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ATHI WATER SERVICES BOARD TANATHI WATER SERVICES BOARD

PROPOSED BOREHOLE AT KANYONGO AREA, KALAMA, MACHAKOS COUNTY

REVIEW OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

FEBRUARY 2016

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FACT SHEET

Project Name	Consultancy Services for Hydrogeological Studies, Design, Bid Document Preparation and Supervision of Construction of Boreholes and Elevated Steel Water Tanks in Tanathi Water Services Board Area
Tender No.	AWSB/WASSIP/ AF/ Comp.1/ CS-37/2012
Assignment Name	Environmental and Social Impact Assessment for the Proposed Borehole
Location	Kanyongo Area, Kalama, Machakos County
GPS Coordinates	01° 37' 21" S and longitudes 37° 19' 18" E
Borehole Depth	150 meters
Yield	$4m^3/h$
Estimated cost	Kshs 8,620,000
Main use	Domestic
Funding Agency	World Bank
Client	Athi Water Service Board
Consultant	Kenface Enconsults (Africa) Ltd
Start date	May 2015
Completion date	July 2016
Targeted users	2530

Disclaimer
This Environmental Impact Assessment Report is being submitted in accordance with the terms and conditions of contract in respect of provision of consultancy services. It has been carried out in full observance of the EIA regulations and in compliance with the Environmental Management and Coordination Act, 1999 and subject to terms and conditions of the National Environment Management Authority (NEMA).

ACKNOWLEDGEMENT

The assessment team wishes to thank AWSB team who participated in conducting this ESIA/RAP review by providing necessary assistance and relevant documentation.

We wish to thank the Environment Officer AWSB and her staff for their immense assistance and cooperation during our field visits and assistance in availing relevant information. Also, we thank the County, Sub-County and local administration, communities for their support, who graciously provided pertinent data and/or information, documents and actively participated and interacted with the ESIA/RAP Consultancy Team.

ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AWSB	Athi Water Service Board
CBO	Community Based Organization
EHS	Environment Health and Safety
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
ESMP	Environmental and Social Management Plan
HIV	Human Immunodeficiency Virus
NEMA	National Environmental Management Authority
NGO	Non-Government Organisations
NLC	National Land Commission
OP	Operational Policy
TANATHI	Tanathi Water Service Board
WB	World Bank
WRMA	Water Resources Management Authority

EXECUTIVE SUMMARY

This document has been compiled and reviewed by the consultancy team on behalf of **ATHI WATER SERVICES BOARD**. It identifies, describes, evaluates and develops means of mitigating potential negative environmental impacts of proposed drilling of a borehole at **Kanyongo Area, Kalama, Machakos County.**

The local community gets their water source by scooping sand from the small seasonal stream to find water. This has resulted in proposed drilling of the borehole as the best alternative water source mostly for domestic and institutional purposes. This Environmental Impact Assessment (EIA) study has been found necessary for this borehole drilling project in order to incorporate environmental issues during construction and operation. Environmental Impact Assessment for such projects is a requirement in Kenya under the Environmental Management and Co-ordination Act (EMCA) 1999 and World Bank Operational Policy 4.01 on Environmental Assessments.

This assessment carried out by the consultancy team examined the potential environmental impacts of the project on the immediate surroundings throughout the project phases. It encompassed all aspects pertaining to the physical, ecological, socio-cultural, health and safety conditions at the site and its environs during drilling. The study was based on laid down scientific qualitative procedures with the most recent methodologies and analysis required in EIAs and, strictly adheres to the relevant legislative framework governing the groundwater abstraction industry.

Significant Environmental Impacts

Positive impacts*:* Increased access to water, creation of employment opportunities, improved health and sanitation of community members, reduced travel times to water points, increased participation of women in socio-economic development and improved household and community income generating activities.

Negative Impacts*:* Loss of vegetation, alteration or destruction of wildlife habitat, oil/grease spillage, noise pollution, air pollution, occupational health and safety hazards, soil erosion, financial burden to community members, water vectors and lowering of water table.

Mitigation of Negative Impacts*: Chapter* seven provides an elaborate matrix for the negative impact mitigation. Chapter eight presents a detailed Environmental and Social Management Plan with timelines and cost estimates where applicable for implementation by responsible parties or stakeholders.

Issues raised during public consultations: During public consultations, various aspects of the project were discussed. The issues raised by the community members touched on water scarcity, water for schools, water conflicts and beneficiaries. Detailed account of the discussions is presented in chapter five.

Recommendation: It is recommended that AWSB and the relevant stakeholders implement the Environmental and Social Management Plan. During the operation and maintenance of the borehole, it is necessary that environmental regulations be strictly adhered to. The performance of the borehole shall also be monitored against the recommended mitigation measures to ensure sustainability.

Overall Public Opinion: The construction of the proposed borehole in the area will have far reaching positive environmental impact on the community in terms of accessibility to quality water and reduction in waterborne diseases. The project area has serious water challenges which continue to stifle socio-economic development and threaten livelihoods. It is for this reason that the community members are very supportive of the project. It was also established that all the identified negative environmental impacts will be effectively mitigated through full implementation of the ESMP.

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Chapter One

1. INTRODUCTION

1.1 Background

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). Of this financing to develop six (6) boreholes will be drilled within Makueni and Machakos Counties in Tanathi Water Services Board (TANATHI) area of operation and will be implemented by Athi Water Services Board (AWSB). One of the boreholes will be developed in Kanyongo Area, Machakos County.

With this, the proponent, AWSB will be addressing the issues pertaining to the water shortage in Kanyongo Area, Machakos County. The local community has been faced with acute shortage of water especially during the dry periods when the surface water flow decreases resulting in water trucking.

Lack of an elaborate water supply in the area has impacted negatively to the overall development and socio-economic goals of the local community.

1.2 The project

The scope of the proposed project will include the following:

i. Drilling of borehole;
ii. Installation of a solar pump;
iii. Rising main;
iv. Elevated steel water tank;
v. Construction of a pump house; and
vi. Construction of a water kiosk.

1.3 Objectives of Environmental and Social Impact Assessment (ESIA)

The overall objective of carrying out an Environmental Impact Assessment is to determine the likely impacts of a given project on the environment, propose possible mitigation measures and monitoring.

The Constitution of Kenya requires that environmental concerns are integrated in all economic development which calls for environmental integration in the project life cycle in order to:

(i) Protect and manage the environment for sustainable development;

(ii) Integration of environmental management and economic decisions at early planning stages;

(iii) Predict the consequences of a proposed project in terms of environmental, social, economic and cultural settings and propose mitigation measures;

(iv) Compare available alternatives for a particular project and determine the optimal mix of environmental and economic costs and benefits; and

(v) Involve public, proponents, private and government agencies in assessment and review of a proposed project in an open, transparent and participatory approach.

1.4 ESIA Guiding Principles

The guiding principles for Environmental and Social Impact Assessment are:

(i) It requires that all environmental concerns must be accounted for in all development activities;
(ii) It also encourages public participation in all stages of proposed project development. It increases the ownership and sustainability;
(iii) It also recognizes the role of social and cultural principles traditionally used in the management of the environment and natural resources;
(iv) International cooperation in the use and wise management of shared resources;
(v) Intra-generation and inter-generation equality;
(vi) Polluter-pays principle; and
(vii) The precautionary principle.

1.5 Scope and content of project assessment

The project assessment investigates and analyzes the anticipated environmental impacts of the proposed drilling of the borehole in line with the Environmental Impact Assessment and Audit 2003 regulations. Consequently, the report provides the following:

- ✓ Nature of project;
- ✓ The location of the project including the physical area that may be affected by the project's activities;
- ✓ The activities that shall be undertaken during the project installation, operation and decommissioning of the project;
- ✓ The materials to be used, products and by-product including waste to be generated by the project and the methods of disposal;
- ✓ The potential environmental impacts of the project and mitigation measures to be taken during and after the implementation of the project;
- ✓ An action plan for prevention and management of possible accidents during the project cycle;
- ✓ A plan to ensure the health and safety of the workers and the neighboring communities; and
- ✓ The economic and social cultural impacts to local community and the nation in general.

To achieve all these, a systematic approach was followed by the consultants which included the general steps outlined below:

- ✓ Environmental screening;
- ✓ Environmental scoping which provided the key environmental issues;
- ✓ Desktop studies;
- ✓ Interviews with the Project Proponent;
- ✓ Physical inspection of the site and surrounding areas;
- ✓ EIA Public participation; and
- ✓ Reporting including the preparation of an Environmental Management Plan.

All these aspects were considered accordingly. This report also seeks to ensure that all the potential environmental impacts are identified and that workable mitigation measures are adopted. The report also seeks to ensure compliance with the provision of the EMCA 1999, and Environmental (Impact Assessment and Audit) Regulations 2003 as well as World Bank safeguard policies.

The report emphasizes the duties of AWSB and contractor during the installation phase as well as the operation phase of this project.

1.6 Methodology

The assessment team used both primary and secondary data. Primary data was collected through site visits and public consultations. While at the site, the consultant used key informant interviews, semi-structured interviews, observations and focus group discussions. Secondary data was obtained through literature review.

1.6.1 Literature Review

Information obtained through literature review enabled us to know:

- ✓ Amount of water required;
- ✓ Water quality criteria to apply - potable, livestock etc.;
- ✓ Hydrogeological information available;
- ✓ Data gaps to be filled;
- ✓ Social, environment, community and land ownership criteria likely to influence the sitting and operation of the project; and
- ✓ Relevant laws and regulations.

1.6.2 Site Visits

We visited the project site in order to:

- ✓ Develop a better understanding of the project area;
- ✓ Consult the local people about the proposed project and document their views;
- ✓ Carry out hydrogeological surveys;
- ✓ Assess project impacts.

1.6.3 Public Consultations

Consultation was also undertaken as part of the ESIA in order to obtain the views of members of the immediate community and interested and affected groups within the site's immediate area of influence. The consultation was done with randomly selected people in the neighbourhood of the proposed site and involved use of a semi-structured interviews.

1.7 Terms of Reference

The environmental consultant as stipulated under the EMCA was commissioned by AWSB to undertake an Environmental Impact Assessment (EIA) study for the intended borehole drilling and to prepare a report for further examination by the National Environmental Management Authority (NEMA) and subsequent authorization to implement the proposed project.

The guidelines to conducting an ESIA as per Environmental (Impact and Audit) regulations 2003 apply in the absence of any defined terms of reference between the proponent and the environmental expert.

1.8 ESIA Team

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

i. Lead EIA Expert/Team Leader;
ii. Environmentalist; and
iii. Sociologist.

Chapter Two

2. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 Overview of the Policy Framework

2.1.1 National Water Policy

The National Policy of Water which was promulgated in April 1999 as Sessional Paper No. 1 of 1999 calls for decentralization of operational activities from the central government to other sectors, including local authorities, the private sector and increased involvement of communities in order to improve efficiency in service delivery. It also tackles issues pertaining to water supply and sanitation facilities development, institutional framework and financing of the sector. According to the policy, in order to enable sustainable water supply and sanitation services, there is need to apply alternative management options that are participatory through enhanced involvement of others in the provision of these services but particularly the private sector.

The overall objective of the National Water Policy is to lay the foundation for the rational and efficient framework for meeting the water needs for national economic development, poverty alleviation, environmental protection and social wellbeing of the people through sustainable water resource management.

2.1.2 Water Catchments Management Policies

The policy on water catchments management has been shaped over time by two Sessional Papers as listed below:

- ✓ Sessional paper No. 1 of 1968; and
- ✓ Kenya Forest Development Policy Sessional paper No. 9 of May 2005.

Sessional Paper No. 9 encourages the involvement of the private sector, communities and other stakeholders' participation in forest management in order to conserve water catchments areas and reduce poverty.

2.1.3 Policy on Environment and Development

This is presented as the Sessional paper No. 6 of 1999 on Environment and Development. The overall goal is to integrate environmental concerns into the national planning and management process and provide guidelines for environmentally sustainable development. Under section 4.3 of the document, Provision of potable water and water for sanitation is viewed as being central to satisfying basic human needs. It is indicated that the current water development programmes focus almost entirely on water delivery with little concern for demand management and conservation. Water resources have an extremely high value and effective mechanisms for managing and conserving water could result unto economic benefits as well as sustainable use of this vital resource.

Some of the key objectives of the policy are:

- ✓ To protect water catchments;
- ✓ To ensure all development policies, programmes and projects take environmental considerations into accounts, and
- ✓ To enhance, review regularly, harmonize, implement and enforce laws for the management, sustainable utilization and conservation of natural resources.

Under this policy, broad categories of development issues have been covered that require sustainable approach. The policy recommends the need for enhanced re-use/recycling of residues including water and wastewater as well as increased public awareness raising and appreciation of clean environment. It also enhances participation of stakeholders in the management of natural resources within their respective localities.

2.2 Overview of the Legislative Framework

2.2.1 The Constitution of Kenya

The Constitution is the supreme law of the Republic and binds all persons and all State organs at all levels of government.

The Constitution of Kenya, 2010 provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectoral legislative documents are drawn.

In relation to the environment, article 42 of chapter four, *The Bill Of Rights*, confers to every person 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 measures, particularly those contemplated in Article 69, and to have obligations relating to the environment fulfilled under Article 70.

Chapter 5 of the document provides the main pillars on which the 77 environmental statutes are hinged.

Part 1 of the chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property.

The second part of this chapter directs focus on the environment and natural resources. It provides a clear outline of the state's obligation with respect to the environment, thus;

"The state shall:

- ✓ *Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;*
- ✓ *Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;*
- ✓ *Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;*
- ✓ *Encourage public participation in the management, protection and conservation of the environment;*
- ✓ *Protect genetic resources and biological diversity;*
- ✓ *Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;*
- ✓ *Eliminate processes and activities that are likely to endanger the environment; and*
- ✓ *Utilize the environment and natural resources for the benefit of the people of Kenya."*

There are further provisions on enforcement of environmental rights as well as establishment of legislation relating to the environment in accordance to the guidelines provided in this chapter.

In conformity with the Constitution of Kenya, every activity or project undertaken within the republic must be in tandem with the state's vision for the national environment as well as adherence to the right of every individual to a clean and healthy environment. The proposed project is a central development activity that utilizes sensitive components of the physical and natural environment hence need for a clearly spelt out environmental management plan to curb probable adverse effects to the environment.

2.2.2 The Environmental Management and Co-ordination Act (EMCA), 1999

This Act of Parliament, also known as EMCA, is the parent Act of Parliament that provides for the establishment of appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto.

EMCA, in its 13 interrelated parts, provides regulatory provisions for all levels of environmental conservation and management. The first four parts provide legislative guidelines on administrative and planning components of environmental management. They include:

(i) General Principles;
(ii) Administration;
(iii) Environmental planning;
(iv) Protection and Conservation of the Environment. Parts five to seven focus on on-field management of the environment as an integral component of actual or proposed projects;
(v) Environmental impact assessments (EIA), audits and monitoring;
(vi) Environmental audit and monitoring; and
(vii) Environmental quality standards.

The last five parts of the Act regulate on enforcement of provisions outlined in the Act and recognition of international agreements along which the EMCA has been established. They are; Environmental Restoration orders, Environmental Easements, Inspection, analysis and

records, Inspection Analysis and Records, International Treaties, Conventions and Agreements, National Environment Tribunal, Environmental Offences.

All the chapters 1 to 13 apply to the proposed project at one stage or the other and therefore the project proponent is required to understand and conform with the Act accordingly. One such area is Environmental Impact Assessment. This is expressly stated in section 58(2) of the Act. *"The proponent of a 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 project report under sub-section (1), that the intended project may or is likely to have or will have a significant impact on the environment, so directs."*

EMCA has set out several regulations for managing the environment which include the following:

(a) The Environmental (Impact Assessment and Audit) Regulations, 2003

This is a supplementary legislation to the EMCA. It gives additional "punch" by providing guidelines for conducting Environmental Impact Assessments and Audits. It offers guidance on the fundamental aspects on which emphasis must be laid during field study and outlines the nature and structure of Environmental Impact Assessments and Audit reports. The legislation further explains the legal consequences of partial or non-compliance to the provisions of the Act.

Relevance

The borehole construction as an activity is listed in the second schedule of EMCA as among projects that require an Environmental Impact Assessments before commencement. The project implementation cannot commence before the license is granted, upon conducting the EIA. For this reason, this report provides the legal requirements for the project approval.

Impacts of the borehole, involves major elements of the environment, including land, water and human health and safety. Therefore, there is need to evaluate these impacts and establish the most sustainable approach to benefit both the current and the future generations and mitigate projected negative impacts to people and the environment through conducting Environmental and Social Impact Assessment and subsequent audits.

(b) The Environmental Management and Coordination (Water Quality) Regulations, 2006

Described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006, these regulations apply to drinking water, water used for industrial purposes, agricultural purposes, recreational purposes fisheries and wildlife and any other purposes. It stipulates quality standards for sources and discharge of water to any environmental receptors within an activity area.

The Regulations outline various water quality standards in relation to use and discharge. Such aspects provided for are:

- ✓ Quality standards for sources of domestic water;
- ✓ Quality monitoring for sources of domestic water;
- ✓ Standards for effluent discharge into the environment;
- ✓ Monitoring guide for discharge into the environment;
- ✓ Standards for effluent discharge into public sewers; and
- ✓ Monitoring for discharge of treated effluent into the environment.

Relevance

The proposed project will impound and abstract significant quantity of groundwater. It is thus fundamental to regularly analyze water quality and check for conformity to stipulated legal standards in this supplementary legislation.

Moreover, the quality of water discharges into any environmental receptor must be ascertained for safety and if not, treated.

(c) Environmental Management and Co-ordination (Waste Management) Regulations, 2006

Regulations guiding waste management are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006. They offer legal provisions on handling of a variety of wastes emanating from various projects and activities. The waste categories covered by the regulations include:

- ✓ Industrial wastes;
- ✓ Hazardous and toxic wastes;
- ✓ Pesticides and toxic substances;
- ✓ Biomedical wastes; and
- ✓ Radio-active substances.

These Regulations outline requirements for handling, storing, transporting, and treatment / disposal of all waste categories as provided therein.

Relevance

The proposed project, during construction phase may involve the use of materials that release hazardous waste i.e. cement, oil spillage from vehicles, hence the need for all project actors to abide by these regulations in dealing with such wastes, especially the provisions of industrial, hazardous and toxic wastes which may be handled in the course of the project life.

(d) Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006

These regulations are described in Legal Notice No. 131 of the Kenya Gazette Supplement No. 74 of October 2006 and will apply to all internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnerships to control fossil fuel emissions.

Relevance

The fossil fuels considered are petrol, engine oil and diesel. This will be applicable to equipment and machinery used in the project during construction phases of the project.

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

These Regulations prohibit making or causing any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

Relevance

Under the regulation the Contractor is prohibited from producing excessive noise and vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment or excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source. Under the regulation the Contractor will be required to undertake daily monitoring of the noise levels within the project area during construction period to maintain compliance.

2.2.3 Water Act, 2002

Water in Kenya is owned by the National Government, subject to any right of the user, legally acquired. However; this Act regulates conservation and management of all water resources within the republic, and related purposes.

In section 3 of part II, it states that every water resource is vested in the State, subject to any rights of user granted by or under this Act or any other written law. The Act also provides for establishment of a Water Resource Management Authority, whose aim is to manage and coordinate conservation and utilization of water resources at national scale.

(a) The Water Resources Management Rules, 2007

As a subsidiary to the Act, a legislative supplement, The Water Resources Management Rules, 2007 was gazetted to guide all policies, plans, programmes and activities that are subject to the Water Act, 2002. The Water Resources Management Rules empower Water Resources Management Authority (WRMA) to impose management controls on land use falling under riparian land.

Relevance

Water demand is the sole driving factor in the drilling of the proposed borehole. In the proposed project, groundwater will be the main source of water whose abstraction must comply with the provisions and legal procedures in this Act. The Act will thus play a central role in guiding the exploitation of the ground water resource throughout the project life.

2.2.4 Occupational Health and Safety Act, 2007

The Act provides for the safety, health and welfare of workers and all persons lawfully present at work place, as well as the establishment of the National Council for Occupational Safety and Health and for connected purposes.

Section 3(1) and (2) of the Act explains that it applies in all workplaces where any person is at work, either temporarily or permanently. It expounds on the purpose, which is to secure the safety, health and welfare of persons at work as well as protecting persons other than persons at work against risks resulting from, or connected to, activities at workplace. Further, sections 43 and 44 of part V give regulations on registration of work places.

Relevance

The project will require significant manpower during drilling and will thus result in employment of quite a number of people. Thus, compliance with the relevant provisions in this Act will be vital in ensuring that workers operate in safe healthy environment, and that their welfare shall be catered for. There will also be need for establishment of contractor's health and safety plan in line with this Act. There are a number of supplementary legislative rules to the OSHA. The most relevant are;

(a) The Factory and Other Places of Work (Medical Examination) Rules, 2005

This supplementary legislation covers workers who are exposed to specific occupational hazards for the purpose of preventing or controlling occurrence of occupational diseases.

In the first schedule of the legislation, works involving risks to healthcare are listed and recommended examinations and their respective intervals are indicated for adherence by employers or company directors. Sample requisite certifications are also provided for employers.

Relevance

All persons employed will be required to undergo pre-employment and periodic medical examinations to ascertain their fitness and also to maintain their health and safety at the workplace. Examinations certificates will be required on regular basis, hence the need for adherence.

(b) The Factory and Other Places of Work (Noise Prevention and Control) Rules, 2005

Sections 1-4 of the legislation detail the permissible levels of noise in a workplace. Sections 5 and 6 elaborate on the recommended noise prevention programme as well as measurement and records to be undertaken by the contracted company during construction and even operational phases of the project.

Relevance

The construction phase of this project will involve use of heavy and noisy machines and equipment. This legislation will thus guide against health risks of excessive noise to workers at the work places, hence the relevance.

2.2.5 The Public Health Act (Cap 242)

This Act makes provision for securing and maintaining health. Part III and IV of the Act focuses on notification, prevention and suppression of infectious diseases, including inspection, disinfection and provision of medical aid to affected parties in case of outbreaks of infectious diseases. Part IX regulates on sanitation and housing, granting health authorities powers to prevent or remedy any dangers to health arising from poor handling of sanitation issues as well as improper housing and nuisances arising there from. Besides, regulations governing prevention and destruction of mosquitoes, encompassing due maintenance of yards, premises, wells, cesspits and identification and destruction of breeding places are entailed in part XII.

Relevance

Sanitation, housing, disease outbreaks and communal resource sharing are obvious issues in construction projects. The Public Health Act provides the necessary legal guidelines regulating measures aimed at effective control and management of the said issues.

2.2.6 The Kenya Roads Board Act, 1999

This is the one of the legal instrument that governs management of road network in the country.

Relevance

Of relevance with the proposed project is the need for consultative cooperation with the Roads authorities since pipeline routing will be laid within the road reserves.

2.2.7. Laws on Property and Land Rights in Kenya

The **Constitution of Kenya (CoK), 2010** currently in force, replaced the 1969 constitution. It was approved by 67% of Kenyan voters and was promulgated on 27 August 2010.

The new Kenya Constitution has a comprehensive Bill of Rights in **Chapter Four (4)** and a well elaborated **Chapter Five (5)** on Land and Environment. These two chapters provide constitutional basis for land ownership, expropriation and protection of rights to land. Land in Kenya is classified as public, community or private. Prior to the new Constitution, there were over 70 pieces of legislations, Acts and subsidiary law governing land and land matters. Under the new Constitution they are being consolidated and rationalised to four pieces of legislation as follows:

- ✓ National Land Act, 2012 – discusses Land issues in general and establishes mechanisms for Land acquisition;
- ✓ Land and Environmental Court – this establishes a court to deal with all disputes;
- ✓ Land Registration Act, 2012; and
- ✓ The Community Land Act.

Article 60 (1) states that that "*Land in Kenya shall be held, used and managed in a manner that is equitable, efficient, productive and sustainable, and in accordance to the following principles:*

a) Equitable access to land;
b) Security of land rights;
c) Sustainable and productive management of land resources;
d) Transparent and cost effective administration of land;
e) Sound conservation and protection of ecological sensitive areas;
f) Elimination of gender discrimination in law, customs and practices related to land and property in land; and

g) Encouragement of communities to settle land disputes through the recognized local community initiatives consistent with this Constitution.

The State is permitted to regulate the use of any land, or any interest in or right over any land in the interest of defence, public safety, public order, public morality, public health, or land use planning.

According to **Article 61 (1),** all land in Kenya belongs to the people of Kenya collectively as a nation, as communities and as individuals.

Land is classified as public land, community land or private land and each category is defined in the subsequent articles. Public land is defined to include all minerals and mineral oils; government forests, government game reserves, water catchment areas, national parks, government animal sanctuaries and specially protected areas, gazetted roads and thoroughfares, all rivers, lakes and other water bodies as defined by law; the territorial sea, continental shelf, exclusive economic zone and the sea bed, all land between the high and low water marks, any land not classified as community or private land under the Constitution-such public land shall vest and be held in trust by the national government in trust for the people of Kenya and shall be administered by the National Land Commission.

Community land includes land that is "*lawfully held, managed or used by specific communities as community forest, grazing areas or shrines*," and *"ancestral lands and lands traditionally occupied by hunter-gatherer communities."* Rights are also held through traditional African systems, and rights that derive from the English system introduced and maintained through laws enacted by colonial and then the national parliament. The former is loosely known as customary tenure bound through traditional rules (customary law). The latter body of law is referred to as statutory tenure, secured and expressed through national law, in various Act of parliament e.g. **Land Act 2012, Land Registration Act, 2012, Trust Land Act (cap 288)** of the Laws of Kenya.

The right to property is protected in **Article 40 (1)** Subject to Article 65; "*every person has the right, either individually or in association with others, to acquire and own property of any description; and in any part of Kenya".*

The following land tenure systems exist in Kenya.

(i) Customary Land Tenure

This refers to unwritten land ownership practices by certain communities under customary law. Kenya being a diverse country in terms of its ethnic composition has multiple customary tenure systems, which vary mainly due to different agricultural practices, climatic conditions and cultural practices. However most customary tenure systems exhibit a number of similar characteristics as follows: First, individuals or groups by virtue of their membership in some social unit of production or political community have guaranteed rights of access to land and other natural resources. Individuals or families thus claim property rights by virtue of their affiliation to the group.

(ii) Freehold Tenure

This tenure confers the greatest interest in land called absolute right of ownership or possession of land for an indefinite period of time, or in perpetuity. Freehold land is governed by the **Land Registration Act, 2012**. The Act provides that the registration of a person as the proprietor of the land vests in that person the absolute ownership of that land together with all rights, privileges relating thereto. A freehold title generally has no restriction as to the use and occupation but in practice there are conditional freeholds, which restrict the use for say agricultural or ranching purposes only. Land individualization was demanded by the colonial settlers who required legal guarantee for the private ownership of land without which they were reluctant to invest.

(iii) Leasehold Tenure

Leasehold is an interest in land for a definite term of years and may be granted by a freeholder usually subject to the payment of a fee or rent and is subject also to certain conditions which must be observed e.g. relating to developments and usage. Leases are also granted by the government for government land, the local authorities for trust land and by individuals or organizations owning freehold land. The maximum term of government leases granted in Kenya is 99 years for agricultural land and urban plots. There are few cases of 33 years leases granted by government in respect of urban trust lands. The local authorities have granted leases for 50 and 30 years as appropriate.

(iv) Public Tenure

This is where land owned by the Government for its own purpose and which includes unutilized or un-alienated government land reserved for future use by the Government itself or may be available to the general public for various uses. The land is administered under the **Land Act 2012**. These lands were vested in the president and who has, normally exercised this power through the Commissioner of Lands, to allocate or make grants of any estates, interests or rights in or over un-alienated government land. However, the new constitution grants those rights to the **National Land Commission (NLC)** which is governed by the National Land Commission Act, 2012 that specifies the role of NLC.

The **Land Act 2012**, Part III, Section 27 recognizes the capacity of a child as being capable of holding title to land. However, this can only happen through a trustee and such a child shall be in the same position as an adult with regard to child's liability and obligation to the land.

2.2.8 Expropriation/Acquisition of Land and Compensation of Land and other Assets

2.2.8.1 The Constitution of Kenya, 2010

CoK protects the sanctity of private property rights and states that no property can be compulsorily acquired by the Government except in accordance with law. Article 40(3) states:

"The State shall not deprive a person of property of any description, or of any interest in, or right over, property of any description, unless the deprivation results from an acquisition of land or an interest in land or a conversion of an interest in land, or title to land, in accordance with Chapter Five; or is for a public purpose or in the public interest and is carried out in accordance with this Constitution and any Act of Parliament that:

(i) Requires prompt payment in full, of just compensation to the person; and

(ii) Allows any person who has an interest in or right over, that property a right of access to a court of law.

The Constitution empowers the state to exercise the authority of compulsory acquisition. **Land Act 2012** (LA) designates the **National Land Commission (NLC)** as the agency empowered to compulsorily acquire land. Article 40 of the Constitution provides that the state may deprive owners of property only if the deprivation is *"for a public purpose or in the public interest*," which includes public buildings, roads, wayleaves, drainage, irrigation canals among others. The state's exercise of this power is left at the discretion of National Land Commission, and requires the state to make full and prompt payment of *"just compensation*" and an opportunity for appeal to court.

Article 40 (3) (a) refers to acquisition and conversion of all kinds of land in Kenya (private, public, community land and foreign interests in land). The Constitution further provides that payment of compensation shall be made to "*occupants in good faith*" of land acquired by the state who do not hold title for such land [Article 40 (4)]. An occupant in good faith is a "*bona fide"* occupant. On the other hand, under the Constitution, those who have acquired land illegally are not regarded as deserving any compensation [Article 40 (6)].

2.2.8.2 The Land Act, 2012

The Land Act is the Kenya's framework legislation regulating compulsory acquisition of land (i.e. land, houses, easements etc.). The Land Act was adopted on 2nd May 2012 and provides for sustainable administration and management of land and land based resources including compulsory acquisition.

Section 107 (1) provides for the power of entry to inspect land**. Sub-section (1)** states that whenever the national or county government is satisfied that it may be necessary to acquire some particular land under section 110, the respective Cabinet Secretary or the County Executive Committee Member shall submit a request for acquisition of public land to the Commission to acquire the land on its behalf. **Sub-section (2)** requires that the Commission prescribe a criteria and guidelines to be adhered to by the acquiring authorities in the acquisition of land.

Sub-section (5) stipulates that upon approval of a request under sub-section (1), the Commission shall publish a notice to that effect in the Gazette and the county Gazette, and shall deliver a copy of the notice to the Registrar and every person who appears to the Commission to be interested in the land.

Sub-section (8) states that all land to be compulsorily acquired shall be geo-referenced and authenticated by the office or authority responsible for survey at both the national and county government

Under **Section 108 (1)** The Commission may authorize, in writing, any person, to enter upon any land specified in a notice published under section 107 and inspect the land and to do all things that may be reasonably necessary to ascertain whether the land is suitable for the intended purpose.

Section 109 provides payment for damage for inspection. As soon as practicable after entry has been made under section 108, the Commission shall promptly pay in full, just compensation for any damage resulting from the entry.

Section 110 (1) stipulates that land may be acquired compulsorily under this Part if the Commission certifies, in writing, that the land is required for public purposes or in the public interest as related to and necessary for fulfillment of the stated public purpose.

Section 111 (1) states that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. Under Subsection (2), The Commission shall make rules to regulate the assessment of just compensation.

Section 112 (1) requires that at least thirty days after publishing the notice of intention to acquire land, the Commission shall appoint a date for an inquiry to hear issues of propriety and claims for compensation by persons interested in the land, and shall

(a) Cause notice of the inquiry to be published in the Gazette or county Gazette at least fifteen days before the inquiry; and

(b) Serve a copy of the notice on every person who appears to the Commission to be interested or who claims to be interested in the land.

Section 113 (1) requires that upon the conclusion of the inquiry, the Commission shall prepare a written award, in which the Commission shall make a separate award of compensation for every person whom the Commission has determined to have an interest in the land. Every award shall be filed in the office of the Commission (Subsection 4).

Part III of the Land Act 2012, section 113 (2a) states that "*the Commission shall determine the value of land with conclusive evidence of (i) the size of land to be acquired; (ii) the value, in the opinion of the Commission, of the land; (iii) the amount of compensation payable, whether the owners of land have or have not appeared at the inquiry."*

Market value of the property, which is determined at the date of the publication of the acquisition notice, must be taken into account when determining compensation. Determination of the value has to take into consideration the conditions of the title and the regulations that classify the land use e.g. agricultural, residential, commercial or industrial. Increased market value is disregarded when:

- ✓ It is accrued by improvements made within two years before the date of the publication of the acquisition notice, unless it is proved that such improvement was made in good faith and not in contemplation of the proceedings for compulsory acquisition. It is accrued by land use contrary to the law or detrimental to the health of the occupiers of the premises or public health;

- ✓ Any damages sustained or likely to be sustained by reason of severing such land from other land owned by the claimant;

- ✓ Any damage sustained or likely to be sustained if the acquisition of the land had negative effects on other property owned by the claimant;

- ✓ Reasonable expenses, if as a consequence of the acquisition, the claimant was compelled to change his residence or place of business (i.e., compensation for disruption to the claimant's life); and

- ✓ Any damage from loss of profits over the land occurring between the date of the publication of the acquisition notice and the date the NLC takes possession of the land.

Section 114 (2) stipulates that upon acquisition of land, and prior to taking possession of the land, the Commission may agree with the person who owned that land that instead of receiving an award, the person shall receive a grant of land, not exceeding in value the amount of compensation which the Commission considers would have been awarded, and

upon the conclusion of the agreement that person shall be deemed to have conclusively been awarded and to have received all the compensation to which that person is entitled in respect of the interest in that land.

Section 115 stipulates that upon the conclusion of the inquiry, and once the NLC has determined the amount of compensation, NLC will prepare and serve a written award of compensation to each legitimate claimant. NLC will publish these awards which will be considered "final and conclusive evidence" of the area of the land to be acquired, the value of the land and the amount payable as compensation. Land Act, Section 115 further stipulates that an award shall not be invalidated by reason only of a discrepancy between the area specified in the award and the actual area of the land. Compensation cannot include attorney's fees, costs of obtaining advice, and costs incurred in preparing and submitting written claims.

A notice of award and offer of compensation shall be served to each person by the Commission. **Section 120** provides that "*first offer compensation shall be paid promptly*" to all persons interested in land. Section 119 provides a different condition and states that the NLC "as soon as practicable" will pay such compensation. Where such amount is not paid on or before the taking of the land, the NLC must pay interest on the awarded amount at the market rate yearly, calculated from the date the State takes possession until the date of the payment.

In cases of dispute, the Commission may at any time pay the amount of the compensation into a special compensation account held by the Commission, notifying the owner of the land accordingly. If the amount of any compensation awarded is not paid, the Commission shall on or before the taking of possession of the land, open a special account into which the Commission shall pay interest on the amount awarded at the rate prevailing bank rates from the time of taking possession until the time of payment.

Once the first offer payment has been awarded, the NLC will serve notice to landowners on the property indicating the date the Government will take possession. Upon taking possession of land, the commission shall ensure payment of just compensation in full. When this has been done, NLC removes the ownership of private land from the register of private ownership and the land is vested in the national or county Government as public

land free from any encumbrances (Section 115 & 116).

On the other side, the Commission also has the power to obtain temporary occupation of land. However, the commission shall as soon as is practicable, before taking possession, pay full and just compensation to all persons interested in the land.

In cases of where there is an urgent necessity for the acquisition of land, and it would be contrary to the public interest for the acquisition to be delayed by following the normal procedures of compulsory acquisition under this Act, the Commission may take possession of uncultivated or pasture or arable land upon the expiration of fifteen days from the date of publication of the notice of intention to acquire. On the expiration of that time NLC shall, notwithstanding that no award has been made, take possession of that land. If the documents evidencing title to the land acquired have not been previously delivered, the Commission shall, in writing, require the person having possession of the documents of title to deliver them to the Registrar, and thereupon that person shall forthwith deliver the documents to the Registrar. On receipt of the documents of title, the Registrar shall — cancel the title documents if the whole of the land comprised in the documents has been acquired; if only part of the land comprised in the documents has been acquired, the Registrar shall register the resultant parcels and cause to be issued, to the parties, title documents in respect of the resultant parcels. If the documents are not forthcoming, the Registrar will cause an entry to be made in the register recording the acquisition of the land under this Act.

Part IX of the Land Act provides for settlement programs. Under **Section 134 (1),** The Commission shall, on behalf of the national and county governments, implement settlement programmes to provide access to land for shelter and livelihood.

Subsection (2) stipulates that settlement programmes shall, include, but not be limited to provision of access to land to squatters, persons displaced by natural causes, development projects, conservation, internal conflicts or other such causes that may lead to movement and displacement.

2.2.8.3 Valuers' Act, Chapter 532,

Under The Valuers' Act, Chapter 532, Compensation awards will be made by the National Land Commission based on land valuation determined by registered Valuers. Besides, the

Valuers Act establishes the Valuers Registration Board, which regulates the activities and practice of registered Valuers. All Valuers must be registered with the Board to practice in Kenya. The Board shall keep and maintain the names of registered Valuers which shall include the date of entry in the register, the address of the person registered the qualification of the person and any other relevant particular that the Board may find necessary.

2.3 Institutional Framework

New project developments can have major impacts on the environment including soil degradation, altering landscapes and destroying natural habitats. Other problems associated with development and human activity include land use conflicts, human and animal conflicts, water management and environmental pollution. In addition to harming the environment, these impacts can and do have significant economic costs and negatively affect human health.

In cognizance of this, the Government of Kenya has established a number of institutional and administrative entities to ensure adequate management of associated concerns and eventualities.

The following are the main institutions that perform the regulatory role and are relevant to the project.

2.3.1 Ministry of Water and Irrigation

The mandate is formulation, review and implementation of policy on the water sector.

The functions include:

- ✓ Water harvesting and storage infrastructure for water conservation, which will help in mitigating droughts and famine;
- ✓ Catchments area conservation;
- ✓ Water resources management policy;
- ✓ Urban and rural water development and supply;
- ✓ Waste water treatment and control;
- ✓ National water conservation and Pipeline Corporation; and
- ✓ Flood preparedness and management to cope with and mitigate the impacts.

Water quality and pollution control by adopting the 'Polluter Pays' principles in order to ensure water user responsibility.

Relevance

Storage and utilization of water is the main driving factor in the project. Abstraction from groundwater will be guided by the ministry through WRMA. It is thus paramount that the ministry is centrally involved in the planning and operational phases of the proposed project. The following are the key institutions of relevance to this project:

(a) The Water Resource Management Authority (WRMA)

The Authority shall have the following powers and functions:

- ✓ To develop principles, guidelines and procedures for the allocation of water resources;
- ✓ To monitor, and from time to time reassess, the national water resources management strategy;
- ✓ To receive and determine applications for permits for water use;
- ✓ To monitor and enforce conditions attached to permits for water use;
- ✓ To regulate and protect water resources quality from adverse impacts;
- ✓ To manage and protect water catchments; in accordance with guidelines in the national water resources management strategy, to determine charges to be imposed for the use of water from any water resource;
- ✓ To gather and maintain information on water resources and from time to time publish forecasts, projections and information on water resources;
- ✓ To liaise with other bodies for the better regulation and management of water resources;
- ✓ To advise the Minister concerning any matter in connection with water resources.

(b) Water Service Boards (WSB)

The Boards have the following mandate:

- ✓ strengthen the institution and build its capacity;
- ✓ provide water and sanitation services in an efficient, effective, affordable and sustainable manner;
- ✓ increase access and availability of water and sanitation services;
- ✓ strengthen communication with stakeholders; and
- ✓ Mainstream good corporate governance, gender, and HIV/AIDS awareness campaign in all core activities.

2.3.2 Ministry of Environment and Natural Resources

This is the state office in charge of all issues affecting, and affected by, the environment and all its components.

The Ministry's core mandate includes the following:

- ✓ Environment and Natural Resources Policy formulation, analysis and review;
- ✓ Sustainable management of Mineral resources and conservation of environment;
- ✓ Continuous development of geo-database for integrated natural resources and environmental management systems;
- ✓ Conduct applied research and dissemination of research findings in land resources and geology;
- ✓ Carry out geological surveys, mineral exploration and regulation of mining and use of commercial explosives;
- ✓ Promote, monitor and coordinate environmental activities and enforce compliance of environmental regulations and guidelines; and
- ✓ Meteorological services.

Relevance

Water resources, land, flora and fauna and the air are core components of the natural environment. The proposed development project will utilize all these resources at one stage

or another. Any extractive or depository uses of the resources are guided by the various programmes and regulations under the ministry and consistent consultative partnerships, including adherence to relevant legal provisions will be required in the entire course of the project.

(a) The National Environment Management Authority

The authority is mandated to carry out, among others, the following activities in the sector:

- ✓ Promote the integration of environmental considerations into development policies, plans, programmes and projects, with a view to ensuring the proper management and rational utilization of environmental resources, on sustainable yield basis, for the improvement of the quality of human life in Kenya;
- ✓ Undertake and coordinate research, investigation and surveys, collect, collate and disseminate information on the findings of such research, investigations or surveys;
- ✓ Identify projects and programmes for which environmental audit or environmental monitoring must be conducted under this Act;
- ✓ Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur e.g. floods, landslides and oil spills; and
- ✓ Undertake, in cooperation with relevant lead agencies, programmes intended to enhance environmental education and public awareness, about the need for sound environmental management, as well as for enlisting public support and encouraging the effort made by other entities in that regard;

Render advice and technical support, where possible, to entities engaged in natural resources management and environmental protection, so as to enable them to carry out their responsibilities satisfactorily.

2.4 World Bank Operational Policies

2.4.1 Operational Policy (OP) 4.01: Environmental Assessment, 2001

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.

Table 2.1 OP/BP 4.01 Environmental Assessment (January 1999)

Objectives	Operational Principles
To help ensure the environmental and social soundness and sustainability of investment projects. Also referred to as scoping.	Apply the screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment (EA) so that appropriate studies are undertaken proportional to potential risks and to direct, and, as relevant, indirect, cumulative, and associated impacts. Use sectoral or regional environmental assessment when appropriate.
To support integration of environmental and social aspects of projects into the decision making process.	Assess potential impacts of the proposed project on physical, biological, socio-economic and physical cultural resources, including trans-boundary and global concerns, and potential impacts on human health and safety.
	Assess the adequacy of the applicable legal and institutional framework, including applicable international environmental agreements, and confirm that they provide that the cooperating government does not finance project activities that would contravene such international obligations.
	Provide for assessment of feasible investment, technical, and siting alternatives, including the "no action" alternative, potential impacts, feasibility of mitigating these impacts, their capital and recurrent costs, their suitability under local conditions, and their institutional, training and monitoring requirements associated with them.
	Where applicable to the type of project being supported, normally apply the World Bank Group Environmental Health and Safety

Objectives	Operational Principles
	Guidelines. Justify deviations when alternatives to measures set forth in the handbook are selected.
	Prevent, minimize, or compensate for adverse project impacts and enhance positive impacts through environmental management and planning that includes the proposed mitigation measures, monitoring, institutional capacity development and training measures, an implementation schedule, and cost estimates.
	Involve stakeholders, including project-affected groups and local non-governmental organizations, as early as possible, in the preparation process and ensure that their views and concerns are made known to decision makers and taken into account. Continue consultations throughout project implementation as necessary to address EA-related issues that affect them.
	Use independent expertise in the preparation of EA where appropriate. Use independent advisory panels during preparation and implementation of projects that are highly risky or contentious or that involve serious and multi-dimensional environmental and/or social concerns.
	Provide measures to link the environmental assessment process and findings with studies of economic, financial, institutional, social and technical analyses of a proposed project.
	Provide for application of the principles in this Table to subprojects under investment and financial intermediary activities.
	Disclose draft EIA in a timely manner, before appraisal formally begins, in an accessible place and in a form and language understandable to key stakeholders.

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:

a) Identifies and assesses potential risks and benefits based on proposed activities, relevant site features, consideration of natural/human environment, social and trans-boundary issues;
b) Compares environmental pros and cons of feasible alternatives;
c) Recommends measures to eliminate, offset, or reduce adverse environmental impacts to acceptable levels (sitting, design, technology offsets);
d) Proposes monitoring indicators to implement mitigation measures; and
e) 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 World Bank considers environmental and social impact assessment (ESIA) 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). Environmental assessment applies one or more of these instruments, or elements of them, as appropriate.

The procedure generally follows the stages outlined below:

i. Screening at project identification stage;
ii. Scoping process during pre-feasibility and feasibility studies;
iii. Final environmental assessment; and
iv. Project completion Report;

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:

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 ESIA report.

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, mitigatory 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. This project was assigned EA Category B.

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. However, an approval should be sought from NEMA on the project.

2.4.2 World Bank Policy OP 4.12 (Involuntary Resettlement)

The World Bank policy on involuntary resettlement emphasizes that any development project should avoid or minimize involuntary resettlement and where this is not feasible, it should compensate for lost assets at full replacement cost and assist the 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 **World Bank OP 4.12, Annex A (Paragraphs 17-31),** describes the scope (level of detail) and the elements that a resettlement plan should include.

WB OP 4.12.(6a) demands that the resettlement plan includes measures to ensure that displaced persons are (i) informed about their options and rights, (ii) consulted on, offered

choices among others and provided with technically and economically feasible resettlement alternatives, and (iii) provided prompt and effective compensation at full replacement costs;

WB OP 4.12 (8) requires that particular attention should be paid to the needs of vulnerable groups among those displaced such as those below the poverty line, landless, elderly; women and children and indigenous peoples and ethnic minorities;

WB OP4.12 (12a) states that for households depending on land for their livelihoods preference should be given to land based solutions; however, payment of cash compensation for lost assets may be appropriate where livelihoods are land-based but the land taken for the project is a small fraction (less than 20%) of the affected asset and the residual is economically viable;

WB OP4.12 Para (6 b & c) state that in case of physical relocation, displaced persons should be (i) provided with assistance (such as moving allowances) during relocation; and (ii) provided with residential housing, or housing sites, or, as required, agricultural sites for which a combination of productive potential, location advantages, and other factors is at least equivalent to the advantages of the old site.

Land acquisition in relation to WB policy

*Land for the proposed project was bought from Kiti family who voluntarily agreed to sell the land to the community at prevailing market rates on a willing buyer willing seller basis. The land measures 20*40 feet.*

2.4.3 OP 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.

2.4.4 OP 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 and therefore this policy is not triggered.

2.4.5 OP 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 with intensive social and economic activities. The policy is, therefore, not triggered.

2.4.6 OP 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.

2.5 Environmental, Health and Safety Guidelines

The IFC EHS guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP) as defined in IFC's Performance Standard 3: Resource Efficiency and Pollution Prevention. The guidelines are inclusive of various aspects such as:

- Environment
- Occupational health and safety;
- Community health and safety; and
- Construction and decommissioning

All of these are relevant to this project. The ESMP has summarized all the anticipated impacts according to the various phases of the project. In determining these impacts, public consultations were also conducted to get the views of the various stakeholders and the key impacts that will arise with the implementation of the project.

The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. The relevant Industry Sector Guideline(s) is the Water and Sanitation guidelines. The EHS Guidelines for Water and Sanitation include information relevant to the operation and maintenance of (i) potable water treatment and distribution systems, and (ii) collection of sewage in centralized systems (such as piped sewer collection networks) or decentralized systems (such as septic tanks subsequently serviced by pump trucks) and treatment of collected sewage at centralized facilities.

Information on potable water treatment and distribution systems is therefore relevant to the proposed project.

Chapter Three

3. PROJECT LOCATION AND DESCRIPTION

3.1 Introduction

This chapter focuses on the project description. It discusses the project goal and location, overview of boreholes and the process of borehole construction. The objective is to provide a systematic account of the activities involved in the construction of boreholes.

3.2 Location of the Project

The proposed Kanyongo borehole is located in Kanyongo area, Kakayuni Sub-Location, Kyangala Location, Kalama Division of Machakos District in Machakos County. The selected borehole site is located about 1.5 kilometers east of Kanyongo village. The selected borehole site is located on latitudes 01° 37' 21" South and longitudes 37° 19' 18" East on approximate elevation of 1488 metres above sea level. The proposed borehole is to be drilled and equipped near Wamui seasonal river valley.

The project area is generally used for small scale subsistence cropping especially maize and other food crops with some horticultural farming activity.

Specific Site details

Land ownership	Owned by the community. The land was bought from Kiti family who voluntarily agreed to sell the land to the community at prevailing market rates.
Size of land acquired for the borehole	20*40 feet
Land use at site	crops
GPS Coordinates of the borehole site	01.62264^{0}S, 037.32184°E

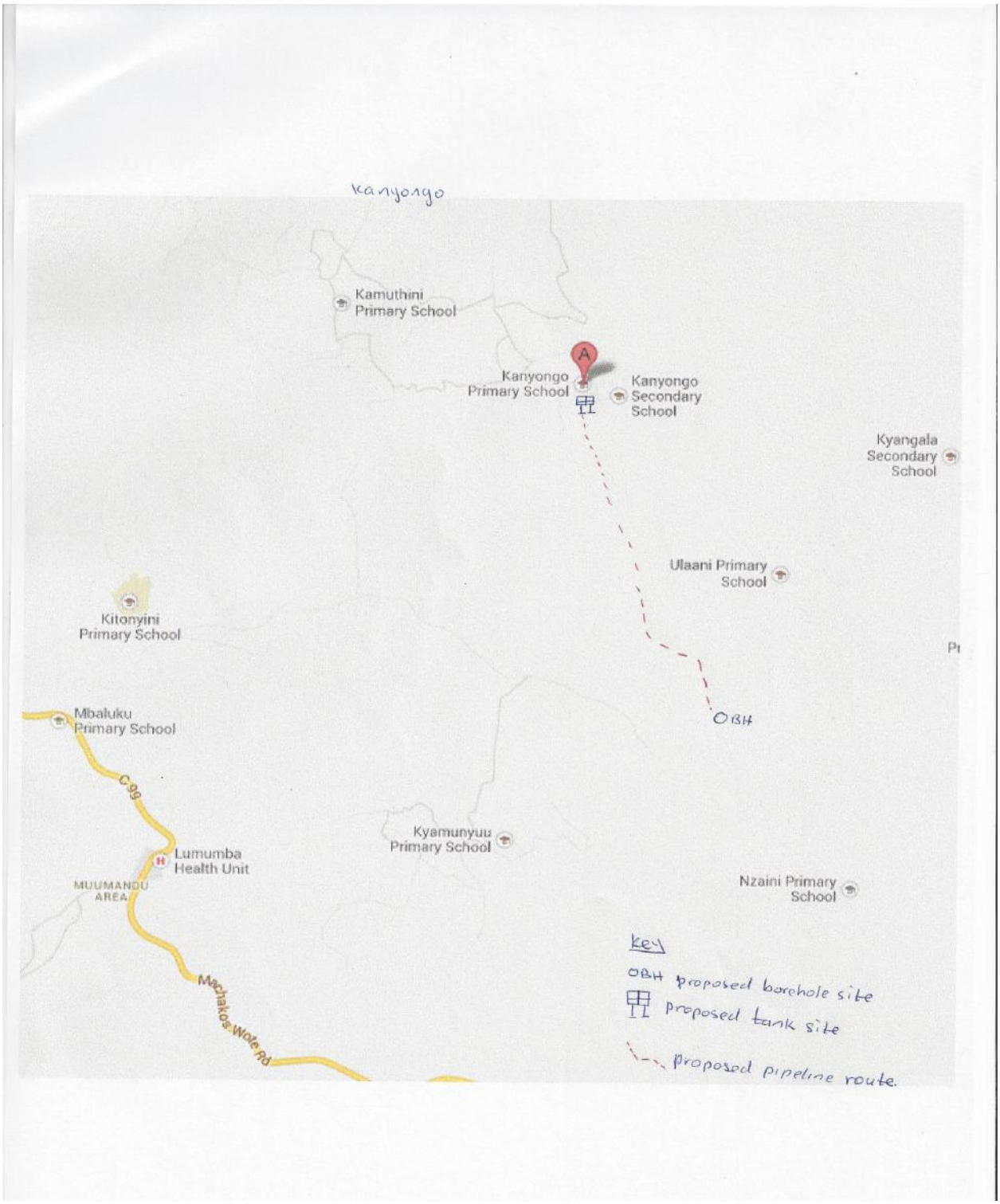


Figure 3.1: Location Plan of the Project Area

3.3 Project Goal

The goal of the project is to *improve access to portable water for the people*. Increased access to water is expected to boost economic activities leading to improved livelihoods. To increase access to water, the project aims to increase the water accessibility for the community to within 30 minutes' walk or less and raise the current accessibility. The population to be served by the project is approximately 2,530. There are several villages to be served including Kanyongo, Iyaani, Miatha, Sangumu, Ulaani and Muvuai. There are also a number of institutions including; Kanyongo Primary School with 433 pupils and 7 teachers, Ulaani Primary School with 320 pupils and 12 teachers while Kanyongo Secondary School has 300 students and 10 teachers. Kanyongo Polytechnic has 200 students and 20 tutors. There are several churches in the area including AIC, A.B.C, Catholic, GRC, Deliverance and CAG to be served.

3.4 Boreholes in the Project Area

There are no boreholes which have been drilled in the general Kanyongo village area. The only borehole which is close to the project area is about 6 Kilometers away near Kyangala District Officer's office and shopping center. This shows that groundwater in the area is untapped and drilling this borehole will not have adverse impacts on the environment.

3.5 Project Implementation

The scope of the proposed project will include the following:

- Drilling and equipping of borehole
- Installation of a submersible pump
- Construction of pump house and provision of power at the borehole site
- Laying of rising main
- Construction of water tank

The design period will be 20 years, with the initial year (when the new system is expected to be commissioned) taken as 2015, future year 2025 and ultimate year as 2035.

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

- WHO Report No. 4 - Selection and Design Criteria for Community Water Supply Projects;

- Ministry of Water and Irrigation – Practice Manual for Water Supply Services in Kenya, 2006.

The above references are used in a complementary manner. Where requirements of two or more codes or standards are found to conflict, the more stringent of them will be adopted for the purpose of this project.

3.5.1 Borehole Drilling

The Borehole will be drilled to a depth of 150m. Estimated borehole yield is $4m^3$/hr and the assumed safe yield will be 60% i.e. 4x0.6 = $2.4m^3$/hr. Assuming that the borehole will operate for an average of 7 hours, the daily yield will be 7x2.4= $16.8m^3$/day.

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

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

3.5.2 Solar pump

Electricity is available at the proposed site, it is within 300m from the proposed borehole site, but considering the economic status of the residents and the fact that the area experiences long hot seasons, it is proposed to install a solar panel for sustainability purpose. The submersible pump is manufactured to a very high specification and will operate on a daily basis without problem for at least 5 years, probably many more. The motor is contained within the pump and is cooled by the water passing over it. It has built in protection features, which together with the control panel ensure that it is protected from risk of overheating, drop in water level, or voltage irregularity.

The high level of reliability, minimal maintenance, need for spare parts and low operating costs make it appealing for rural locations. The main threat to the reliability of solar systems is human interference, from vandalism and efforts at repair.

3.5.3 Rising mains

Water will be pumped to the main storage tank located within Kanyongo Primary School 1.3km North West of the proposed borehole site and distributed by gravity to the consumers.

The rising main from the new proposed borehole has been designed using an economic analysis. The economic diameter has been determined by considering the cost of the pipe and the corresponding pumping cost.

A galvanised steel pipe is proposed for the rising main from the borehole to the tank for the sections that will be exposed and uPVC Class 'D' pipe for sections that will be buried. Pipe roughness values ('k') of 1.0mm for steel and 0.1mm for uPVC (which include normal friction losses in bends and fittings along the pipe) have been adopted as recommended by the Practice Manual for Water Supply Services in Kenya. The velocity of flow in the pipeline will be limited to between 0.7 and 1.2m/s.

Therefore adopt 38mm diameter pipe GI or 50mm diameter Upvc pipe. The static water head about 86m. Provide 38mm diameter GI class 'B' pipes in section where pipeline is exposed (rocky section, valley crossing, section feeding tank; about 330m long) and uPVC' 50mm class 'D' where pipe will have a good soil cover; about 1000m long.

3.5.4 Storage tanks

An elevated 12m^3 steel storage tank (10m high) will be provided within Kanyongo primary school. Water will be pumped from the borehole to the tank. The tank will provide storage required to even out fluctuations in demand and supply and to provide emergency storage when there is a breakdown in pumping equipment. It will also act as a balancing tank to reduce peak flows in the rising main and as a discharge point for the pumping system. The Practice Manual for Water Supply Services in Kenya recommends a storage size for ½ day demand. However the storage will be sized according to the borehole yield.

3.5.5 Pump house

A new pump/control house will be constructed.

3.5.6 Water kiosk

The design of the water kiosk is of an appropriate and low cost technology for ease of construction, operation and management. The water kiosk will be provided with a gate valve and a water meter in valve chamber. Multiple stainless steel water taps will be provided at each kiosk, with all fittings made of galvanized iron. Adequate drainage, discharging into a suitably located soak pit, will be provided around the plinths.

The layout of the project is as shown:

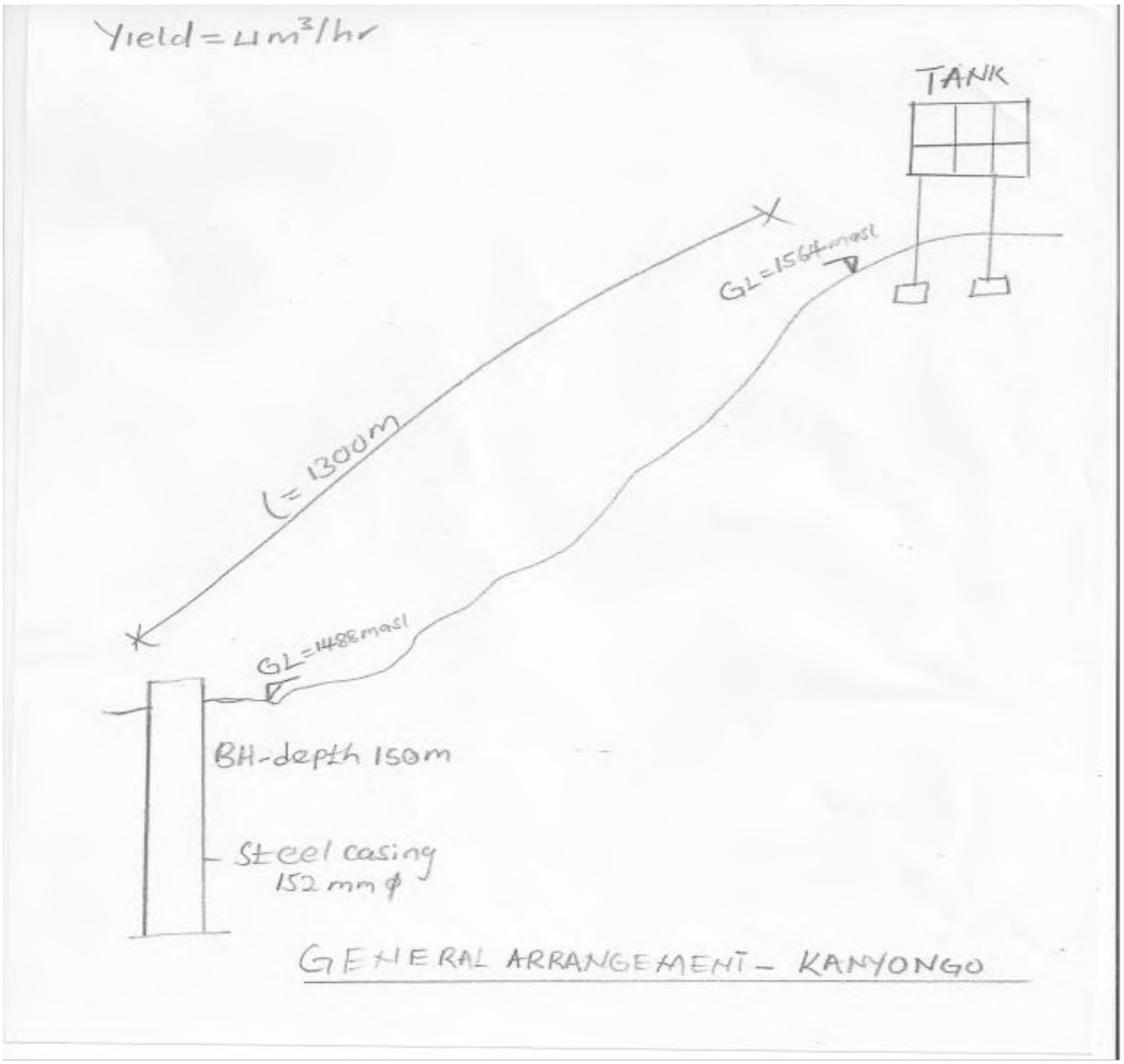


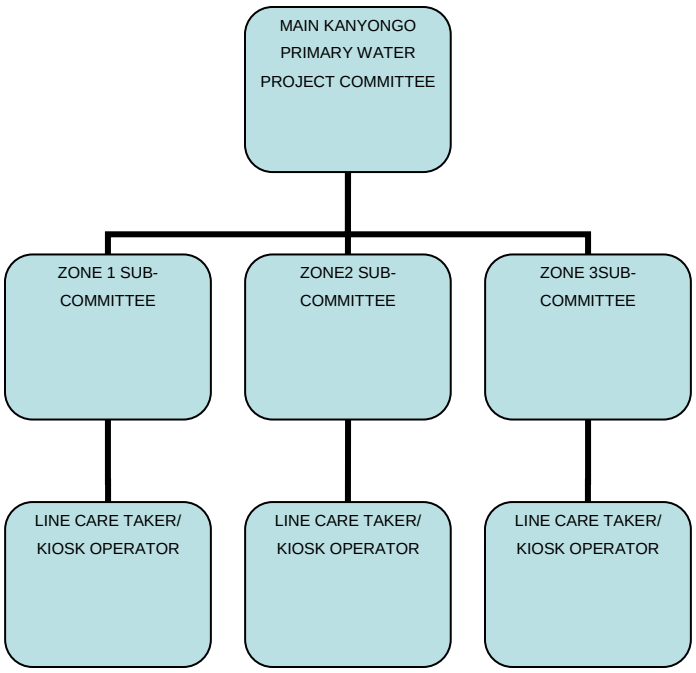
Figure 3.2: General arrangement of Kanyongo project

3.6 Project Management

The project will be under the management of an elected committee. Their role should be supervisory whereby, the project should have a care taker who would be responsible for the day-to-day running of the scheme. The scheme will employ a billing clerk, scheme operator and 2 communal water points' attendants for a start.

Table 3.1: Management Structure Kanyongo Water Project Water Project

Key Operation	How Managed/Organized
Borehole	Operation of the borehole
Community Water Kiosks	Operation of the community water point
Treatment	None (treatment/boiling at home)
Maintenance	Annual of borehole, pumps, tank
Revenue Collection	Revenue clerk on daily basis collects funds, issues receipt, updates ledger balances and compiles monthly financial reports
Banking	Revenue collected is banked on a regular basis
Administration	Co-ordination of all pertinent functions at the scheme level including supervision and deployment functions and record keeping/report submission
Monitoring	Project pipe for bursts, weak points, defaulters etc
Public Relations	Explanation of policy changes and new tariff rates Liaison with institutions through committees, early warning system for defaulters, consumers
Budgeting	Budget done for each year
Procurements	Procurements done as per the procurement procedures
Progress reports on activities	Charts covering borehole and booster station water pumping and expenditure monthly reports. These include revenue returns. Emergencies reported as they occur. Consumer records maintained
Storage	Purchases are stored and dispatched on requisition
Accounting	Water stored, cash collected, repair materials etc
Auditing	Internal and external audits



3.7 Project cost

The cost for construction of the project and the annual maintenance costs is as shown in Table 3.2. The facilities constructed will require preventive and scheduled maintenance. The annual maintenance costs have been calculated using the guidelines provided in the Practice Manual for Water Supply Services in Kenya, (2005). The maintenance costs will be catered for by Kanyongo Water Project which will come from water sales that was estimated at Kshs. 4.00 per 20-litre jerry can.

Table 3.2: Construction and maintenance costs

Asset	Capital Cost (Kshs)	Economic lifetime in years	% Capital Cost	Annual Cost in (Kshs)	Annual replacement cost (Ksh)
Borehole (drilling)	1,275,000	20	1	12,750	63,750
Pump (solar)	2,500,000	10	5	125,000	250,000
Pump House	250,000	30	1	2,500	8,335
Pipeline	1,500,000	30	1	15,000	50,000
Water tank	3,000,000	30	1	30,000	100,000
Fence	25,000	10	1	250	2,500
Communal Water Kiosks	70,000	10	2	1,400	7,000
Total	**8,620,000**			**183,141**	**482,069**

Chapter

Four

4. ENVIRONMENTAL BASELINE CONDITIONS

4.1 Overview

This section presents the geographic characteristics, baseline environmental conditions including the socio-economic conditions within 2km^2 of the site. For convenience, the description of the larger Machakos area is provided followed by presentation of details that are more specific to the project site. It should however be noted that the comprehensiveness of the descriptions of the general geographic and environmental characteristics of the study area is variable being governed by availability of relevant data and information.

4.2 Bio-physical environment

4.2.1 Topography

The project site lies at between 1400m and 1600m above sea level. The ground landscape is undulating with steep hills rising gently to the west and east of the borehole selected site. The topography found in the area has greatly influenced economic activities. Livestock keeping and crop farming is done in small scale as most part of the area is dry.

4.2.2 Climate

The area has two distinct rainy seasons. The long rains coming from March to May while the short rains are received from mid-October to mid-December. The mean annual rainfall is 500mm. Temperatures are highest in the months of January to March and the lowest in the month of July. The temperature varies from 16^{0}C to 28^{0}C.

4.2.3 Hydrogeology

The occurrence of the ground water in the area is characterized by several factors including the presence of weathered zones, sandy deposits, fractured and other weak zones.

The presence of the local small seasonal stream is good for recharge to the groundwater. These weak zones have become the avenues of groundwater. The depth of the weathered and fractured rock zone has gone up to 130 meters deep which makes it possible for the water to come from far as the weak zone is deep.

The rainfall which averages about 500 mm helps in replenishment of the groundwater.

4.2.4 Water Resources

The water sector objective is to improve physical infrastructure to ensure access to safe water to all. Water supply coverage in Machakos County is still less than 50% despite interventions with less than 45% of the population served with piped water system. Major source of water in the region include boreholes and rivers. The main surface sources of water in the project area is seasonal River

4.2.5 Geology

The geology of the study area is dominated by the metamorphic rocks. These rocks consist mainly of gneisses, schist and their weathering products of sandy sediments.

The hard basement rocks that are found at Kanyongo area which are exposed at the seasonal River Wamui

These basement rocks have undergone structural process of faulting, folding, shearing and cracking.

The area comprises of erosion resistant hills composed of granitoid gneisses. The rocks are also exposed at the valleys where seasonal streams meanders exposing the fractured gneisses and schist.

The rocks are locally weathered and fractured which makes it possible for the enhancement of the water recharge mechanisms. The Precambrian rocks are predominantly found in the area. These rocks are locally covered by a very thin layer of top sandy soil which supports a grass cover, shrubs, scattered acacia trees and other vegetation. The rocks occur as folded and fractured gneisses and schist's with all forms of weathering and in some cases form very steep hills.

Where found they are represented by layered fine grained schist's and coarse grained gneisses that have been invaded by pink quartzo-felspathic pegmatites. Biotite, hornblende and quartz feldspar gneisses are abundant in the area. The fractured and weathered zones of these rocks are normally aquiferous.

4.2.6 Current Water Supply Situation

About 70% of the communities rely on rivers as their main source of water. Rivers found within the project area include Wamui River. The community, through government (CDF) and NGO (non-government organisations) interventions has invested in artificial water sources such as shallow wells, boreholes and water pans. Additionally, there are roof rain water catchment infrastructure that have been tapped by the community members for domestic use. In summary, the community is getting water from the following main sources:

- Sand scooping from seasonal stream through traditional open big wells;
- Rain water harvesting through roof catchments;
- Water pans; and
- Sand dams.

Consequently, the school and local community are in dire need of a borehole to supply them with reliable, portable and adequate water supply for domestic uses.

4.2.7 Vegetation

The project area is sparsely populated and the flora and fauna found in the area is the indigenous vegetation cover which has been tampered with to give way to subsistence cultivation and poles and timber for houses construction. However, the tree planting exercise of exotic trees that is being carried out by the local population is slowly promoting the environmental conservation especially in the institutions of learning like Kanyongo primary school.

4.3 Socio-Economic setting

A socio-economic baseline survey was undertaken during the design phase of the project. The objectives of the socio-economic survey was to determine the socio-economic characteristics of Kanyongo Water Supply Project area, to assess the water consumption patterns and to draw up major conclusions that will be useful and relevant to the present planning and future development for the water supply system. Information on the socio-economic issues relevant to water and sanitation, including demography, education issues, economic activities, water sources, water use, sanitation levels, problems related to water and sanitation, willingness to pay for improved services, etc. was obtained.

4.3.1 Target Population

The population to be served by the project is approximately 2,530. The villages to be served including Kanyongo, Iyaani, Miatha, Sangumu, Ulaani and Muvuai. There are also a number of institutions including; Kanyongo Primary School, Ulaani Primary School, Kanyongo Secondary School and Kanyongo Polytechnic. Churches to be served include AIC, A.B.C, Catholic, GRC, Deliverance and CAG.

4.3.2 Population Size, Distribution, Composition and Disadvantaged Households

Information on population of the project area was gathered by members of the working groups during the resource mapping exercise with the assistance of the local administration.

Table 4.1: Population Size & Number of Households within Kakayuni sub-location

Village	No of households	Population	% Population
Iaani	79	395	15.6
Kanyongo	102	510	20.2
Ulaani	92	460	18.2

Village	No of households	Population	% Population
Miatha	69	345	13.6
Sianyumu	79	395	15.6
Muvuai	85	425	16.8
Total	**506**	**2,530**	**100**

Table 4.2: Disadvantaged Households

Nature	No of Households
Women Headed Households	35
Aged	40
Vulnerable (very poor)	90
Orphans	35
Disabled	20

4.3.3 Education Facilities

There are two primary schools, one secondary school and one polytechnic in the project area.

Table 4.3: Schools Enrolment

i) Schools		**Enrolment of pupils**		**No. of teachers & non-teaching staff**	
Primary Day Schools	**Total**	**No. of girls**	**No. of boys**	**Female**	**Male**
Kanyongo	433	150	283	7	15
Ulaani	320	140	180	4	8
Secondary schools					
Kanyongo Day	300	100	200	4	6
Polytechnics					
Kanyongo	200	40	160	7	13
Grand Total	**1,253**	**430**	**823**	**22**	**42**

Kanyongo and Ulaani Primary Schools are single streamed up to standard eight, while Kanyongo Secondary School has a single stream up to form four. The schools are still developing. The catchment for the schools is mainly Kakayuni Sub location. Kanyongo Polytechnic trains the school leavers on technical skills.

4.3.4 Churches

The other institutions in Kanyongo area of Kakayuni sub location, apart from the schools are the churches and were was established by community members and they belong to different churches. These include:

- ABC
- AIC
- The Roman Catholic Church
- Deliverance Church
- GRC

4.3.5 Transport and Communication

The main road from Kyangala Shopping Centre to Kalama Shopping Centre runs through the sub-location. This is an earth road with some section improved to murram standards. The road becomes almost impassable during rains. There are a number of earth roads criss-crossing the sub-location. Most of the area is within the network coverage for mobile phones providing a reliable means of communication. However, Kanyongo village and some of the deep valleys have a poor coverage of mobile phones connectivity.

4.3.6 Health Facilities

There is a dispensary in Kanyongo area where people of Kanyongo get health services from. For serious medical cases, people are normally referred to the Machakos Level 5 Hospital.

4.3.7 Administration

Kakayuni sub-location is administered by the Assistant Chief whose office is in Kyangala market. The location Chief's office is also located in Kyangala market. The district office is in Kalama while the district and county offices are in Machakos town.

4.3.8 Commerce and Industry

The major trading activities carried out in the project area include small scale retail businesses in the form of shops, tea kiosks, and posho mills. There are no industries. Goods other than agricultural commodities are brought in from Machakos town. People are also engaged in brick making which are sold locally. Fishing is also happening at Kalama dam. The fish caught is sold to the local people.

4.3.9 Agriculture and Livestock

Subsistence crop growing and livestock keeping are the main occupation of the area residents. The size of the farms ranges from 1 to 20 acres. The residents mainly grow maize, beans, cassava, cow peas, sorghum, mangoes and paw paws etc. The farmers also keep indigenous cows, sheep, goats and poultry. The rainfall received is occasionally inadequate, to support growing of maize, beans, as subsistence and cash crops.

The table below shows the crops grown and livestock kept within Kakayuni sub location in Kyangala location.

Table 4.4: Crops grown

Crop	Acre per H/H
Maize	2 acres
Beans	1 acres
Sweet potatoes	< 1/8 acre
Cassava	< 1/8 acre
Fruits (mangoes)	< 1/8 acre
Sorghum	< 1/8 acre
Pawpaw	< 1/8 acre

Table 4.5: Livestock kept

Type, local breeds	No. per H/H	Pasture
Cows	1-2	Herding
Goats	3	Herding
Sheep	2	Herding
Poultry	5	Free range

Table 4.6: Livestock population

Village	Indigenous Cows	Goats & sheep	Chicken	Donkeys	Bee hives
Iaani	160	500	1300	10	30
Kanyongo	250	600	1800	20	20
Ulaani	210	600	1700	30	20
Miatha	90	500	1300	10	5
Sianyumu	80	550	1500	8	9
Muvuai	130	600	1600	10	10
Total	**920**	**3,350**	**9,200**	**88**	**94**

4.3.10 Household Incomes and Expenditure Pattern

Agriculture is the main economic activity in the proposed project area. However, the size of land for farming has been decreasing in size overtime therefore increasing the pressure on land. The farmers practice mixed farming where they grow different types of crops and also keep livestock on the piece of land.

The average household income in the area is estimated at Kshs 2,500 per month. Most of the household income in the area is generated through undertaking the following activities:

- Sale of food crops in the market.
- Sale of livestock and their products.
- Casual labour.
- Small scale retail businesses.
- Formal employment.
- Sale of charcoal, sand and timber products.
- Remittances from outside (Machakos, Nairobi, Mombasa etc).

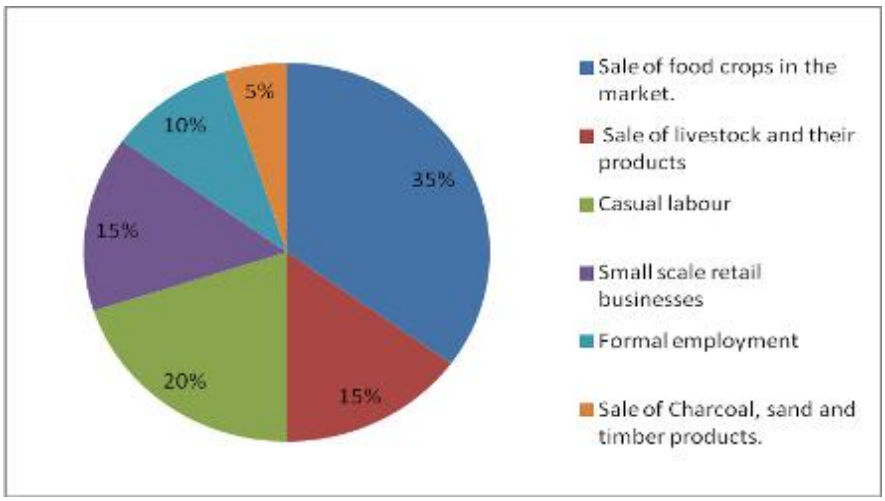


Figure 4.1: Pie chart showing the percentage of the various sources of income

a) Sources of Incomes and Expenditures

The table below summarizes various source of income for an average household in the project area.

Table 4.7: Sources of Household Income

	Production per H/H	**Rates**	**Amount in Kshs.**	**Period**
i) Crops farming				
Maize	5 bags	2,000	10,000	2 times a year
Beans	3 bags	3,000	9,000	2 times a year
Cassava	Sum		500	Once a year
Pawpaw	1 bag	1000	1000	Once a year
Mangoes	2 bags	1,000	2,000	Once a year
Sorghum	1 bag	1,500	1,500	Once a year
ii) Livestock keeping				
Cows	1	15,000	15,000	Yearly
Goats	2	3,000	6,000	Yearly
Sheep	1	2,500	2,500	Yearly
Poultry	3	500	1,500	Yearly
iii) Livestock products				
Milk	5 litres	20	100	Monthly

	Production per H/H	**Rates**	**Amount in Kshs.**	**Period**
Eggs	1/4 trays	200	50	Monthly
iv) Small-scale businesses	Average profit			**Period**
Shops	200			Daily
Tea kiosks	100			Daily
Posho mills	450			Daily
Butcheries	550			Daily
Tailoring shop	150			Daily
v) Employment (salary/wage)	Average pay (Kshs)			
Teachers	7,000-25,000			Monthly
Administrators	15,000			Monthly

b) Expenditure Pattern

Income realized from the different livelihoods activities that the community members engage in is spent to meet the following needs;

- Buying foodstuff.
- Buying clothes.
- Buying paraffin (lighting homes).
- Paying school fees.
- Paying medical bills.
- Transportation.
- Purchase of household goods / items and furniture.
- Buying construction materials e.g. iron sheets.

Table 4.8: Expenditure Pattern for a Typical Household within Kakayuni area

Item	Amount {Ksh}	Period
Buying foodstuffs	90	Daily
Clothes	6,000	Yearly
Paraffin	300	Monthly
Transport	500	Monthly
Paying school fees	7,000	Yearly
Paying medical bills	1,000	Yearly
Household goods/items	2,500	Yearly
Construction materials	4,000	Yearly

From the discussion, it was noted that huge percentage of people's income is spent on buying foodstuff. Some households are not even able to feed themselves all round the year and at times go hungry or manage to have just one meal per day.

Securing loans is also a problem mainly due to lack of security and fear of loans which attract high interest rates. Businesses also perform poorly due to lack of regular income for most people. In the project area, poverty manifests itself in form of illiteracy, malnutrition of children, poor shelter and failure to access essential services such as education, health, water and sanitation.

Figure 4.2: Percentage of the expenditure pattern for an average household in Kakayuni sub location, Kyangala location

The community members indicated their willingness to form groups through which they would marshal resources and start various income generating projects to improve their living standards.

4.3.11 Sources of Energy

Energy provision to rural communities in the region has proved to be a great challenge. The vast majority of these people are dependent on the traditional fuels (wood-charcoal, crop residue maize walks and cobs); often using primitive and inefficient technologies (open fires). For many, this combination barely allows fulfillment of the basic human needs of nutrition, warmth and light, let alone the possibility of harnessing energy for productive uses which might begin to permit escape from the cycles of poverty.

The electricity infrastructure in the region covers only a few trading centers and towns implying most households rely on biomass and fossil fuels for energy needs. This also means that only the people within the town can engage in a more productive work though the town is faced with recurrent power blackouts. Those in far remote areas suffer under high and volatile fuel prices, which add to the negative spiral of additional costs.

4.3.12 HIV/AIDS Situation

Machakos County is among the regions with a moderate to high prevalence of HIV/AIDS, which were generally estimated at between 10-30%. The prevalence of HIV/AIDS infection increases with proximity to the urban centres where the prevalence is estimated to be above 30%. HIV/AIDS patients occupy 35% of the hospital beds. Despite over 90 per cent awareness, the scourge continues to rise, and the effects are far reaching.

HIV/AIDS awareness level in Kyangala location is fairly high. This is attributed to awareness creation forums by government. Family members do not have adequate resources to support the infected people access the necessary drugs and therapy.

There is VCT centre in Kanyongo area. HIV/AIDS has had a major impact on the community members of Kakayuni sub location.

4.3.13 Conflict Management and Resolution Mechanism

There is stiff competition for the little available water especially during the drought period. This causes conflict since everybody needs a share of the little available water. Competition

for the little available water for the different uses mainly domestic purposes and watering livestock. Domestic quarrels also occur at household levels. Land conflicts do also occur from time to time.

The different types of conflicts which occur are handled through various existing resolution mechanism. Both parties can sit together and dialogue to arrive at an amicable solution to maintain good neighbourhood relations. Depending on the veracity of the issue at hand some matters are brought to the attention of village elders who are appointed and authorized to deal with some of the conflict issues by the area Chief and Assistant Chief. The village elders mediate and resolve conflicts among the community members they are in charge of. They charge a fine to those found guilt and set out conditions to the conflicting parties so as to maintain harmony in the community. However, in case a solution is not found at that level the complainant is allowed to file the case with the area administrators who include the Assistant Chief, the area Chief or even the Assistant County Commissioner. The case can also be recommended to be dealt with at the law courts or referred to the Deputy County Commissioner of the area who can also intervene to ensure harmony is restored.

Chapter

Five

5. PUBLIC CONSULTATION AND PARTICIPATION

5.1 Introduction

This chapter outlines the key issues raised by the public on the proposed project. The findings indicate that all the community members support the project as long as they are involved and fully sensitized on the same.

5.2 Objectives of Public Consultation

The need for public consultations as required by EMCA (1999) was to:

- ✓ Disseminate and correctly inform the stakeholders about the project, its key components, location and expected impacts;
- ✓ Awareness creation on the need for ESIA;
- ✓ Gather comments, concerns and suggestions of the interested and affected parties;
- ✓ Ensure that the concerns of the stakeholders were known to the decision-makers early enough; and
- ✓ Incorporate the information collected into the ESIA study

The purpose for such a process was to identify the positive and negative impacts and subsequently promote and mitigate them respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeded as planned.

5.3 Interested and affected stakeholders consulted

The stakeholders consulted in this study were: community elders, location chiefs, area leaders and community members.

5.4 Issues Raised

5.4.1 Water Scarcity

Stakeholders reported that scarcity of water was a serious challenge in the area. They were optimistic that construction of borehole will complement the existing water sources and reduce traveling distances to water points.

5.4.2 Water Conflicts

The issue of conflicts was discussed. Community members were asked whether water would be a source of conflict. Most of the community members were of the view that they have not experienced any conflicts.

5.4.3 Beneficiaries

The community members informed the ESIA consultancy team that the school as well as women and children from the community will be the greatest beneficiaries of the borehole project as they are the ones tasked with the duty of fetching water. Consequently, time wasted in search for water will be used for other constructive activities. Additionally, the danger posed to students, women and children during the search for water will greatly reduce.

5.5 Summary of response from the community members interviewed

No.	Question	Responses
1	Is there any water shortage in the area?	Yes (100%)
2	Are you aware of the proposed borehole drilling project?	Yes (100%)
3	Are you familiar with the activities involved in borehole drilling?	Yes (100%)
4	If yes in the above, do you expect any interference to your premises as a result of implementation of the proposed borehole drilling?	No (100%)
5	Do you have any objection to the proposed borehole drilling?	No (100%)
6	How will the proposed project alleviate the water shortage problem?	increase access to portable water
7	Are there water conflicts in this area?	Yes (60%)
8	What are the potential impacts of the proposed project?	- Improved access to portable water - Reduced time taken to water

No.	Question	Responses
		sources - Reduced distances to water sources
9	Was the community consulted during design stage of the project?	Yes (90%)
10	What operation and maintenance arrangements for the project has been made by the community?	community members will contribute money for operations and maintenance
11	Do you have a water users association and by laws?	No
12	How long has it been in existence?	N/A
13	How is sustainability of the project guaranteed?	Billing
14	How do you intend to regulate and use the water from the project?	water committee will regulate the usage
15	What are the priority water uses in the locality?	Domestic use

(List of persons consulted are attached in the appendix)

Chapter Six

6. ANALYSIS OF PROJECT ALTERNATIVES

During the course of formulating the proposed development, several alternatives were considered to ensure that the best option of project development was adopted. The consideration of alternatives is one of the more proactive approaches of environmental assessment. This process serves to enhance the project design through an examination of other feasible options instead of only focusing on the more defensive task of reducing adverse impacts of a single design. The project alternatives considered included:

6.1 Alternative Location

Alternative location is one of the options considered for this project. In this case, the proponent will have to move the project to another site instead of implementing it on the proposed site. This is not however a feasible option considering that:

- ✓ Groundwater reserve analysis established that there are no boreholes drilled in that area. Therefore drilling this borehole will not adversely affect the aquifer characteristics of the area and will open up the project area for future groundwater development.
- ✓ The proposed site was chosen by the community after considering all other alternatives sites;
- ✓ The land has already been acquired. Finding and acquiring another land to accommodate the scale, type and size of the project and completing official transaction may take longer and delay the project;
- ✓ Even if the land was to be obtained, there is no guarantee that such land would be suitable in terms of environmental, health and safety requirements; accessibility and zoning based on land use; and

- ✓ Even if the land was to be obtained, AWSB will spend some more time and resources on hydro-geological investigations and other project planning activities to adjust to new site conditions, this will not be cost friendly to the proponent.

6.2 The No Project Alternative

The other best alternative to address the significant impacts is the No project alternative. This alternative will ensure that things remain unchanged. The environment therefore will not be tampered with. This option is not feasible too. This is due to:

- ✓ It results in losses to the project proponent and other stakeholders, society and the Government;
- ✓ The project would not be constructed and there would be no water supply;
- ✓ The land will remain literally idle;
- ✓ Lack of creation of employment, hence, effect on socio-economic empowerment of the society;
- ✓ Local skills would remain under-utilized; and
- ✓ The community will still travel long distances to access water.

6.3 Alternatives water sources

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.

6.4 Alternative design and technology

The proponent would also have opted to adopt alternative design and technology. This option too is not feasible since the adopted technology in this project is a brain child of various professionals including engineers, and surveyors and environmental consultants who have vast experience in the hydrogeology regulations and standards both local and international and they settled for the best as a way of fostering best practice within the industry.

The proposed borehole will use a submersible water pump powered by solar which is economical and easy to run. Other power source like electricity and diesel are not viable due to its prohibitive cost for operations & maintenance.

6.5 Input Alternatives

The choice of materials and inputs selected for the project was based on the stipulated laws, standards and specifications as commonly applied in a project of such nature. The selection of materials takes into account design specifications and end user consideration.

Chapter Seven

7. ANTICIPATED POTENTIAL ENVIRONMENTAL IMPACTS

7.1 Introduction

This Chapter identifies and discusses both positive and negative impacts associated with the proposed borehole water project. Impacts to the environment could be positive or negative, direct or indirect, reversible or irreversible. The extent of environmental impact is determined by its significance, adversity, temporary or permanent, long-term or short-term, localized or widespread. Some impact mitigation has already been proactively addressed in the design while others would be undertaken through considered incorporation in the implementation of the project and guided by the Environmental and Social Management Plan (ESMP) presented in this report.

The anticipated impacts are discussed in three phases namely: construction, operational and decommissioning phases.

7.2 Construction Phase

7.2.1 Positive Impacts

7.2.1.1 Temporary Employment Opportunities

One of the main positive impacts during the construction phase will be the availability of employment opportunities especially to casual workers and several other specialized workers. Employment opportunities have both economic and social benefit.

7.2.2 Negative Impacts

7.2.2.1 Loss of Vegetation Cover and Biodiversity

Before the drilling and installation of the boreholes, pipeline works and construction of water

kiosk and elevated steel tank, clearing of part of the existing vegetation cover will be done. Direct impact from such disturbance may cause changes in the natural community ecosystem or lead to invasion by non-native plant species. Loss of plant communities may also result in soil erosion and/or compaction. The loose soil material may also be washed down into the lower areas (streams and valleys).

Mitigation

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

7.2.2.2 Alteration or Destruction of Wildlife Habitat

Drilling of borehole, laying of water pipeline and construction of water kiosk may have immediate impact on wildlife habitat. Alteration, fragmentation, or destruction of wildlife habitat can result in the direct loss or displacement of species and the ability of the ecosystem to support other biological resources such as the plant communities upon which the wildlife rely on for survival. The level of habitat destruction in this project is minimal as the core impact areas are quite small. There were also no observed counts of endangered animal species in the proposed construction sites.

Mitigation

- Clearance of vegetation should be done in necessary areas only; and
- Notify Kenya Wildlife Service (KWS) in case animals are encountered during construction activities.

7.2.2.3 Solid and Liquid Waste Generation

The construction works involves activities which may lead to generation of both solid and liquid wastes. These will include rejected casing materials, excavated materials and cleared vegetation among others. There will also 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. The workers at the site will also generate faecal wastes during their day to day operations. The generated waste needs proper handling to prevent diseases, such as cholera, typhoid and diarrhoea outbreak on the site. Unless this is addressed, it can prove to be an environmental/health hazard.

Mitigation

- Use an integrated solid and liquid waste management system which includes reduction at source, recycling, re-use, incineration, and sanitary land fills;
- Any remaining waste (paper or polythene containers, cement bags, bentonite, construction debris, etc. shall 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;
- Where no toilets exist, portable toilets and necessary sanitary arrangements will be availed; and
- Keep the site clean and orderly at all times.

7.2.3.4 Noise Pollution

The construction works will most likely be a noisy operation due to moving parts of machines *(drilling rig, pipeline excavation works and communicating workers*) and trucks that carry the equipment to the site. To some degree site workers and community members are likely to be affected since noise beyond some level is itself a nuisance and thus should be controlled within acceptable limits. 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

- 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";
- The drill rig must be fitted with appropriate noise suppression equipment such as mufflers;
- Proper maintenance of the construction equipment;
- The workers will be supplied with on ear mask where applicable to control excessive noise;
- Place 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; and
- Sensitize vehicle drivers and machine operators to switch off engines of vehicles or generators when not in use and to avoid hooting.

7.2.2.5 Dust Emissions

Particulate matter pollution is likely to occur during site clearance, excavation works and drilling operations. There is possibility that generated dust may affect the workers and the surrounding community members' heath. The law requires that best management practices are adopted during drilling activities. Ideally, no visible dust should be created nor should exhaust from any equipment be visible for more than 10 seconds. However, the potential impact on air quality will be minimal.

Mitigation

- Ensure that the workers have proper PPEs like dust masks;
- Ensure strict enforcement of on-site speed limits; and
- The equipment used to drill water must be fitted with dust suppressors equipment (e.g. water sprays), and pre-start inspection of dust control equipment will be undertaken.

7.2.2.6 Risk of Accidents and Health and Safety Concerns

During construction activities, it is expected that the construction workers may encounter occupational health hazards as a result of coming into contact and handling hazardous waste e.g engine oil and grease. Because of clearing of access roads and water pipelines, setting up and operating the drilling machines, workers will be exposed to risk of accidents and injuries. Such injuries can result from loading and unloading truck mounted drill rig, transportation of the drill rig, hand tools and cuts from sharp objects, slips and fall hazards among others. We recommend that necessary safety precautions like defensive driving and putting up signages be taken by the truck drivers and workers to minimise accidents. 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

- Ensure compliance with occupational health and safety act, 2007;
- Ensure workers are provided with personal protective equipment and first aid kit;
- Ensure all equipment are inspected before use for appropriate safeguards and that the machine operators are trained on machine safety;
- Ensure the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay;
- Ensure appropriate road safety signage are strategically placed and drivers adhere to the requirements of such signage;
- Provide adequate manual labor to meet the requirements of the tasks,

- Provide appropriate barriers along the excavated trenches. All construction sites shall be isolated from the 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; and
- 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.

7.2.2.3 Risk of Oil Spillage

The drilling machine contains movable parts which will require oiling and greasing to minimize wear and tear. Likewise the truck for carrying the drilling rig, pipes and other construction materials to site may require oil and other lubricants change. Possibilities of oil spillage contaminating the soil and water within the project areas are real.

Mitigation

- Safety procedures will be enforced to minimise cases of oil spillage. Such procedures may include maintaining the machinery in specific designated areas designed for such purposes;
- 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; and
- 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.

7.2.2.8 Groundwater Pollution

Borehole construction activities have the potential to introduce contaminants into ground water reservoirs creating a great concern to human and animal health. Pollution of groundwater quality during the drilling may occur 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 this ESIA. 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

- 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; and
- Undertake an audit on the integrity of the borehole abstraction piping and associated casings.

7.2.2.9 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

- Programs will 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; and

- Identify other players (local CBOs, NGOs, and government organizations) on HIV/AIDS for enhanced collaboration.

7.3 Operation Phase

7.3.1 Positive Impacts

7.3.1.1 Increased Access to Water

The current water sources rapidly deplete during the dry season. Consequently, the community members have to travel increasingly far distances in search for water. During such journeys, community members have either lost lives or livestock. It is expected that the construction of boreholes will greatly improve access to water in the area.

7.3.1.2 Permanent Employment Opportunities

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

7.3.1.3 Improved Health and Sanitation

The proportion of the population currently relying on water from unprotected water sources such as rivers and shallow wells will reduce significantly. These will have a direct impact on health and sanitation especially in relation to waterborne diseases such as diarrhea and helminthic infections. Families that are unable to wash clothes or bathe will be able to do so due to close proximity to water sources.

7.3.1.4 Reduced Travel Times to Water Points

From our discussions with community members, most families spend almost 30 min-1 hour in search for water. It is expected that the construction of the borehole will lead to significant time savings due to reduced distances to water points. It is expected that same will improve the economic and social status of women and children since there will be more time for other activities for example for farming.

7.3.1.5 Increased Participation of Women in Socio-economic Development

The prevailing socio-cultural norms influencing household division of labour determine that looking after children, preparation of food and collecting water and firewood are tasks for the women. By constructing borehole closer to the communities, the women will be able to spend their time in other productive activities thereby increasing their participation in socio-economic development.

7.3.2 Negative Impacts

7.3.2.1 Additional Financial Burden

It was established that borehole is the most common source of water in the project area. However, the borehole can be non-operational due to lack of proper community management framework for operation, repair and maintenance of the same. It is expected that construction of the borehole at the proposed site will impose additional financial burden to the community members who will have to dig from own pockets to repair and/or maintain them.

Mitigation

- The project proponent will train the community members on proper operation, management and maintenance of the borehole to ensure sustainability; and
- The proponent will consult on reasonable water tariffs to sustain the water supply as well as creating a sense of value for water to the beneficiary community. From an analysis of the operational cost of the project, the estimated water tariff is Kshs 4 per 20 litres jerry can.

7.3.2.2 Change in Settlement Patterns

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

Mitigation

- Liaise with Machakos county government to control developments in the area and ensure provision of adequate services.

7.3.2.3 Risk of Water Vectors

Water spillage around the taps during operation may provide breeding ground for vectors of waterborne diseases such as worms, mosquitos and schistosomiasis. With increasing population and demand of water resources, more energy may be directed into enhancing water flow but forgetting the management of sanitation and wastewater. This scenario also leads to low attention to water quality and concentrating into increasing the volume.

Mitigation

- The waste water drainage channel be constructed to lead water away from the pump pad;
- The waste water may be used for small gardening initiatives by the communities or directed to soak pits;
- Observe the Water Act 2002 and associated Water Rules;
- Conduct continuous maintenance of the borehole, pipework, tank and water kiosk; and
- Conduct water sampling at least every 3 months for water monitoring record base on this facility

7.3.2.4 Lowering of Water Table

It is expected that the water from the borehole will be used for both human and animal consumption. Consequently, the risk of over abstraction is real. This may cause lowering of ground water table which may interfere with other existing boreholes.

Mitigation

- The borehole will 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;

- The committee managing the water source shall ensure that there is no over pumping and also they will stick to the permit class issued by WRMA;
- 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; and
- Ensure optimum maintenance of the water supply system components including pipelines, valves and consumer taps.

7.3.2.5 Risk of Soil Erosion

There are possibilities of soil erosion occurring during the operation of the boreholes which may become serious when the topsoil is left bare and agents of erosion become active. Soil erosion is a serious environmental problem which should be controlled. Lost soil due to erosion is normally deposited elsewhere, and the location of the deposition could alter downstream hydrology and increase flooding. It may also interfere with water quality directly through increasing turbidity levels, siltation and indirectly from contaminants carried with or attached to eroded soil particles. The proposed project is expected to have minimal risk of erosion as the area to be disturbed is quite small.

Mitigation

- Regularly check and maintain pipes to avoid burst pipes and leakages which can lead to massive water losses (and so revenue) as well as soil loss;
- Apply soil erosion control measures such as levelling the project site to reduce run-off; and
- Ensure compacted areas are ripped off to reduce run-off.

7.4 Decommissioning Phase

Decommissioning refers to the final disposal of the project and associated materials at the expiry of the project life span or when the borehole dry up or when the community gets another water source better than the proposed borehole. During this project, the proponent will be expected to demolish the pump house, remove the casings, pump, water pipeline, water kiosk, elevated water tank and remediate the site.

7.4.1. Positive Impacts

7.4.1.1 Rehabilitation

Upon decommissioning of the proposed project, rehabilitation of the project site will be carried out to restore the site to its original status or to a better state than it was originally. This will include replacement of topsoil and re-vegetation which will lead to improved visual quality of the area. This will also mean that alternative options can be utilized within the project site.

7.4.1.2 Employment Opportunity

For decommissioning to take place properly and in good time, several people will be involved. As a result several employment opportunities will be created for the demolition staff during the demolition phase of the proposed project.

7.4.2. Negative Impacts

7.4.1.1 Solid Waste Generation

Demolition of project related infrastructure will result in large quantities of solid waste. The waste will include materials such as concrete, metal, wood, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. We recommend that proper waste disposal mechanisms be observed.

7.4.2.2 Noise Pollution

The decommissioning related activities such as demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing the proposed project structures.

7.4.2.3 Occupational Health Hazards

Demolition works will inevitably expose workers and the public to occupational health and public safety risks: in particular, working with heavy equipment, handling and use of tools engender certain risks. The construction workers are also likely to be exposed to risk of

accidents and injuries resulting from accidental falls, falling objects, injuries from hand tools and other equipment.

Chapter Eight

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1 Introduction

This chapter presents the Environmental and Social Management Plan (ESMP) that will be implemented by the proponent to prevent, or reduce significant negative impacts to acceptable levels. This plan is not static but will be updated throughout the project life cycle.

The purpose of the Environmental and Social Management Plan (ESMP) for the proposed water Project is to provide mitigation measures for the significant negative environmental impacts. The objectives of the ESMP are:

- ✓ To clearly show how the project will manage the negative impacts while enhancing the positive ones to ensure a project that is economically, socially and environmentally sustainable;
- ✓ To provide evidence of practical and achievable plans for the management of the proposed project;
- ✓ To provide the Proponent and the relevant Lead Agencies with a framework to confirm compliance with relevant laws and regulations; and
- ✓ To provide community with evidence of the management of the project in an environmentally and socially acceptable manner.

Environmental monitoring is an applied research and analysis activity to support cost-effective and timely assessment of the status and trends in environmental and social conditions in response to different project activities. Also, it is necessary to assess the project performance against the desired mitigation measures, and compliance with the regulations and standards in order to protect people's health and safety, and the environment health and performance. Monitoring activities will be applied to direct monitoring indicators whenever applicable.

Indirect indicators can be monitored instead of direct ones whenever it would provide acceptable indication of the occurrence of specific impacts and/or compliance with provisions of the ESMP.

Table 8.1 Management Framework

Potential Environmental/ Social impacts	***Recommend Actions***	***Responsible Party***	***Time Frame***	***Estimated Cost***
Construction Phase				
1. To minimize vegetation disturbance at and around project sites				
Vegetation disturbance	✓ Ensure proper demarcation and delineation of the project area to be affected by construction works; ✓ It is recommended that indigenous trees or other fast growing trees be planted in strategic locations where the vegetation cover will be cleared as part of landscaping initiatives; ✓ Project implementation plans will be developed such that section excavated are worked on and completed before moving to other areas; and ✓ Re-vegetation of exposed areas around the site will be carried out rapidly in order to mitigate against erosion of soil through surface water runoff and wind erosion. ✓ Identify and restrict movement of vehicles to areas of disturbance	Contractor	During construction and decommissioning	20,000.00
2. ***To minimize disturbance and destruction of wildlife habitat***				
Alteration or destruction of wildlife habitat	✓ Clearance of vegetation should be done in necessary areas only; and ✓ Notify Kenya Wildlife Service (KWS) in case animals are encountered during construction activities.	Contractor	Throughout construction period	No additional costs

Potential Environmental/ Social impacts	***Recommend Actions***	***Responsible Party***	***Time Frame***	***Estimated Cost***
3. ***To Minimize solid and liquid waste generation and ensure proper waste management***				
Increased solid and liquid waste generation	✓ Use an integrated solid and liquid waste management system which includes reduction at source, recycling, re-use, incineration, and sanitary land fills; ✓ Any remaining waste (paper or polythene containers, cement bags, bentonite, construction debris, etc. will 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. ✓ Where no toilets exist, portable toilets and necessary sanitary arrangements will be availed; and ✓ Keep the site clean and orderly at all times.	Contractor	Throughout construction period	40,000.00

Potential Environmental/ Social impacts	***Recommend Actions***	***Responsible Party***	***Time Frame***	***Estimated Cost***
4. To Minimize noise and air pollution during construction and decommissioning				
Noise and Vibration	✓ 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"; ✓ The drill rig must be fitted with appropriate noise suppression equipment such as mufflers; ✓ Proper maintenance of the construction equipment; ✓ The workers will be supplied with on ear mask where applicable to control excessive noise; ✓ Place 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; and ✓ Sensitize vehicle drivers and machine operators to switch off engines of vehicles or generators when not in use and to avoid hooting.	Contractor	Throughout construction period	50,000.00

Potential Environmental/ Social impacts	***Recommend Actions***	***Responsible Party***	***Time Frame***	***Estimated Cost***
5. ***To Minimize dust and air pollution during construction and decommissioning***				
Dust emission	✓ Ensure that the workers have proper PPEs like dust masks; ✓ Ensure strict enforcement of on-site speed limits; and ✓ The equipment used to drill water must be fitted with dust suppressors equipment (e.g. water sprays), and pre-start inspection of dust control equipment will be undertaken.	Contractor	During construction and decommissioning	25,000.00
6. To minimize health and safety risks				
Risk of accidents and health and safety concerns	✓ Ensure compliance with occupational health and safety act, 2007; ✓ Ensure workers are provided with personal protective equipment and first aid kit; ✓ Ensure all equipment are inspected before use for appropriate safeguards and that the machine operators are trained on machine safety; ✓ Ensure the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay; ✓ Ensure appropriate road safety signage are strategically placed and drivers adhere to the requirements of such signage; ✓ Provide adequate manual labor to meet the requirements of the tasks;	Contractor	During construction and decommissioning	25,000.00

Potential Environmental/ Social impacts	***Recommend Actions***	***Responsible Party***	***Time Frame***	***Estimated Cost***
	✓ 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; and ✓ 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. To Minimize oil spillage				
Oil spillage	✓ Safety procedures will be enforced to minimise cases of oil spillage. Such procedures may include maintaining the machinery in specific designated areas designed for such purposes; ✓ 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; and ✓ 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.	Contractor	Throughout construction phase	50,000.00

Potential Environmental/ Social impacts	***Recommend Actions***	***Responsible Party***	***Time Frame***	***Estimated Cost***
8. ***To Minimize ground water pollution***				
Ground pollution	✓ 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; and ✓ Undertake an audit on the integrity of the borehole abstraction piping and associated casings.	Contractor	Throughout construction phase	80,000.00
9. ***To reduce incidences of HIV/AIDS and STIs***				
HIV/AIDS	✓ Programs will 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; and ✓ Identify other players (local CBOs, NGOs, and government organizations) on HIV/AIDS for enhanced collaboration.	Contractor	Throughout construction phase	70,000.00

Potential Environmental/ Social impacts	***Recommend Actions***	***Responsible Party***	***Time Frame***	***Estimated Cost***
Operation Phase				
1. *To reduce financial burden to community members*				
Borehole management	✓ The project proponent will train the community members on proper operation, management and maintenance of the borehole to ensure sustainability; and ✓ The proponent will consult on reasonable water tariffs to sustain the water supply as well as creating a sense of value for water to the beneficiary community. From an analysis of the operational cost of the project, the estimated water tariff is Kshs 4 per 20 litres jerry can.	Proponent and Project Management Committee	Throughout operation phase	50,000
2. To ensure the project site is not overpopulated				
Change in settlement patterns	✓ Liaise with Machakos county government to control developments in the area and ensure provision of adequate services.	Proponent and Machakos County Government	Continuous	No additional costs
3. ***To maintain the water quality***				
Risk of water vectors	✓ The waste water drainage channel be constructed to lead water away from the pump pad; ✓ The waste water may be used for small gardening initiatives by the communities or directed to soak pits; ✓ Observe the Water Act 2002 and associated Water Rules; ✓ Conduct continuous maintenance of the borehole, pipework, tank and water kiosk; and ✓ Conduct water sampling at least every 3 months for water monitoring record base on this facility.	Proponent and Project Management Committee	Throughout operation phase	100,000

Potential Environmental/ Social impacts	***Recommend Actions***	***Responsible Party***	***Time Frame***	***Estimated Cost***
4. To maintain correct water table				
Lowered water table/depletion of groundwater	✓ The borehole will 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; ✓ The committee managing the water source shall ensure that there is no over pumping and also they will stick to the permit class issued by WRMA; ✓ 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; and ✓ Ensure optimum maintenance of the water supply system components including pipelines, valves and consumer taps.	Project Management Committee and WRMA	Continuous	40,000.00
5. To minimise soil erosion				
Soil erosion	✓ Regularly check and maintain pipes to avoid burst pipes and leakages which can lead to massive water losses (and so revenue) as well as soil loss;	contractor	Construction	None

Potential Environmental/ Social impacts	***Recommend Actions***	***Responsible Party***	***Time Frame***	***Estimated Cost***
	✓ Apply soil erosion control measures such as levelling the project site to reduce run-off; and ✓ Ensure compacted areas are ripped off to reduce run-off.			
Decommissioning Phase				
Solid waste, noise, dust, occupational and safety concerns	✓ 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.	Proponent, Environmental experts, project management committee and NEMA	During decommissioning phase	Costs to be determined during decommissioning time
Total				**550,000**

8.2 Implementation and operation of the ESMP

Effective implementation and operation of the ESMP require clear-cut identification of responsibilities that will guide assigning tasks. The parties responsible for implementation of the ESMP include:

i. AWSB and TANATHI will be responsible for coordination of all the activities and liaisons, particularly concerning 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 Machakos;
v. The Contractor;
vi. The Supervision Consultant; and
vii. The local administration.

Other implementation related components include:

1. Training and awareness creation;
2. Communication;
3. Emergency preparedness and response;
4. Checking and corrective action; and
5. Review of the ESMP.

8.2.1 Training and awareness creation

Efficient implementation and operation of the ESMP require competent capacities, wise management, environmentally and socially sound employees. The borehole management committee shall be aware of the project nature and impacts, so that they can develop their appreciation and thorough commitment to the ESMP requirements, complexity and integrity.

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

The proponent ought to ensure the following in order to fulfill the awareness and training requirements:

1. Training needs are identified;
2. Training requirements for each operational unit within the project are established;
3. Personnel are trained in their specific environmental responsibilities that are directly related to significant aspects, targets, and objectives of the ESMP;
4. Personnel that do not have a significant role, receive awareness training;
5. New-hires and re-assigned personnel are given appropriate training on the specific aspects of their new positions;
6. Personnel are kept abreast of regulatory changes that impact their job performance.
7. Training includes communication of the following:
    a) Requirements of the ESMP and the importance of regulatory compliance with policy;
    b) Potential effects of the employee's work, both negative and positive; and
    c) Responsibility in achieving compliance with policies, regulations and ESMP requirements.

8.2.2 Communication

Efficient communication should be maintained at both external and internal levels. The overall advantage of this communication program is to ensure that the anticipated adverse impacts and risks can be effectively mitigated.

The proponent will effectively communicate and cooperate on continuous basis with the related authorities and committee in order to avoid or minimize to the extent possible disruptions.

Communicating internally and externally- if effective- will ensure:

- ✓ Better understanding and appreciation of target groups to the proposed project conditions and benefits;

- ✓ No or minimum disruption by the project to other developed/under-development projects and vice versa;
- ✓ Minimum impacts and risks; and
- ✓ Community participation in helping and making choices to develop suitable and acceptable avoidance/mitigation scenarios.

8.2.3 Emergency preparedness and response

Emergency preparedness must be given priority during the ESMP implementation and operation and all key procedures reviewed for emergency preparation, including the occupational health and safety programs for the farmers and the workers.

During the pre-construction phase, the Contractor will be required to document procedures for managing these potentialities and to train key personnel on these procedures. Also he will ensure that adequate and correct emergency equipment are available where they should be. The prepared plan documents will clearly identify implementation responsibilities.

The Emergency Management Plan will be reviewed and verified by the proponent. Also, the implementation of this plan will be monitored and evaluated. Whenever environmental and/or social emergency situation is triggered during the construction phase, the proponent shall directly inform the Contractor requesting him to respond according to the stated plan. After a drill or incidents occurrence, these processes will be reported on, reviewed and modified by the environment officer. In this regard, the environment officer will hold the responsibility of reviewing and verifying the Contractor reports and plan adaptations.

8.2.4 Checking and corrective action

The ESMP implementation and performance shall be monitored continually; performance, conformance and non-conformance audit will be applied on in order to adapt the plan by adopting effective corrections whenever needed. Environmental audit will be conducted on annual basis as required by NEMA. All records will be stored in a well-ordered and easily accessible manner, enabling individual items to be located easily and ensuring that the records are protected. The audit reports will be reported in accordance to the stated reporting structure.

The selected environmental expert will be required to possess relevant experience and capable of undertaking such responsibilities.

For the purpose of the community water supply project, the audit would cover but not limited to the following changes triggered by the community water project:

a) Technical issues related to the community water supply;
b) Socio-economic issues; and
c) Gender and socio-cultural aspects.

The corrective and preventive actions based on audit findings and their consequences will be monitored. The periodic audit findings will be summarized into an audit report and reviewed during the project review meeting by the proponent.

8.2.5 Review of the ESMP

The Environment Officer will review the ESMP on a periodic basis as per a documented procedure to ensure its continued suitability and effectiveness. During the review, the staff will effectively utilize all available information, including internal and external audit findings, environmental concerns, objectives, targets, non-conformance, and corrective and preventive actions in order to improve the ESMP implementation. The review results will be recorded and maintained and the resultant decisions and actions taken will be implemented by the concerned personnel. ESMP has been designed to ensure maximum environmental and social protection, better coordination and cooperation between the project stakeholders and minimum cost implications.

8.2.6 ESMP reporting structure

The ESMP reporting structure is a shown in table 8.2 as follows:

Table 8.2: The Proposed ESMP Reporting Structure

Report	Report Type	Frequency
Progress Report	Document to the ESMP implementation progress, limitations & difficulties based on regular monitoring. This includes checking & corrective actions. Also the progress report will address the conducted public consultation sessions.	Monthly, Quarterly (every three months) & Annually.
Emergency Management Plan	The plan will document emergency preparation, including the health & safety programs for all key procedures reviewed, in addition to all necessary adequate & correct emergency equipment.	Prior to construction progress

Report	Report Type	Frequency
Audit Reports	ESMP Performance, Conformance & Non-conformance Audit, it will also include checking & corrective actions	Quarterly (every three Months) & Annually.
Environmental & Social Management Evaluation Report	Evaluation Report of the Project Environmental & Social Impacts. The evaluation will also document all conducted management practices & evaluate the effect of these practices	Once upon construction completion

8.2.7 Environment Monitoring Plan

The Environmental Monitoring Plan 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 8.3: Environment Monitoring Plan

Indicators	Monitoring Actions	Target Area	Responsibility	Frequency	Budget (KShs.)
Land Acquisition Aspects	Verifying that the land documentation are in order	• Borehole Sites (already drilled) • Water transmission Pipelines • Water Storage Tanks • Water Kiosks	TANATHI and AWSB	Once before the construction works begins	No costs are anticipated
Health and Safety	• 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	Contractor Supervision TANATHI and AWSB	Continuous	80,000.00

Indicators	Monitoring Actions	Target Area	Responsibility	Frequency	Budget (KShs.)
Water Abstraction or Water Rights	Ensuring water abstraction is measured by a water meter.	Borehole Site	TANATHI WRMA Project Management Committee	Continuous monitoring Borehole yield verification annually	70,000.00
Hydro-geological Situation	Undertake annual verification of borehole yield				
Losses at the water user points	Ensure all user points are installed with water meters for monitoring				
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	TANATHI WRMA Project Management Committee	Before construction and after the works	150,000.00
Potential conflicts on water accessibility	Convenience of people at source User satisfaction surveys	Accessibility to residents at the source.	TANATHI Project Management Committee	Continuous	150,000.00
TOTAL					**450,000.00**

Chapter Nine

9. CONCLUSION AND RECOMMENDATION

9.1 Conclusion

An Environmental and Social Management Plan provided in chapter eight charts the path for sustainable project implementation. The plan provides strategies and activities that needs to be implemented so as to mitigate the negative impacts. Implementation timelines, responsibilities and cost estimates are also provided where applicable.

9.2 Recommendation

It is recommended that AWSB, contractor and all the stakeholders mentioned in the ESMP implement the recommendations in the environmental and social management plan. This is to ensure that the potentially affected environment is well managed and that accidents are prevented in the course of project implementation. AWSB is expected to comply with the relevant legal and policy requirements with regard to project implementation.

During the operation of the borehole, it is necessary that environmental regulations be strictly adhered to. The performance of the borehole will also be monitored against the recommended mitigation measures to ensure sustainability.

9.3 Overall Opinion

The construction of the borehole will have far reaching impact on the community in terms of accessibility to quality water. The project area has water challenges which continue to stifle socio-economic development and threaten livelihoods. It is for this reason that the community members are very supportive of the project. It was also established that all the identified negative impacts will be effectively mitigated through full implementation of the ESMP.

REFERENCES

1. Environmental and Social Impact Assessment Report; by Jurassic consultants
2. Kenya gazette supplement Acts 2000, Environmental Management and Coordination Act Number 8 of 1999. Government printer, Nairobi
3. Kenya gazette supplement Acts Land Planning Act (Cap. 303) government printer, Nairobi
4. Kenya gazette supplement Acts Local Authority Act (Cap. 265) government printer, Nairobi
5. Kenya gazette supplement Acts Penal Code Act (Cap. 63) government printer, Nairobi
6. Kenya gazette supplement Acts Physical Planning Act, 1999 government printer, Nairobi
7. Kenya gazette supplement Acts Public Health Act (Cap. 242) government printer, Nairobi
8. Kenya gazette supplement number 56. Environmental Impact Assessment and Audit Regulations 2003. Government printer, Nairobi

ANNEX

Annex 1. Chance find procedure

Any archaeological or heritage site discoveries during drilling works must be reported to AWSB and treated as an incident. Work at the area must cease immediately, the area demarcated, AWSB will investigate and, where appropriate, carry out salvage operations.
The Contractor or other person discovering a potentially significant site or artefact will initiate the following actions:

- Stop work in the immediate area and take digital photographs to record the find;
- Install temporary site protection measures (e.g. delineate a 'no-go' area using warning tape, stakes and signage / deploy worker and give instructions to prevent access or further disturbance) and take all reasonable steps to avoid any further disturbance or damage from drilling, excavation, machinery;
- Inform site supervisor/foreman;
- Inform all relevant staff /Contractor personnel of the chance find and whether access to work area is being restricted;
- Strictly enforce any no-go area needed to protect the site;
- Notify AWSB, who will advise on any additional measures such as deployment of security guard and consultation or a visit from archaeologist / other heritage specialist. In the event of the latter, the specialist/archaeologist will be responsible for evaluating whether the chance find needs to be classified as cultural heritage and if so, whether it is isolated or part of a larger site or feature. AWSB will also notify the National Museums of Kenya;
- Artefacts are to be left in place for recording by the specialist/archaeologist. It is important they are not disturbed or moved as there setting is as important as the artefact/fossil; if materials are to be collected they will be placed in bags and labelled by the specialist /archaeologist and forwarded to the authorities in a manner that ensures the integrity of the 'chain of custody'. Project personnel are not permitted to take or keep artefacts as personal possessions as that is a crime;
- Any damage, accidental or otherwise, should be investigated by the site foreman

and AWSB. The details are then recorded in an Incident Report and, if necessary an Incident (Chance Find) Investigation Report;

- Appropriate mitigation / treatment strategies will be developed according to the specific circumstances of each find and, as appropriate, take account of the degree of cultural importance of the find. Stakeholder engagement may be needed with affected communities to determine the correct mitigation actions or, if applicable, suitable compensation (e.g. reburial costs). Site treatment scenarios may include:
    - Preservation in place through avoidance or specialized drilling techniques, and/or
    - Rescue excavations to remove, record and relocate in advance of further construction work if avoidance is not possible.
- If the Chance Find is an isolated artefact/site or is not classed as cultural heritage, AWSB must approve the removal of site protection measures and activity can resume only with consultation and approval of the local authorities;
- If the heritage specialist and/or archaeologist confirms the chance find to be cultural heritage, he/she will inform AWSB and initiate discussions about the handling process;
- If a chance find is a verified cultural heritage site, prepare a final Chance Finds report once required treatment has been completed;
- While required treatment is ongoing, AWSB will coordinate with the relevant staff / contractor, keeping them informed as to status and schedule of investigations / actions, and informing them when activities may resume;
- Chance find recording shall include the following:
    - Incident Notification;
    - Incident Report;
    - Incident (Chance Find) Investigation Report – e.g. detailing corrective actions, with digital images, maps and plans showing any locations that are no-go, limited access or present risks of further chance finds;
- AWSB shall collate data and report Chance Finds and related activities on a regular basis during construction phase in accordance with the Project's monitoring and reporting programme;

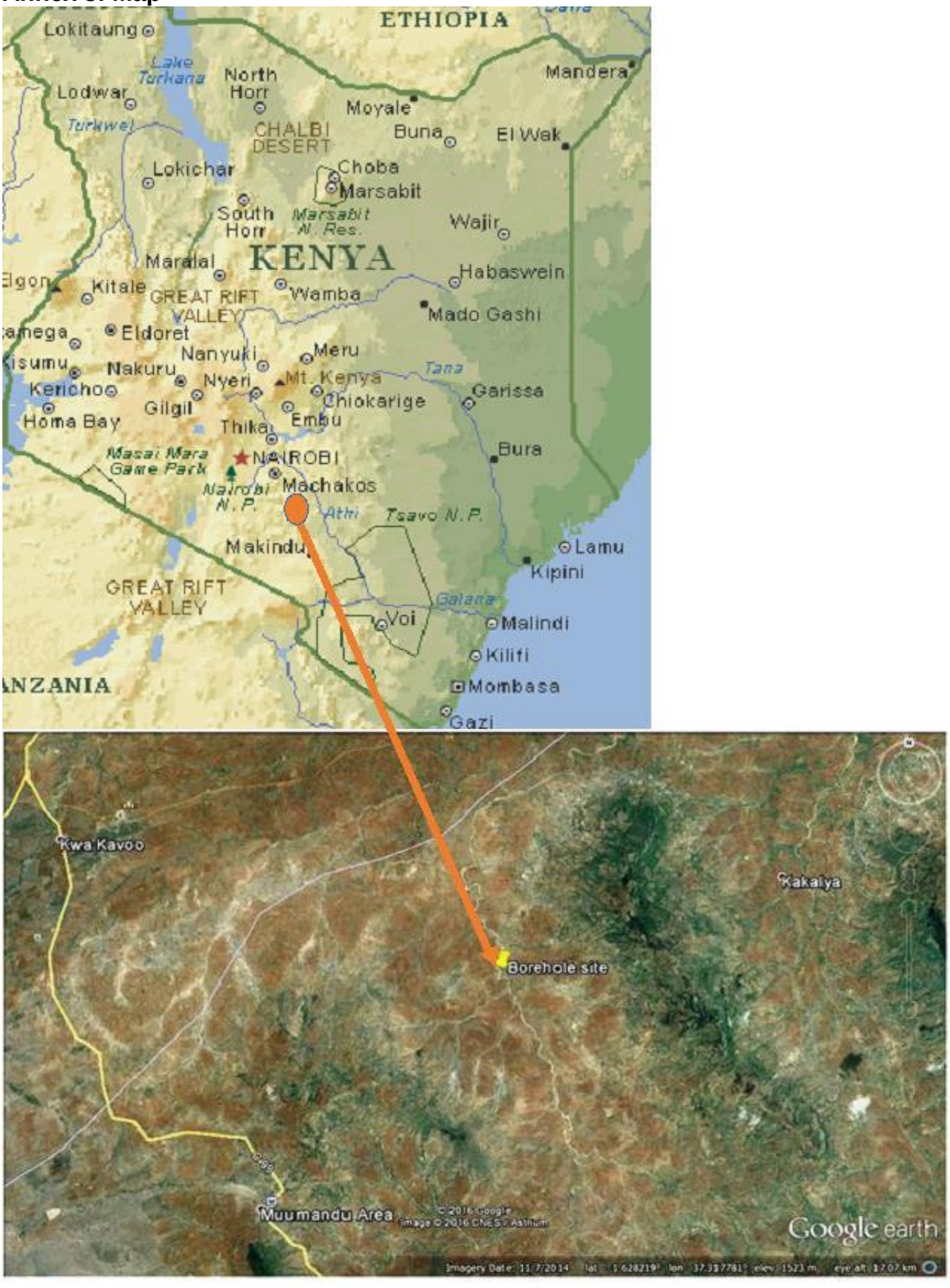
- The action taken and outcome will be recorded in the environmental issues register.

Annex 2: List of people consulted

27/5/2015

No	Name	ID no.	Occupation	Mobile no.
1	Nathan K. Kimondin	2628285	Farmer	
2	Benson Kiteka	2623834	Pastor	0712433530
3	Damaris Murunga			
4	Joel Mwalili	4596337	Farmer	0715075624
5	Francisca Mwema	22400826	Farmer	0723574696
6	F.J. Mutunga	34623140	Principal Kanyongo secondary school	0722306226
7	Sammy Ndeto	9851239	Chairperson Kanyongo Market	0721950202
8	Joseph Mutuku Musau	5044755	Elder Kanyongo village	0725646972
9	Misil Mathew	7259368	Pastor A.B.C Kanyongo	0712138908
10	Daniel Sila	10860875	Headteacher Kanyongo Primary school	0702289694

Annex 3: Map


ETHIOPIA
Lokitaung
Lake Turkana
North Horr
Mandera
Lodwar
Moyale
Turkwel
CHALBI DESERT
Buna
El Wak
Lokichar
Choba
Marsabit
South Horr
Marsabit N. Res.
Wajir
KENYA
Maralal
Habaswein
Elgon
Kitale
GREAT RIFT VALLEY
Wamba
Mado Gashi
Eldoret
Nanyuki
Meru
Nakuru
Nyeri
Mt. Kenya
Tana
Kericho
Chiokarige
Garissa
Gilgil
Homa Bay
Embu
Thika
Masai Mara Game Park
NAIROBI
Bura
Machakos
Nairobi N.P.
Athi
Tsavo N.P.
Makindu
Lamu
Kipini
GREAT RIFT VALLEY
Galana
Voi
Malindi
Kilifi
Mombasa
Gazi
Kwa Kavoo
Kakaiya
Borehole site
Muumandu Area
Google earth

Annex 4: Sample Questionnaires

ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNARE

PROPOSEDBOREHOLEDRILLINGAT..KANYONGO VILLAGE - KALANA

ENVIROMENTAL IMPACT ASSESSMENT QUESTIONNARE:

The proponent..KANYONGO PR. SCHOOL.. Intends to drill one production borehole at a parcel of Land LR no:.....in ..KANYONGO..area ..MACHAKOS..district. For the purpose of ..DOMESTIC.....USE..In efforts towards ensuring safe sustainable environment, National Environmental Management Authority (NEMA) works in consultation with all stake holders. Your views are crucial to enable NEMA to make an informed decision in either approving and/or recommending remedial measures in development of the project.

Kindly fill in the following questionnaire;

1. Name...PASTOR..MISILI MATHEW.....
2. Position..PASTOR - A.B.C KANYONGO.....
3. Are you aware of the proposed bore hole drilling project?

   Yes ☑ NO ☐
4. Are you familiar with activities involved in bore hole drilling?

   Yes ☑ NO ☐.
5. If Yes in 4 above, do you expect any interference to your premises as a result of implementation of the proposed bore hole drilling?

   Yes ☑ NO ☐
6. If yes, briefly explain...IT WILL SERVE THE ....COMMUNITY.....
7. Are you aware of any similar project (bore hole) in the neighbouring premises?

   Yes ☐. No ☑
8. If yes in seven above please give brief details (the owner, distance from the Proposed drilling site).....
9. Do you have any objection to the proposed borehole drilling?

   Yes ☐ No ☑

   If yes state the reason(s).....

ABC. KANYONGO KALAMA SUB PASTORATE Date..... P.O. BOX 1450-90100, MACHAKOS

SIGNATURE/STAMP:.....
ID NO:...7259365.....
TEL/CELL NO:...0712136906.....

Thank you for participating in protecting our environment.

ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNARE

PROPOSEDBOREHOLEDRILLINGAT..KANYONGO VILLAGE – KALAMA

ENVIROMENTAL IMPACT ASSESSMENT QUESTIONNARE:

The proponent..KANYONGO P.SCHOOL..... Intends to drill one production borehole at a parcel of Land LR no:.....in KANYONGO area ..MACHAKOS district. For the purpose of ..DOMESTIC USE..In efforts towards ensuring safe sustainable environment, National Environmental Management Authority (NEMA) works in consultation with all stake holders. Your views are crucial to enable NEMA to make an informed decision in either approving and/or recommending remedial measures in development of the project.

Kindly fill in the following questionnaire;

1. Name..DANIEL SILA.....
2. Position.....HEAD TEACHER KANYONGO PRIMARY SCHOOL
3. Are you aware of the proposed bore hole drilling project?
   Yes ☑ NO ☐
4. Are you familiar with activities involved in bore hole drilling?
   Yes ☑ NO ☐.
5. If Yes in 4 above, do you expect any interference to your premises as a result of implementation of the proposed bore hole drilling?
   Yes ☐ NO ☑
6. If yes, briefly explain.....
   .....N/A.....
   .....
   .....
7. Are you aware of any similar project (bore hole) in the neighbouring premises?
   Yes ☐. No ☑
8. If yes in seven above please give brief details (the owner, distance from the Proposed drilling site).....N/A.....
   .....
9. Do you have any objection to the proposed borehole drilling?
   Yes ☐ No ☑
   If yes state the reason(s).....
   .....
   .....

KANYONGO PRI. SCHOOL
P.O. BOX 1450
MACHAKOS.

SIGNATURE/STAMP:.....**DATE**..22.10.13.....
ID NO:...10560875.....
TEL/CELL NO:....0702896941.....

Thank you for participating in protecting our environment.

ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNARE

PROPOSEDBOREHOLEDRILLINGAT..KANYONGO VILLAGE - KALANZA

ENVIROMENTAL IMPACT ASSESSMENT QUESTIONNARE:

The proponent..KANYONGO PR. SCHOOL..... Intends to drill one production borehole at a parcel of Land LR no:.....in KANYONGOarea MACHAKOS...district. For the purpose of DOMESTIC USE.....In efforts towards ensuring safe sustainable environment, National Environmental Management Authority (NEMA) works in consultation with all stake holders. Your views are crucial to enable NEMA to make an informed decision in either approving and/or recommending remedial measures in development of the project.

Kindly fill in the following questionnaire;

1. Name....F.W- MUTUNGA
2. Position.....Principal - Kanyongo Sec. school
3. Are you aware of the proposed bore hole drilling project?

   Yes ☑ NO ☐
4. Are you familiar with activities involved in bore hole drilling?

   Yes ☑ NO ☐.
5. If Yes in 4 above, do you expect any interference to your premises as a result of implementation of the proposed bore hole drilling?

   Yes ☐ NO ☑
6. If yes, briefly explain.....
   .....N/A.....
   .....
   .....
7. Are you aware of any similar project (bore hole) in the neighbouring premises?

   Yes ☐. No ☑
8. If yes in seven above please give brief details (the owner, distance from the Proposed drilling site).....N/A.....
   .....
9. Do you have any objection to the proposed borehole drilling?

   Yes ☐ No ☑

   If yes state the reason(s).....N/A.....
   .....
   .....

SIGNATURE/STAMP:.....
ID NO:.....3462314.....
TEL/CELL NO:.....0722306226.....

P.C. KANYONGO SECONDARY SCHOOL 22 OCT 2013 P.O. Box 1450-90100, MACHAKOS

Thank you for participating in protecting our environment.

ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNARE

PROPOSED WELL DRILLING AT. KANYONGO VILLAGE - KAKAMA

ENVIROMENTAL IMPACT ASSESSMENT QUESTIONNARE:

The proponent..KANYONGO PR. SCHOOL.. Intends to drill one production well at a parcel of Land LR no:.....in KANYONGO....area MACHAKOS district. For the purpose of .DOMESTIC.....USE...In efforts towards ensuring safe sustainable environment, National Environmental Management Authority (NEMA) works in consultation with all stake holders. Your views are crucial to enable NEMA to make an informed decision in either approving and/or recommending remedial measures in development of the project.

Kindly fill in the following questionnaire;

1. Name....SAMMY NDETO
2. Position.....Chairperson Kanyongo Market
3. Are you aware of the proposed well drilling project?
   Yes ☑ NO ☐
4. Are you familiar with activities involved in well drilling?
   Yes ☑ NO ☐.
5. If Yes in 4 above, do you expect any interference to your premises as a result of implementation of the proposed well drilling?
   Yes ☐ NO ☑
6. If yes, briefly explain.....
   .....
   .....
   .....
7. Are you aware of any similar project (well) in the neighbouring premises?
   Yes ☐. No ☑
8. If yes in seven above please give brief details (the owner, distance from the Proposed drilling site).....
   .....
9. Do you have any objection to the proposed well drilling?
   Yes ☐ No ☑
   If yes state the reason(s).....
   .....
   .....

SIGNATURE/STAMP:.....
ID NO:.....9851739.....
TEL/CELL NO:.....0721950202.....

Thank you for participating in protecting our environment.

ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNARE

PROPOSEDBOREHOLEDRILLINGAT. KANYONGA VILLAGE - KALAMA

ENVIROMENTAL IMPACT ASSESSMENT QUESTIONNARE:

The proponent KANYONGA P. SCHOOL Intends to drill one production borehole at a parcel of Land LR no:.....in KANYONGA area MACHAKOS district. For the purpose of DOMESTIC USE In efforts towards ensuring safe sustainable environment, National Environmental Management Authority (NEMA) works in consultation with all stake holders. Your views are crucial to enable NEMA to make an informed decision in either approving and/or recommending remedial measures in development of the project.

Kindly fill in the following questionnaire;

1. Name JOSEPH Mutuku Musau
2. Position Head Man - Kanyonga Village
3. Are you aware of the proposed bore hole drilling project?

   Yes ☑ NO ☐
4. Are you familiar with activities involved in bore hole drilling?

   Yes ☑ NO ☐.
5. If Yes in 4 above, do you expect any interference to your premises as a result of implementation of the proposed bore hole drilling?

   Yes ☑ NO ☐
6. If yes, briefly explain..... I will offer My Land Fully Freely
7. Are you aware of any similar project (bore hole) in the neighbouring premises?

   Yes ☐. No ☑
8. If yes in seven above please give brief details (the owner, distance from the Proposed drilling site).....
9. Do you have any objection to the proposed borehole drilling?

   Yes ☑ No ☑

   If yes state the reason(s).....

SIGNATURE/STAMP: .....
ID NO: 5014755
TEL/CELL NO: 0725644977

Thank you for participating in protecting our environment.