land is prepared, the Consultant, will assist the Boards at his cost to:

- (i) Acquire approval of the mutation and allocation of new land reference numbers from the County Surveyor.
- (ii) Cause the relevant Registry Index Map (RIM) to be amended in accordance with this approved mutation.
- (iii) Prepare a land sale agreement and land transfer form with the Land Owners (PAPs). These land agreements shall be attested by a Commissioner of Oaths.
- (iv) Register this mutation of the subdivision with the relevant Land Registry.

Assessment of stamp duty

The Consultant will assist the Boards to obtain an assessment of the stamp duty. The payment of the stamp duty shall be the responsibility of the Boards.

Issuing of title deed

The Consultant shall assist the Boards and the land owners to obtain title deed for their parcels of land from the relevant Land Registries.

CONSULTATION WITH STAKEHOLDERS

The consultant will develop and implement a program of consultations with:

- (a) Key stakeholders during the development, implementation and monitoring and evaluation of the Environmental and Social Impact Assessment and Resettlement Action Plan. The stakeholders include Project Affected Persons (PAPs), relevant government ministries and agencies, County Governments.
- (b) Consult with persons directly affected by implementation of these projects.

The consultations will be in open forums, interviews, focus Group discussions and workshops where the consultant will conduct public presentations of the project and gather the fears, concerns, public views, comments and suggestions regarding how the projects will affect land and environment.

STAGE II: IMPLEMENTATION OF RAP AND ESIA

Implementation of the resettlement action plan shall be carried out before the commencement of implementation of the project by compensating the full replacement value of land and assets and where applicable replacing title deeds for sub-divided land. All disputes regarding this Resettlement Action Plan shall be resolved at this stage.

The consultant shall implement appropriate mitigation measures in the developed Environmental and Social Management plan during project implementation.

STAGE III: MONITORING OF THE RAP AND ESIA

The Consultant will follow up with the PAPs to monitor how they are coping up with the re-settlement by monitoring their living standards and livelihood for one year. The Consultant will prepare quarterly progress reports. Recommendations regarding livelihood and living standards will be addressed at this stage.

The consultant will conduct environmental monitoring during project implementation and an initial environmental audit at the end of the defects liability period of the civil works to determine the closeness and accuracy of the predictions of the EIA and provide a report on the status of the environment after the project implementation.

This report shall be approved by NEMA

EQUIPMENT, LOGISTICS AND FACILITIES

The Consultant shall be responsible for the provision of all the necessary resources to carry out the Services; and shall make arrangements for the establishment of office, supporting office equipment and furniture, vehicles, accommodation, utilities, communications, and any other required resources.

DURATION, REPORTING AND TIMING OF THE SERVICES

The time period required for the provision of the services is envisaged to be four and half (4.5) months from the effective contract date.

CLIENT INPUTS

LVNWSB will avail to the Consultant, designs for these projects; previous Re-settlement Action Plans for projects previously carried out under WaSSIP and introduce the Consultant to other Government agencies that are relevant to this assignment.

INSTITUTIONAL ARRANGEMENT

The Consultant will primarily be reporting to the to the Chief Executive Officer, Lake Victoria North Water Services Board, who will be the Project Manager responsible for approving the outputs of the Consultant.

The CEO LVNWSB may delegate some of the responsibilities of the Project Manager to a competent person notified to the consultant. The Project Manager will delegate appropriate duties and responsibilities to the consultant for the administration of the contract.

The Chief Executive Officer, Lake Victoria North Water Services Board, shall be responsible for seeking concurrence of the World Bank relating to approval of the resettlement action plan.

The valuation report shall be deposited with the Chief Valuer, Ministry of Lands and Urban Development. The relevant Land Control Boards shall give consent for land sub-division and transfer of ownership. The relevant Land Registries shall issue title deeds for land ownership

QUALIFICATION OF THE CONSULTANT

The Consultant should possess at least a Bachelors degree in project management or social sciences or land economics or land survey and be registered as a Consultant with a current practising professional license with at least ten working years, five of which should be as a registered consultant. The Consultant should have successfully completed three assignments of similar complexity and nature.

Annex 2: Project Design Concepts (Extracts)



4 PROPOSED WATER SUPPLY PROJECT

4.1 Water Source

4.1.1 Borehole Location and Yield

The proposed water system is based on the Nyamila borehole on Location 665101mE and 9931641mN by UTM coordinates by GPS. The borehole was drilled between 21st and 22nd July 2016 to a total depth of 78m. The tested average yield of the borehole is 3.0m³/hr.

Drilling Date-Start /Completion	Borehole Depth (m)	Casing 152.4mm (plain) (m)	Casing 154.2mm (slotted) (m)	Average Discharge (m ³ /hr)	Static water Level (m)	Pump Intake Depth (m)
21-07-2016/ 26-07-2016	78	48	30	3.0	1.65	74

4.1.2 Borehole Water Quality

The borehole water quality results (summarised below), indicate that the water has high levels of iron and marginally fails on alkalinity. The water is however recommended for suitable for domestic use.

Parameter	Unit	WHO Standards	KBBS Standards	Result	Remarks
pH	pH Scale	6.5 – 8.5	6.5 – 8.5	7.15	Complied
Colour	Hazens Units	Max 15	Max 15	85	Failed
Turbidity	N.T.U	Max 5	Max 5	23.4	Failed
Conductivity (25°C)	µmhos/cm	Max 2500	Max 2000	958	Complied
Iron	Mg/l	Max 0.3	Max 0.3	0.4	Failed
Manganese	Mg/l	Max 0.1	Max 0.5	0.12	Complied
Calcium	mgCa ²⁺ /L	Max 100	Max 150	56.8	Complied
Magnesium	mgMg ²⁺ /L	Max 100	Max 100	37.45	Complied
Sodium	mgNa ⁺ /l	Max 200	Max 200	72	Complied
Potassium	mgK ⁺ /L	Max 50	-	19	Complied
Total Hardness	MgCaCO ₃ /L	Max 500	Max 300	296	Complied
Total Alkalinity	MgCaCO ₃ /L	Max 500	-	526	Failed
Chloride	MgCa ⁺ /L	Max 250	Max 250	24	Complied
Fluorides	mgF ⁻ /L	Max 1.5	Max 1.5	1.35	Complied
Nitrates	mgNO ₂ /L	Max 10	-	1.51	Complied
Nitrite	mg/l	Max 0.1	Max 0.003	0.03	Complied
Sulphate	mg/l	Max 450	Max 400	5.77	Complied
Free Carbon dioxide	Mg/l	-	-	96	
Total Dissolved Solids	Mg/L	Max 1500	Max 1000	593.96	Complied
Arsenic	µg/l	Max 10	Max 10	-	Complied

4.1 Scheme Layout

Water from the borehole will be pumped to a water storage tank located on a higher ground 1.17km from the borehole location. Initially five (5) communal water points are proposed in 5 Cluster (Sub-villages) to serve four Villages. Water from the tank will be distributed to



consumer points by gravity. The Water demand of the proposed water system is shown in Table 4:1 below.

Table 4:1 Scheme Water Demand

Cluster	Water point's Name	Water point's Number	Estimated Demand (m ³ /day)			
			current	Initial	Future	Ultimate
Gogo Katuma	Obambo	1	12.58	12.83	15.45	18.94
Kijawa			1.02	1.04	1.24	1.51
Okoma /Nyadhidho	Nyandhindho	2	2.16	2.20	2.65	3.23
Nyamila B	Nyamila	3	4.29	4.38	5.27	6.47
Nyamila C			4.92	5.02	6.04	7.41
Nyamila A	Kibuon	4	5.58	5.70	6.85	8.39
Nyamila Upper			1.98	2.02	2.44	3.02
Katinga	Radienya	5	11.98	12.23	14.72	18.05
Total		5	44.50	45.41	54.68	67.03

4.2 Preliminary Design of Water System

4.2.1 Design Water Demand

Considering the ultimate water demand of 67.03m³/day against the allowable abstraction and maximum borehole yield of 50.40m³/day and 72m³/day respectively it is proposed to design the supply system for a demand of 50.4m³/day. The demand is distributed to the supply areas as indicated below.

Table 4:2 Pipeline Design Flows

Area Name	Distribution Line	Design Flow (l/s)	Design Flow (m ³ /Hr)
Obambo	Line A	0.16	13.87
Nyandhindho	Line B	0.03	2.20
Nyamila	Line E	0.11	9.39
Kibuon	Line D	0.09	7.72
Radienya	Line C	0.14	12.23

4.2.2 Water treatment

The borehole water has high levels of Iron and marginally fails on alkalinity. The water is however recommended for suitable for domestic use. No form of treatment other than disinfection is proposed.

4.2.3 Water Transmission and distribution

The following criteria are used in proposing the water transmission and distribution system;



Preparation of Design and Supervision of Construction of Water Supplies from Drought Boreholes for Lake Victoria South Water Services Board



- Short length rising mainlines
- Ensure distribution to the project areas is entirely by gravity
- Reduce the maximum walking distance to water points to a maximum of 500m
- Ensure reliable water supply throughout the day

The transmission and distribution system will comprise the following;

- Rising mainline
- Water storage tank
- Distribution system of approximately 3.0km long
- 5No. Communal water points/kiosks



4.2.4 Pumping System

The proposed system uses pumping to lift borehole water to a high elevated storage tank located at the borehole site. Distribution to water points will be by gravity. The total pumping head from the borehole to the proposed tank site is approximately 120m. Sustainable sources of energy can be explored to power the pumping system. Alternatives include wind power and solar energy. As an alternative to a purely electric pumping, a solar driven borehole pump is proposed. The borehole solar pump will operate for 10-12hours.

Pump Type	Pump Spec	Power (watt)	Flowrate (m ³ /hr)		Head (m)	
			Max	Min	Max	Min
Solar Pump	Lorentz PS 4000c-SJ3-320 or equivalent	1000-3400	3.5	1.5	160	100

The solar pump will be powered using 16No. 250W Solar PV Module

4.2.5 Water distribution System

The water distribution system will comprise the following;

- Water storage
- Distribution network, and
- Communal Water points

Water storage

The storage tank has been sized for ½ day storage as guided by the Practice Manual for Water Supply Services in Kenya. The storage will act as a balancing tank to reduce peak flows in the rising main and also to reduce the number of pumping starts. A storage capacity of 5m³ is provided. A high level storage tank of 25m³ capacity is provided. The five water kiosks will also be equipped with a 4.0m³ storage tanks. The total scheme water storage is effectively 45m³.

Distribution network

Water distribution network is proposed with a capacity to meet the future water demand. The distribution pipeline design flows are apportioned to meet the corresponding water demand as apportioned in proportion to the village population. This apportionment is then distributed proportionately to the number of water kiosks in the area. The distribution system will deliver



**Preparation of Design and Supervision of Construction of Water
Supplies from Drought Boreholes for Lake Victoria South Water
Services Board**



the total daily demand in 12 hours. The system will use PVC pipes to reduce construction costs.

Distribution Line Notation	Description	From Chainage	To Chainage	Length (m)
Rising Main	75mm uPVC PN10	0.0	1,165.4	1,165.4
Distribution Main B	63mm uPVC PN6	0.0	117.0	117.0
	50mm uPVC PN6	117.0	751.7	634.7
	32mm uPVC PN6	751.7	1,234.4	482.8
Subtotal				1,234.4
Line C	32mm uPVC PN6	0.0	126.9	126.9
Line D	32mm uPVC PN6	0.0	394.4	394.4
Line E	32mm uPVC PN6	0.0	93.1	93.1
Total				3,014.3

Water Points

Water abstraction will initially be at communal water points through water kiosks. The water points are sited so that the maximum walking distance for 90% of the water users is approximately 0.5km. However the number of water users per water point should be in the range of 200-750m. The design encompasses appropriate and low cost technology for construction, operation and management. The kiosks will be provided with a gate valve and a water meter in valve chamber. The water kiosks will also be provided with a storage tank to ensure reliability and to cushion the user against pump failures. Multiple water taps will be provided at each kiosk to reduce waiting time at water kiosk. Individually water connection will be expected to progressively grow in number to increase the service levels. Table below shows the schedule of provided water kiosk and expected abstractions.

Villages	Water Point No.	Design Flow (m ³ /day)
Obambo	Water Point No.1	13.87
Nyandhindho	Water Point No.2	2.20
Nyamila	Water Point No.3	9.39
Kibuon	Water Point No.4	7.72
Radienya	Water Point No.5	12.23



Preparation of Design and Supervision of Construction of Water
Supplies from Drought Boreholes for Lake Victoria South Water
Services Board



Villages	Water Point No.	Design Flow (m ³ /day)
Rising Main		45.41

4.2.6 Project Management Building

A project management building proposed to be located close to the borehole site. The building will give the project management space to undertake administrative activities. The solar panel to power the solar pumps will also be installed on the admiration office roof.

4.2.7 Proposed Water supply

Water distribution network is proposed with a capacity to meet the initial water demand over 12hr period. The distribution pipeline design flows are apportioned to meet the corresponding water demand as apportioned in proportion to the village populations. This apportionment is then distributed proportionately to the number of water kiosks in the area. The distribution system will deliver the total daily demand in 12 hours. The system will use PVC pipes to reduce construction costs.

Water will be distributed through PVC distribution pipelines estimated at approximately 3.0km to five communal water points.

The proposed infrastructures under this option are summarized below.

Table 4:3 Option I Infrastructure

Cost Component	Description	Size /Capacity
Water Source	78m Deep Borehole	3.0 m ³ /Hr.
Borehole Pump	4KW, 2.1m ³ /hr., 120m submersible solar borehole pump	50.04m ³ /Day
Solar Equipment	16No. 250Watts multi-crystalline PV solar modular	4.0Kw
Storage Tanks	25m ³ Masonry ground level Storage tank	25m ³
Distribution Pipeline	PVC pipeline of varying sizes and classes	3.0km.
Water Kiosks	Masonry water kiosk equipped with 4.0m plastic storage tanks	5No.

4.3 Cost Estimates for Water Supply

The estimated construction costs for the proposed water supply system are based on the infrastructure provided above. The estimated cost is calculated using the prevailing construction and material unit costs in the country. The estimated construction cost of the proposed options are summarized in the Table below. These are estimates only, and the actual costs will

Annex 3: Lead Experts Practicing License

FORM T



(x19(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/4724
Application Reference No: NEMA/EIA/EI/6683

M/S Harrison Wanjohi Ngrigacha
(individual or firm) of address

P.O. BOX 1902-00100, Nairobi

is licensed to practice in the

capacity of n (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **0027**

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

Issued Date: **1/23/2017**

Expiry Date: **12/31/2017**

Signature.....

(Seal)

Director General
The National Environment Management
Authority



Annex 4: List of Stakeholders Participating

Proposed Draught Mitigation Boreholes for RVWSB, LVNWSB and LVWSWB
Environmental and Social Impact Assessment

Public Participation Form

Board: LVWSWB Site: NYAMILA BOREHOLE PROJECT Date: 11/11/2017

No.	Name	ID Number	Occupation	Location	Address		Telephone	Signature
					Box			
1	George Allesh	20551411	BUYER OFFICE	WAMUNU	425		075252187	[Signature]
2	JAMES B. BGENSA	2101255	LVNWSB OFFICE	KALANGA	673		072233716	Zzz
4	Horahim Shioch	1450010	OFFICE	WAMUNU	673		072233716	[Signature]
5	DAVID O BUNSA	0670076	LEADER	KALANGA	335		072233716	[Signature]
6	George Agungi	1370001	LEADER	KALANGA	11		072233716	[Signature]
7	Elijah Ogema	2863503	Teacher	NYAMILA	125		0718659100	[Signature]
8	JULIUS ODITA	10598163	AGRICULTURIST	KALANGA	35		071150504	[Signature]
9	MARGRET NGETO		FARMER	KALANGA	Box 61		07183761	[Signature]
10	YAHOO O. OGENG	07210	FARMER	KALANGA	Box 61		07183761	[Signature]
11	ALLENCE O. BELLE	084646	FARMER	KALANGA	Box 61		07183761	[Signature]
12	ALBERT ARIKWA OCHINGO	35302891	FARMER	"	"		07162566	[Signature]

Proposed Draught Mitigation Boreholes for RVWSB, LVNWSB and LVWSWB
Environmental and Social Impact Assessment

Public Participation Form

Board: LVWSWB Site: NYAMILA BOREHOLE PROJECT Date: 11/11/17

No.	Name	ID Number	Occupation	Location	Address		Telephone	Signature
					Box			
1	SAMUEL JUMA	8250302	PLANT	KALANGA	Box 65		0721170	[Signature]
2	Maurice Duma	1020207	FARMER	KALANGA	Box 65		0721170	[Signature]
4	ESTHER A. OKO	1020207	FARMER	KALANGA	Box 65		0721170	[Signature]
5	EMILY A. OKO	1020207	FARMER	KALANGA	Box 65		0721170	[Signature]
6	SIPRIYA ARIKWA		FARMER	KALANGA	Box 65		0721170	[Signature]
7	KARAH OCHINGO		FARMER	KALANGA	Box 65		0721170	[Signature]
8	MILICENT A. OKO	2916509	FARMER	KALANGA	Box 65		0721170	[Signature]
9	WILIE ACHENG		FARMER	KALANGA	Box 65		0721170	[Signature]
10	FREDRICK ONYANGO	1020207	CHIEF	KALANGA	Box 65		0721170	[Signature]
11	Dennis O. Ogeny	1020207	FARMER	KALANGA	Box 65		0721170	[Signature]
12	ESTHER NIENO		FARMER	KALANGA	Box 65		0721170	[Signature]

Proposed Draught Mitigation Boreholes for RWWSB, LVNWSB and LVWSB
Environmental and Social Impact Assessment

Public Participation Form

Board: LVWSB Site: NYAMILA WATER PROJECT Date: 11/1/17

No.	Name	ID Number	Occupation	Location	Address		Signature
					Box	Telephone	
1	SILVIA AUCO OCHINGO	0197302	FASHION	KALAMBA/ UGAMBO	Box 61/1801	0718619131	SILVIA AUCO
2	CYPRIANA ABENABO ENCHIBI		"	"	"	"	"
4	DORINA APHA OKUNDA		"	"	"	0740612571	DOA
5	EZEKIEL NYAMUNGO MANDIYA	2654901	"	"	"	0792159944	EZEKIEL MANDIYA
6	SALMON OAGYO	1507024	"	"	Box 145	0715200370	SALMON OAGYO
7	ROSE ALUMA	0803222	"	"	Box 35 R 201	0717501517	ROSE
8	JUTEL APINYA		"	"	Box 37 R 201		JUTEL APINYA
9	JENIFER KAMBIA		"	"	Box 35 R 201		JENIFER KAMBIA
10	UNICE OBUUOR	2011740	"	"	Box 35 R 201		UNICE OBUUOR
11	MARIES TSINJO	3453498	"	"	Box 61 R 201	0717744100	MARIES TSINJO
12	ROSE ADHAMBA	7375779	"	"	"	0717744100	ROSE ADHAMBA

Proposed Draught Mitigation Boreholes for RWWSB, LVNWSB and LVWSB
Environmental and Social Impact Assessment

Public Participation Form

Board: LVWSB Site: NYAMILA WATER PROJECT Date: 11/1/17

No.	Name	ID Number	Occupation	Location	Address		Signature
					Box	Telephone	
1	Caroline Akinyi		Female	Kanyinga Kanyinga	Box 36		Caroline Akinyi
2	MARGRET HIGGINS		"	Kanyinga Kanyinga	"	0717744100	MARGRET HIGGINS
4	WASH ELUSCH	3482531	"	Kanyinga Kanyinga	Box 35	0717744100	WASH ELUSCH
5	TERESA BEKE		"	"	"		TERESA BEKE
6	FRANCE ADAMBA		"	"	Box 18		FRANCE ADAMBA
7	BENED OCHACH	20198700	"	"	Box 18	0725062561	BENED OCHACH
8	George Ayang	1270901	Male	Kanyinga	Box 18	0717744100	George Ayang
9							
10							
11							
12							

Annex 5: Minutes of Public Meeting

MINUTES OF A PUBLIC MEETING HELD AT NYAMILA SDA CHURCH, PUNDO VILLAGE, KALANYA-KANYANGO SUBLOCATION, IN EAST KANYADA LOCATION OF HOMA BAY COUNTY.

DATE: 11th January, 2017

Time: 1.13pm

Present:

- Chief, East Kanyada Location, Mr. Fred Odhiambo Onyango
- Nyamila Borehole Committee members lead by Vice Chairman, Mr. Dominic Owaga
- Lake Victoria South Water Service Board officials lead by Mr. George Ageng'o. (in charge of environment).
- Mr. Ibrahim Oluoch from Lake Victoria North Water Service Board.
- NEMA EIA/EA Lead Expert, Mr. George Adhoch representing Aquadean Services Limited
- The general public from the surrounding community.

Min. 1. Agenda

- Introduction by area water project committee Vice Chairman, Mr. Dominic Owaga
- Address by Mr. George Ageng'o
- Address by the LVNWSB official Mr. Ibrahim Oluoch.
- Explanation of borehole design by LVNWSB Engineering Assistant Mr. Dan Obumba.
- Explanation of the role and ESIA process- George Adhoch (EIA/EA Lead Expert)
- Address by the area Chief, Mr. Fred Odhiambo Onyango
- Plenary: Questions, Views, and concerns from the general public.
- Vote of thanks/Closing Remarks by water committee Vice Chairman Mr. Dominic Owaga

Min. 2. Introduction by the Water Committee Chairman/Call to order:

The meeting was called to order at 1.13am by Nyamila Water project committee Vice Chairman Mr. Dominic Owaga. The meeting was officially opened with a word of prayer from Samuel Juma. It then followed an introduction session where the attendants said their names and roles. The Vice Chairman welcomed everybody to the meeting and thanked them for taking their time to attend. He then handed over the meeting to Mr. George Ageng'o.

Min. 3 Address by the LVSWB official, George Ageng'o

Mr. George Ageng'o who is in charge of environment at LVSWB took the stage and thanked the community for taking their time to attend the meeting. He said Nyamila water project is one of the selected projects for funding in the country by the World Bank through Lake Victoria North Water Service Board. He explained the purpose of the meeting, saying that the views and comments are important in making decision while approving the project. He said such project must involve a public meeting where the community is able to

give views, concerns, and perceptions of the proposed water project. He said the meeting explains the advantages and disadvantages and devise ways of minimizing the disadvantages. He then handed over the meeting to Mr Ibrahim Oluoch from LVNWSB.

Min. 4 Address by the LVNWSB Official, Mr. Ibrahim Oluoch

The meeting was informed that the water project is to be funded by the World Bank and is one of the 57 projects selected countrywide. He said he is happy the Nyamila project is among those selected for funding. He said the meeting is important in determining whether the project is welcomed by the community or not. He said the meeting is meant to give the community full details of the project so that they can give their comments openly. He said for purposes of NEMA approval, it is a requirement that views and concerns from the community are captured to help in the implementation of the project. In order to come out with the community verdict over the project, he said a public meeting is necessary to know whether the project is welcome and the feedback relayed to the donors. Mr Oluoch added that views, concerns and community expectations help NEMA and World Bank make informed decisions. He said upon completion of the construction works, the project will be run by the water committee already constituted with assistance from the County Government. Water users will pay small amounts decided by the water committee to help in the maintenance and service of the water facility. He said it is upon the community to provide land for the implementation of the project. Those giving land for the project will sign consent form witnessed by the area chiefs or Assistant chiefs. He said it will not be upon Lake Victoria North Water Service Board to provide more funds after handing over the project to the community. He then handed over the meeting to Mr. Dan Obumba.

Min. 5 Address by the LVSWB Engineering Assistant, Mr. Dan Obumba

Mr. Obumba explained to the meeting what had taken place and what activity to follow in terms of the project implementation. He explained the design details of the project and scope of Works. The proposed borehole project will benefit the surrounding community with five water kiosks located at strategic places namely Obambo, Nyandhindia, Nyamila, Kibuon, and Radenya. He said the borehole was drilled between 21st and 22nd July 2016 to a total of 78m. The tested average yield of the borehole was 3.0m³/hr.

The meeting was informed that the proposed system uses solar pumping to lift borehole water to a high elevated storage tank located 1.17km from the borehole site. Distribution to water points will be by gravity. The meeting was informed that water pipelines will pass through private and public lands. Mr. Obumba said the pipelines would be laid along the road to ensure minimal land take. Water Kiosks, caretaking offices will be constructed on private lands. Individuals whose lands will be used as for construction of the projects components have given their written consents for use of their land.

Mr. Obumba explained the benefits that the water project will come with including creation of employment such as digging of trenches, construction of office, caretaking jobs. He cautioned that the money to be realized from the jobs to be created should be spent wisely. He said the community will be free to apply for individual connection. He added that the community will register the as a Water Users Association.

He said the community will be charged a small payment to cater for the management and service of the facility. LVSWSB will monitor the management of the water to ensure it is properly used. He said that after an award of the contract, the project will be implemented within six months. Mr Obumba then handed over the meeting to Mr. George Adhoch, EIA Lead Expert representing Aquaclean services limited.

Min 6; Explanation of EIA role and process- George Adhoch (EIA/EA Lead Expert)

During this session, Mr. Adhoch explained the purpose of the meeting and said that is a requirement by the law that every major development project of the same nature must be assessed to identify the impacts it may have on the environment and the surrounding community. The consultant told the meeting that the main aim of the gathering was to explain the project details to the people and address their concerns and questions. Mr. Adhoch told the meeting that a project of such nature requires that the public must be consulted so that their concerns are considered in the project implementation. He also explained the role of Environmental Impact Assessment in the proposed project. He said the purpose of the Environmental Impact Assessment is to suggest ways of maximizing on the positive impacts of the projects and device means of mitigating the adverse negative impacts. He said such a project must get approval from the National Environment Management Authority (NEMA) before implementation. One requirement for approval requires that a public meeting with the stakeholders be arranged so the project details can be explained to the people and their views and concerns taken and incorporated in the project development. The stakeholders concerns and views are also used by the National Environment Management Authority in approval of projects or in recommending remedial measures before approval.

Mr. Adhoch explained the impacts that are likely to impact from the project development both positive and negative. The consultant mentioned positive impacts like jobs to caretakers, construction workers, and cooking of food to the construction workers by the village women. The meeting was also informed that the water project will help reduce cases of waterborne diseases as well as reducing time spent on searching for the commodity. Expected negative impacts are injury and interference and disturbance with the roads and farms during pipeline laying. He took time to explain to the meeting how the adverse impacts will be mitigated. The meeting was then opened to the general public for comments views and questions.

Min. 7 Address by the area Chief, Mr. Fred Odhiambo Onyango

The chief started by thanking the donor for selecting the area for the project implementation. He urged the community to take care and protect the water equipments adding that it will be upon them to maintain the water project. He then asked the community members to apply for individual connection when that time comes. He told the proponent to organize seminars to educate the community and settle conflicts if any. He told the water management committee that there should be accountability and transparency in the management of the water project. The chief said there should be a standard billing system which should be accepted by everybody. He finally asked the community members to give land willingly for the implementation of the project.

Min. 3 Plenary: Questions, Views, and concerns from the general public.

It was time for the general public to give their views, question concerning the project. Each participant was to say his/her name before giving a comment. The comment and concerns were noted down.

Mr. Moris Ouma, asked to know if there will be water rationing and if there will be individual metre or for everybody.

Mr. Ezekiel Madori wanted to know if there will be individual connections

Mr. Justus Odira asked whether Gogo village can be given an extra kiosk since it was not covered.

Mr. Salmon Juma wanted to know the depth of the water pipes and if they will be cemented. He also wanted know if the cost of water will be uniform.

Mrs. Margaret Akeyo asked whether the water could be used for irrigation. She also wondered whether skilled labour will be imported or obtained locally.

Mr. Samuel Okeyo appreciated the project and thanked the donors.

Mr. Ogoma Elija of Vianney Educational Centre asked whether there will be a tank close to their school.

Mr. Aloyce Onyango wondered who will pay for the damage of the water facility.

Mr. Benard Ouma asked whether those who have donated lands for kiosks will get water for free.

In addressing the questions and concerns, Mr. Ageng'o said told the meeting that training on operation and maintenance of the water project will be offered and it will be upon the community to take charge. The community will decide the cost of water upon completion of the construction works. Each Kiosk will have a metre serving the whole area. The meeting was told that rationing was not expected as the water yield is high except during dry weather or on a need basis. The meeting was also told that a form will be designed to allow individual connection and the applicant will pay for all the costs involved. The meeting learnt that the budget for construction is as per the area indicated in the design. Areas which are not covered like Gogo can get help when money is sourced from other areas like County Government. Mr. Obumba told the meeting that black HDP plastics will be used in piping and that metal pipes will be used on roads. The meeting was also told that the water project committee will decide in consultation with the committee. The meeting was told that Vianney Educational Centre has an overhead tank next to it and therefore connection will be easy.

The meeting learnt that water service provision is a devolved function. Management and maintenance will be done by the water project committee. The committee will look into payment of the caretakers, plumbers, and maintenance of the pipes. There will be forums to educate the committee members on the same. Overall supervision will be done by Sub-County water office. The meeting was informed that there will be no individual connection during implementation time. The work will be undertaken as per the planned budget. Individual connection will be done upon completion of the work and application for the same done

through the water management committee. The meeting was informed that upon completion of the works, the community will be trained on how to run the water project for their benefit. The management committee will hire plumber to do repairs and connections where necessary. Mr. Agengo said not all area will be covered. However, the community can look at other sources of funding to further water projects in the area. For instance, the County Government, as a potential financier of water projects. The meeting was also informed that each kiosk will have a metre and the same applies to individual connection. The water pump to be used will be a hybrid using both solar and electricity power.

Mr. Oluch also said that the management of the water will be devolved to the County Government Level. The board can however offer small management trainings and keeping records to ensure sustainability of the project. The committee will work out tariffs on the water costing. The fee will be reasonable enough to cater for the repair and damages of the facility components.

Having exhausted the questions from the community, Mr. Oluch from LVNWSB sought to know the verdict of the people with regard to the proposed water supply project. The community members unanimously accepted the implementation of the proposed project and asked for a speedy implementation.

Min. 9 Vote of Thanks and Closing Remarks.

Vote of thanks was given by Mr. Dominic Owaga, water committee vice chairman. He thanks the guests for taking their time to come and bring water to the community. He asked the community to own the water project for a successful implementation. There being no other business, the meeting ended at 3.20pm with a word of prayer from Samuel Juma.

Minutes prepared by
George Adhoch
Aquaclean Services Limited
EIA/EA Lead Expert

Sign.....


Date..... 25/02/17

Confirmed by
Mr. Fred Odhiambo Oryango,
Chief,
East Kanyada Location

Sign..... CHIEF
KALANYA KANYADA LOCATION
P. O. BOX 130-40326.
HOMA BAY - KIPSAY
DATE: 25/02/2017

Date..... 25/02/2017

Annex 6: Borehole Water Quality Test results

	WATER RESOURCES MANAGEMENT AUTHORITY	
	TITLE: Water Sample Analytical Certificate – Physical Chemical Results	REF. NO : F/9/1/3
	DEPARTMENT: Technical	ISSUE NO : 04
	ISSUED BY: DTCM	REV. NO : 03
	AUTHORISED BY : TCM	DATE OF ISSUE: 15 th April 2013
		Page : 1 of 2

Serial No: _____ Sample No: 0180


Name of Customer EXPORT HYDRO PUMPS & SERVICES (A) LTD Address: _____


Purpose of Sampling: DOMESTIC County: MIGORI

Date Sampled: 25/7/16 Date Received: 28/7/16

Source: NYAMILA COMMUNITY BOREHOLE, (LAKE VICTORIA NORTH WATER SERVICES BOARD) Date Compiled: 8/8/16

PARAMETERS	UNIT	RESULTS	WHO STANDARDS	KEBS(KS 459-1:2007) STANDARDS
pH	pH Scale	7.15	6.5-8.5	6.5-8.5
Colour	mgPt/l	85	Max 13	Max 15
Turbidity	N.T.U	23.4	Max 5	Max 5
Conductivity (25 ^o C)	µS/cm	958	Max 2500	-
Iron	mg/l	0.4	Max 0.3	Max 0.3
Manganese	mg/l	0.12	Max 0.1	Max 0.5
Calcium	mg/l	56.8	Max 100	Max 150
Magnesium	mg/l	37.45	Max 100	Max 100
Sodium	mg/l	72.0	Max 200	Max 200
Potassium	mg/l	19	Max 50	-
Total Hardness	mgCaCO ₃ /l	296	Max 500	Max 300
Total Alkalinity	mgCaCO ₃ /l	326	Max 500	-
Chloride	mg/l	24	Max 250	Max 250
Fluoride	mg/l	1.35	Max 1.5	Max 1.5
Nitrate	mgN/l	1.51	Max 10	-
Nitrite	mgN/l	0.03	Max 0.1	Max 0.003
Sulphate	mg/l	5.77	Max 450	Max 400
Free Carbon Dioxide	mg/l	96	-	-
Total Dissolved Solids	mg/l	593.96	Max 1500	Max 1000
Arsenic	µg/l	-	Max 10	Max 10
Others		-		

Name of Analyst PRISILA JULIA Signature 

	WATER RESOURCES MANAGEMENT AUTHORITY	
	TITLE: Water Sample Analytical Certificate – Physical Chemical Results	REF. NO : F/9/1/3
	DEPARTMENT: Technical	ISSUE NO : 04
	ISSUED BY: DTCM	REV. NO : 03
	AUTHORISED BY : TCM	DATE OF ISSUE: 15 th April 2013
	Page: 2 of 2	

Comments by Head of Laboratory


The water is coloured and turbid. For a new borehole, the water is expected to clear with time. The other chemical parameters are within the limits for drinking purposes.

Name: **KENNETH K'OREJE**
ATCM-CENTRAL WATER TESTING LABORATORIES

Signature:  Date: 



Issued by: 
 (Deputy Technical Coordination Manager)

Approved by: 
 (Technical Coordination Manager)

Annex 7: Copy of No Objection letters from the land donors

LAND OWNER AGREEMENT FORM

To
LAKE VICTORIA NORTH WATER SERVICE BOARD (LVNWSB)
CERTIFICATE OF NO OBJECTION
Project Name: NYAMILA WATER PROJECT
Address: 61-40326 RODI KOPANY.
Village: PUNDO.
Sub-Location: KALANYA.
Location: KALANYA KANYANGO
Type of Technology: PIPING.

CERTIFICATE 1

I, the landowner, named here below do certify that I have been consulted and have no objection on my land parcel being crossed/affected by pipeline or other works of the project named above.

Land Owner's name: KENNEDY OMONDI OMONDO
Land Ref. No.: 1108 / KANYADA / KANYANGO / KALANYA.
ID NO. 24069857
Sign: Omondo Kennedy
Date: 16th Feb, 2017.

CERTIFICATE 2

I certify that this agreement has been prepared and signed before me:

Area Asst. Chief
Name: FREDRICK ONYANGO Sign: 
CHIEF
KALANYA KANYANGO LODA TIBEN
P.O. BOX 150-40326.
RODI - KOPANY.
DATE: 17/02/2017

CERTIFICATE 3

I certify that the project is to be in my location and I support it:

Area Chief
Name: FREDRICK ONYANGO Sign: 
CHIEF
KALANYA KANYANGO LODA TIBEN
P.O. BOX 150-40326.
RODI - KOPANY.
DATE: 17/02/2017

LAND OWNER AGREEMENT FORM

To

LAKE VICTORIA NORTH WATER SERVICE BOARD (LVNWSB)

CERTIFICATE OF NO OBJECTION

Project Name: NYAMILA WATER PROJECT
Address: P.O BOX 3, KODI KOPANY - 072180534
Village: FUNDA VILLAGE
Sub-Location: KALANYA/KANYANGO
Location: KALANYA/KANYANGO
Type of Technology: PIPELINE

CERTIFICATE 1

I, the landowner, named here below do certify that I have been consulted and have no objection on my land parcel being crossed/affected by pipeline or other works of the project named above.

Land Owner's name: NICHOLAS ONYANGO ANYANGO
Land Ref. No: KANYANGO/KANYANGO/KALANYA 1103
ID NO: 13572847
Sign: [Signature]
Date: 13/01/2017

CERTIFICATE 2

I certify that this agreement has been prepared and signed before me:

Area Assg. Chief: FOR -
Name: FREDRICK ONYANGO Sign: [Signature] CHIEF
KALANYA KANYANGO LOCATION
P.O. BOX 150-40326,
KODI - KOPANY,
DATE: 10/02/2017

CERTIFICATE 3

I certify that the project is to be in my location and I support it:

Area Chief:
Name: FREDRICK ONYANGO Sign: [Signature] CHIEF
KALANYA KANYANGO LOCATION
P.O. BOX 150-40326,
KODI - KOPANY,
DATE: 10/02/2017

LAND OWNER AGREEMENT FORM

To

LAKE VICTORIA NORTH WATER SERVICE BOARD (LVNWSB)

CERTIFICATE OF NO OBJECTION

Project Name: NYAMILA WATER PROJECT.

Address: Box 61 RORI KOPANY, HOMA

Village: PUNDO

Sub-Location: KALANYA / KANYANGO

Location: KALANYA / KANYANGO

Type of Technology: PIPING.

CERTIFICATE 1

I, the landowner, named here below do certify that I have been consulted and have no objection on my land parcel being crossed/affected by pipeline or other works of the project named above.

Land Owner's name: ESTHER AKINYI AGUWADA

Land Ref. No. KALANYA / KANYANGO / KALANYA

ID NO. 10536775

Sign: 

Date: 14/1/2017

CERTIFICATE 2

I certify that this agreement has been prepared and signed before me:

Area Asst. Chief FOR-

Name: FREDRICK ONYANGO

Sign: 

CHIEF
KALANYA KANYANGO LIDATIEN
P.O. BOX 150-40526.

DATE: 10/02/2017

CERTIFICATE 3

I certify that the project is to be in my location and I support it:

Area Chief

Name: FREDRICK ONYANGO

Sign: 

CHIEF
KALANYA KANYANGO LIDATIEN
P.O. BOX 150-40526.

DATE: 10/02/2017

LAND OWNER AGREEMENT FORM

To

LAKE VICTORIA NORTH WATER SERVICE BOARD (LVNWSB)

CERTIFICATE OF NO OBJECTION

Project Name: NYAMILA WATER PROJECT
Address: P.O. BOX 45 RORO, KAPANY - 0721-170-070
Village: WICORO - COUNTY - VILLAGE
Sub-Location: KALANYA / KANYANGO
Location: KALANYA / KANYANGO
Type of Technology: RAIN WATER TANK

CERTIFICATE 1

I, the landowner, named here below do certify that I have been consulted and have no objection on my land parcel being crossed/affected by pipeline or other works of the project named above.

Land Owner's name: Samuel Juma KIMOLE
Land Ref. No. KANYA / KANYANGO / KALANYA 557
ID NO. S250342
Sign: [Signature]
Date: 12/01/2017

CERTIFICATE 2

I certify that this agreement has been prepared and signed before me:

Area Assg. Chief FOR -
Name: FREDRICK ONYANGO Sign: [Signature]
CHIEF
KALANYA KANYANGO LIODA TINI
P.O. BOX 150 - 40526,
RORO, KAPANY.
DATE: 10/02/2017

CERTIFICATE 3

I certify that the project is to be in my location and I support it:

Area Chief
Name: FREDRICK ONYANGO Sign: [Signature]
CHIEF
KALANYA KANYANGO LIODA TINI
P.O. BOX 150 - 40526,
RORO, KAPANY.
DATE: 10/02/2017

LAND OWNER AGREEMENT FORM

To

LAKE VICTORIA NORTH WATER SERVICE BOARD (LVNWSB)

CERTIFICATE OF NO OBJECTION

Project Name: NYAMILA WATER PROJECT

Address: BOX 61-40326 REDI KOPANY - 07101847202

Village: RUNDO

Sub-Location: KALANYA KANYANGO

Location: KALANYA KANYANGO

Type of Technology: WATER KIOSK NO. 5

CERTIFICATE 1

I, the landowner, named here below do certify that I have been consulted and have no objection on my land parcel being crossed/affected by pipeline or other works of the project named above.

Land Owner's name: ALOYS DNYANGO BELLE

Land Ref. No. KANYANGO / KANYANGO / KALANYA / 1111

ID NO. 0846456

Sign: [Signature]

Date: 12th JANUARY 2017

CERTIFICATE 2

I certify that this agreement has been prepared and signed before me:

Area Asst. Chief FRED -
Name: FREDRICK DNYANGO Sign: [Signature]

CHIEF
KALANYA KANYANGO LOCATION
P. O. BOX 130-4 0326.
REDI KOPANY
DATE: 10/02/2017

CERTIFICATE 3

I certify that the project is to be in my location and I support it:

Area Chief
Name: FREDRICK DNYANGO Sign: [Signature]

CHIEF
KALANYA KANYANGO LOCATION
P. O. BOX 130-4 0326.
REDI KOPANY
DATE: 10/02/2017

LAND OWNER AGREEMENT FORM

To

LAKE VICTORIA NORTH WATER SERVICE BOARD (LVNWSB)

CERTIFICATE OF NO OBJECTION

Project Name: NYAMILA WATER PROJECT

Address: Box 61 Rudi Kopany

Village: PUNDO

Sub-Location: KALANYA / KANYANGO

Location: KALANYA / KANYANGO

Type of Technology: WATER KICK/ PIPING

CERTIFICATE 1

I, the landowner, named here below do certify that I have been consulted and have no objection on my land parcel being crossed/affected by pipeline or other works of the project named above.

Land Owner's name: JOHN SAHAMBU AGWANDAH

Land Ref. No. KANYADA / KANYANGO / KALANYA

ID NO. 11282827

Sign: [Signature]

Date: 13/1/2017

CERTIFICATE 2

I certify that this agreement has been prepared and signed before me:

Area Asst. Chief FOR: **CHIEF**
Name: FREDRICK ONANGO [Signature] **KALANYA KANYANGO LIDATIIN**
P.O. BOX 150-40526
REGD. - KOBONY
DATE: 10/02/2017

CERTIFICATE 3

I certify that the project is to be in my location and I support it:

Area Chief
Name: FREDRICK ONANGO [Signature] **CHIEF**
KALANYA KANYANGO LIDATIIN
P.O. BOX 150-40526
REGD. - KOBONY
DATE: 10/02/2017

LAND OWNER AGREEMENT FORM

To

LAKE VICTORIA NORTH WATER SERVICE BOARD (LVNWSB)

CERTIFICATE OF NO OBJECTION

Project Name: NYAMILA WATER PROJECT

Address: P.O. BOX 61-40326, ROOI-KOPANY, 0720735874

Village: PUNDO - COUNTY VILLAGE

Sub-Location: KALANYA/KANYANGO

Location: KALANYA/KANYANGO

Type of Technology: WATER KIOSK 2.

CERTIFICATE 1

I, the landowner, named here below do certify that I have been consulted and have no objection on my land parcel being crossed/affected by pipeline or other works of the project named above.

Land Owner's name: SAEMON OTUGI OGEDA

Land Ref. No. KANYADA/KALANYA/KANYANGO/4681

ID NO. 1597210 -

Sign: 

Date: 12/1/2017

CERTIFICATE 2

I certify that this agreement has been prepared and signed before me:

Area Asst. Chief FOR: FREDRICK ONANGO Sign: 

CHIEF
KALANYA KANYANGO LTD/THIN
P.O. BOX 150-40526,
ROOI-KOPANY
DATE: 10/02/2017

CERTIFICATE 3

I certify that the project is to be in my location and I support it:

Area Chief FREDRICK ONANGO Sign: 

CHIEF
KALANYA KANYANGO LTD/THIN
P.O. BOX 150-40526,
ROOI-KOPANY
DATE: 10/02/2017

LAND OWNER AGREEMENT FORM

To

LAKE VICTORIA NORTH WATER SERVICE BOARD (LVNWSB)

CERTIFICATE OF NO OBJECTION

Project Name: NYAMILA WATER PROJECT

Address: BOX 01-40326 RODI KOPANY - 0716376418

Village: PUNDO

Sub-Location: KALANYA KANYANGO

Location: KALANYA KANYANGO

Type of Technology: ~~WELL~~ BORE HOLE, WATER KIOSK & AIR OFFICE

CERTIFICATE 1

I, the landowner, named here below do certify that I have been consulted and have no objection on my land parcel being crossed/affected by pipeline or other works of the project named above.

Land Owner's name: DOMNIC OWAGA OGUTA

Land Ref. No. KANYA/KANYANGO/KALANYA/1098

ID NO. 6647290

Sign: [Signature]

Date: 11TH JANUARY, 2017

CERTIFICATE 2

I certify that this agreement has been prepared and signed before me:

Area Asst. Chief FOR: FOR

Name: FREDRICK ONYANGO Sign: [Signature]

Date: 11/01/2017

CERTIFICATE 3

I certify that the project is to be in my location and I support it:

Area Chief
Name: FREDRICK ONYANGO Sign: [Signature]

CHIEF
KALANYA KANYANGO LOCATION
P. O. BOX 130-40326,
RODI - KOPANY
DATE: 11/01/2017

Date: 11/01/2017

CHIEF
KALANYA KANYANGO LOCATION
P. O. BOX 130-40326,
RODI - KOPANY
DATE: 11/01/2017

Annex 8: Comments from Stakeholders



Proposed Draught Mitigation Boreholes for RVWSB, LVNWSB and LVSWB Environmental and Social Impact Assessment

Public Participation Form

Board LVSWB Site NYAMILA Date 11/01/2017

To the Participant:

Interventions under WaSSIP-AF, channelling resources through LVNWSB, is focused into assisting the communities living in the target project areas in LVNWSB, LVSWB and RVWSB to access water for domestic and livestock needs during the dry conditions. The proposed boreholes are being developed through the established procedures under the Water Resources Management Authority as well as the provisions under EMCA, 1992.

This Stakeholder Consultation is your forum to express your honest views and opinions on the proposed development with respect to your neighbourhood welfare, safety, water supply and sanitation and hygiene amenities among other issues that you may consider pertinent to be addressed in the project implementation. Please use the space below in this regard. Please use the following space in this regard.

Concerns/Issues:

Recommendations/Mapendekezo:

I can deeply accept the project fully because we really face the major drought and such kinds of disasters. We must evaluate it but only if we put ourselves together as one and collaborate with others and the Government and the world bank.

NOTE: You may use additional sheets if necessary.



1. What do you think are the main challenges from the project to you?

- i. Losing some parcels of land for piping and storage of the tank which could be used for
- ii. Our contribution towards the project to water the community both in able and unable.
- iii. Creating other local ponds and water young waters.

2. What do you see as the benefits and disadvantages of the proposed project?

- i. Clean water for use both for human/ domestic in fit for plant use because it's salty water.
- ii. Nearby kiosks, looking time for our daily activities & communicating with other community members.
- iii. Moving to other places to reach the kiosks causing damage eg fences, plants, roads etc.
- iv. Getting employment (labor) for the youths.

3. What would be your roles and responsibilities in the proposed project implementation?

- i. Am the ~~landowner~~ main storage of the tank area and live above that.
- ii. Watching when any damage may occur and working together with the managing dept.
- iii. Cooperate with the area and the management head in local coordination.

Relationship with the project/uhusiano wako na mradi (Weka Alama):

1. Resident 2. Business Person 3. Landowner 4. Water User 5. Employee Other _____

Name/Jina: Samuel Juma Address/P. O. Box: PS 204 Tel./Nambani ya Simu: 0724190688

Signature: ID No./Nambani ya Kiamulazi: 0150342 Date: 11/01/2019



**Proposed Draught Mitigation Boreholes for RVWSB, LVNWSB and LVSWB
Environmental and Social Impact Assessment**

Public Participation Form

Board LVSWB Site NYAMILA Date 11/11/19

To the Participant:

Interventions under WaSSIP-AF, channelling resources through LVNWSB, is focused into assisting the communities living in the target project areas in LVNWSB, LVSWB and RVWSB to access water for domestic and livestock needs during the dry conditions. The proposed boreholes are being developed through the established procedures under the Water Resources Management Authority as well as the provisions under EMCA, 1999.

This Stakeholder Consultation is your forum to express your forecast views and opinions on the proposed development with respect to your neighbourhood welfare, safety, water supply and sanitation and hygiene amenities among other issues that you may consider pertinent to be addressed in the project implementation. Please use the space below in this regard. Please use the following space in this regard.

Concerns/Issues

- We require water to assist in our schools to help save time for our pupils who may be sent fetch water during study time.

Recommendations/Responses

I recommend that the project should commence due serious water problems in the area.

NOTE: You may use additional sheets if necessary



1. What do you think are the main challenges from the project to you?

i. Due to scarcity of water in the area, some water points are crowded hence latecomers to school going pupils.
 ii. It will require a piece of land which MUST be donated by us
 iii. It will also require our contributions to help in the establishment and maintenance of the facilities

2. What do you see as the benefits and disadvantages of the proposed project?

i. It will reduce for us the distance covered in order to look for water.
 ii. It will limit crowding at water points due to easy accessibility at different water points.
 iii. It will improve our health, because of the clean water we get at the water points.

3. What would be your roles and responsibilities in the proposed project implementation?

i. Donating land for the piping and construction of kiosks.
 ii. Using the water responsibly to avoid water wastage.
 iii. Help in maintaining the facilities by giving little contribution to assist in case of breakdown.

Relationship with the project/uhuziend wako na mwend (Waka Atama):

1. Resident 2. Business Person 3. Landowner 4. Water User 5. Employee Other _____

Name/Una: Ogoma Elijah Arwani P. O. Box: 125 Tel. Nambani ya Simu: 0718659160

Signi/Sakini: Elijah ID No./Nambani ya Kitambulicho: 28653503 Date: 11-1-2017



Proposed Drought Mitigation Boreholes for RVWSB, LVNWSB and LVSWSB Environmental and Social Impact Assessment

Public Participation Form

Board LVSWSB Site NYAMILA Date 11/1/17

To the Participant:

Interventions under WaSSIP-AF, channeling resources through LVNWSB is focused into assisting the communities living in the target project areas in LVNWSB, LVSWSB and RVWSB to access water for domestic and livestock needs during the dry seasons. The proposed boreholes are being developed through the established procedures under the Water Resources Management Authority as well as the provisions under EVCA, 1999.

This Stakeholder Consultation is your forum to express your honest views and opinions on the proposed development with respect to your neighbourhood welfare, safety, water supply and sanitation and hygiene priorities among other issues that you may consider pertinent to be addressed in the project implementation. Please use the space below in this regard. Please use the following space in this regard.

Concerns/Issues:

- More individual connections
- Cover a wide area with the pipes
- Breakage of pipes
- Theft of solar

Recommendations/Dependences:

- Community to provide adequate security

NOTE: You may use additional sheets if necessary



1. What do you think are the main challenges from the project to you?

- i. _____
- ii. _____
- iii. _____
- iv. _____

2. What do you see as the benefits and disadvantages of the proposed project?

- i. *there will be more water free from diseases*
- ii. *Time saving as the water will now be clear*
- iii. _____
- iv. _____

3. What would be your roles and responsibilities in the proposed project implementation?

- i. *AS a community member I have care and responsibility of the water facility*
- ii. _____
- iii. _____
- iv. _____

Relationship with the project/uhusiano wako na mradi (Weka Aina):

1. Resident 2. Business Person 3. Landowner 4. Water User 5. Employee Other _____

Name/Jina: *Emare Akwony* Address/P. O. Box: *61* Tel./Namba ya Simu: *013102438*

Signature: *[Signature]* ID No./Namburi ya Kitambulisho: _____ Date: *11/11/19*



Proposed Draught Mitigation Boreholes for RVWSB, LVNWSB and LVSWSB Environmental and Social Impact Assessment

Public Participation Form

Board LVSWSB Site NYAMILA Date 11/1/18

To the Participant:

Interventions under WaSSIP-AF, channeling resources through LVWSB, is focused into assisting the communities living in the target project areas of LVNWSB, LVSWSB and RVWSB to access water for domestic and livestock needs during the dry conditions. The proposed boreholes are being developed through the established procedures under the Water Resources Management Authority as well as the provisions under EMCA, 1999.

This Stakeholder Consultation is your forum to express your honest views and opinions on the proposed development with respect to your neighbourhood welfare, safety, water supply and sanitation and hygiene amongst other issues that you may consider pertinent to be addressed in the project implementation. Please use the space below in this regard. Please use the following space in this regard.

Concerns/Issues:

- Management problems may be an issue
- security issues
- Maintenance of the installed equipment
-

Recommendations/Mapendekezo

- Increased number of truck and network to reach more people
- Better training to the right team from the community

NOTE: You may use additional sheets if necessary.



1. What do you think are the main challenges from the project to you?

- i. - Management problems
- ii. - Some of the houses will be far from the rest of the community members
- iii.
- iv.

2. What do you see as the benefits and disadvantages of the proposed project?

- i. - Cleaner and better sanitation
- ii. - Easy access to the water
- iii. - Unity of the members
- iv.

3. What would be your roles and responsibilities in the proposed project implementation?

- i. - Over see the project
- ii. - Offer Security
- iii. - Help in the mgt. of the project
- iv.

Relationship with the project/uhusiano wako na mradi (Weka Alama)

1. Resident 2. Business Person 3. Landowner 4. Water User 5. Employee Other _____

Name/Utwa: JAMES GDIRA Address/P. O. Box: 35 R-101 Tel./Namban ya Simu: 0715780564

Signature: [Signature] ID No./Namban ya Kitambulisho: 145598163 Date: 11-1-2017



**Proposed Draught Mitigation Boreholes for RVWSB, LVNWSB and LVSWB
Environmental and Social Impact Assessment**

Public Participation Form

Board RVWSB Site NYAMILA Date 21/1/12

To the Participant:

Implementing under WaSSIP-AF, channeling resources through LVWSB, is focused on assisting the communities living in the target project areas in LVWSB, LVNWSB and RVWSB to access water for domestic and livestock needs during the dry conditions. The proposed boreholes are being developed through the established procedures under the Water Resources Management Authority as well as the provisions under EMCA, 1999.

This Stakeholder Consultation is your forum to express your honest views and opinions on the proposed development with respect to your neighbourhood welfare, safety, water supply and sanitation and hygiene amenities among other issues that you may consider pertinent to be addressed in the project implementation. Please use the space below in this regard. Please use the following space in this regard.

Concerns/Issues:

- To get enough clean water for domestic and livestock use.
- This nearby was protected water kiosks from which to get the water.
- Hygienic conditions will have to be observed.
- Great security arrangement to be made and also maintenance.

Recommendations/Requests:

- Have the water ready for use as soon as possible.
- All users to be registered.
- The Project to operate by a CBO - i.e Nyamila Water Project to be a CBO.
- All affected land owners to give written consent to avoid later complaints.

NOTE: You may use additional sheets if necessary



1. What do you think are the main challenges from the project to you?

i. Payment issues

ii. Divinity

iii. Location issues

iv.

2. What do you see as the benefits and disadvantages of the proposed project?

i. Time consuming

ii. It help us get clean water to drink

iii. Easy access to water point

iv. Destroying our properties e.g. the plantation

3. What would be your roles and responsibilities in the proposed project implementation?

i. Take care of the project

ii. Management

iii. Security issues

iv.

Relationship with the project/ustano wako na mradi (Weka Alama)

1. Resident 2. Business Person 3. Landowner 4. Water User 5. Employee Other

Name/ina: OWAGA MELDAH Anwani/P. O. Box: 36 Tel./Nambani ya Simu: 07-65264622

Sign/Sahhi: [Signature] ID No./Nambani ya Kitambulisho: 0720927 Date: 11/10/17