



LAKEVICTORIA NORTH WATER SERVICES BOARD
WATER AND SANITATION SERVICES
IMPROVEMENT PROJECT-ADDITIONAL FINANCING
(WaSSIP-AF)

PROJECT CREDIT NO: 51030 - KE



PROPOSED REHABILITATION OF KWANZA WATER SUPPLY
SCHEME

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

PROJECT REPORT

Client:
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JANUARY 2016
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CERTIFICATION

This ESIA project report has been prepared in accordance with Environmental Management and Coordination Act (EMCA) 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003 for the proposed rehabilitation of Kwanza water supply scheme.

I, the undersigned ESIA Consultant, confirm that the contents of this report are a true representation of the proposed development.

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4th February 2016

TITLE OF PROJECT

Rehabilitation of Kwanza Water Supply Schemes

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ABBREVIATIONS

LVNWSB	Lake Victoria North Water Service Board
WaSSIP	Water and Sanitation Improvement Programmes
IDA	International Development Association
WaSSIP-AF	Water and Sanitation Improvement Programmes Additional Financing
EIA	Environmental Impact Assessment
ESMP	Environmental and Social Management Plan
RAP	Resettlement Action Plan
ESIA	Environmental and Social Impact Assessment
EMCA	Environmental Management and Co-Ordination Act
NEMA	National Environmental Management Authority
WRMA	Water Resources Management Authority
PBT	Pressure Breaking Tank
NEAP	National Environment Action Plan
MDGs	Millennium Development Goals
WASREB	Water Service Regulatory Board
WSTF	Water Service Trust Fund
WSBs	Water Service Boards
EMP	Environmental Management Plan
SESA	Strategic Environmental and Social Assessment
ESMF	Environmental and Social Management Framework
ECDE	Early Childhood Development Education
GER	Gross Enrolment Rate
CBR	Crude Birth Rate
CDR	Crude Death Rate
T.B	Tuberculosis
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IDP	Internally Displaced Person
STI	Sexually Transmitted Infection
STD	Sexually Transmitted Disease
EA	Environmental Audits

EXECUTIVE SUMMARY

1 Introduction

Kenya's people and the economy are highly vulnerable to erratic climatic patterns and limited water availability due to their reliance on key sectors (agriculture, tourism, hydro-energy, etc.) that depend on rainfall and water availability. The country has limited freshwater endowments and is classified as a chronically 'water scarce' country in absolute and relative terms. It faces the additional challenge of high inter-annual and intra-annual rainfall variability. Climate variability and hydro-climatic shocks (droughts and floods) impact disproportionately on the poor, and climate change is projected to exacerbate existing climate risks and water resource constraints. Kenya has yet to adequately manage its highly variable hydrology to improve climate resilience, as evidenced in decades-long underinvestment in water infrastructure. The Government of the Republic of Kenya (GoK) has mainstreamed its National Water Policy to envisage 100% access to safe water for the Country's population by 2030. To achieve this target, the GoK has been implementing a far reaching sector reform program since 2002 aimed at harmonizing the Management of Water Resources and Water Supply and Sanitation (WSS) throughout the country. This reform has been propelled by the Water Act (2002), which aims at harmonizing the Management of Water Resources and Water Supply and Sanitation Services. The World Bank has been supporting the GoK in its Water Sector Reforms through financing of programmes towards improvement of Water and Sanitation Services in the country. In this regard, the (GoK) and World Bank, through the International Development Association (IDA), have agreed on the implementation of the Water and Sanitation Services Improvement Project –Additional Funding (WaSSIP - AF).

This Project aims at supporting the Water Sector Reforms effort by achieving the following three objectives namely:

- (i) Increase access to reliable, affordable and sustainable Water Supply and Sanitation Services.
- (ii) Improve the Water and Wastewater Services.
- (iii) Institutional Strengthening and capacity building of Water Service Providers.

One of the activities identified is the rehabilitation and augmentation of Kwanza Water Supply Scheme within the Lake Victoria North Water Services Board (LVNWSB) area of jurisdiction.

LVNWSB has undertaken Detailed Designs and prepared Tender Documents and Drawings for the works. LVNWSB is in the process of procuring a contractor for the Implementation of these works. The present Water Services in Kwanza and Kolongolo Wards in TransNzoia County are under extreme pressures due to the high population increase, development and growth over the last decade. In addition, sections of the systems are either dilapidated or require urgent rehabilitation due to normal wear, tear and age. The problems are at times compounded by interference with the existing infrastructure such as damage to appurtenances etc. The suppressed water supply in some areas affects the wellbeing and living standards of the population in these areas

2 Project background and scope of rehabilitation works

The water supply is located in Kwanza sub- County of Trans Nzoia County. It is located about 20km North-West of Kitale town. The present water supply consists of 2 different raw water diesel pumping systems each from Asega and Nge'ng'e dams. The water supply networks cover the markets of Kwanza, Sitikho, Kolongolo, Luuya and Keiyo. The water supply is presently out of operation due to high cost and breakdown of project components. The water supply is under the management of the Kwanza Sub County Water Officer. The supply area has a population of approximately 9,000 people. The proposed rehabilitation/augmentation measures for the scheme include but are not limited to:-

- Rehabilitation of the existing Asega Dam Intake area, including construction of intake chamber;
- Laying of 4,424m long DN 200mm raw water rising main to the proposed Kwanza T/works;
- Construction of water treatment works composed of; stilling well, flocculation channel, sedimentation tank, rapid sand filters, chlorination tank, elevated backwash system, staff house, pump house, chemical store, and office block, fence and gate;
- Supply and installation of 1no. Pump set (backwash pump) & Control panels, and electrical installations in the buildings;
- Laying of 8,637m long gravity distribution line to Kolongolo;
- Laying of 6,085m long gravity distribution line to Luuya;
- Laying of a total of 7,637m long gravity distribution line to Umoja and Kobos;
- Laying of an outlet main to Kwanza town; and
- Minor rehabilitations of the existing storage tanks in the area.

The approximate costs for the proposed works based on the final detailed designs is **KES. 94,007,696** and a construction period of about 12 months.

3 The Environmental and Social Impact Assessment (ESIA) study

The goal of this ESIA study was to identify impacts resulting from the proposed project to the environment and social setting. The impacts were determined on the basis of the baseline conditions established during the fieldwork and information obtained from the documents reviewed as well as interviews of the stakeholders. For subjective predictions of the impacts, the site area was subjected to environmental scoping process. This was a process of evaluating the overall magnitude of the project and the significance of the anticipated impacts and possibilities of handling the same. Detailed evaluation of the project area was undertaken such as to focus on any significant environmental and social issues as established during the scoping process. This scoping report was designed to provide a preliminary view of the environmental and social status. The report presents the overall project concepts, anticipated magnitude, key stakeholders and the implementation plan outline. It also involved establishment of the diversity on the physical environment, climatic conditions, demographic trends as well as the hydro-geological status in the area. Relevant policy and legal requirements were also listed. The study team strived to share experiences on water resources and social issues in that the part of the country where the project is located and in particular with regard to water demand and utilization. The Environmental Impact Assessment findings presented in this report provides a critical examination of issues considered important in fulfilling the requirements of a clean, sustainable and healthy environment especially in a project that would involve re-locations.

4 Legal Framework

Laws and regulations pertinent to the various aspects and activities of the proposed Rehabilitation of Kwanza Water Supply Project include the following among others:

- Environment and development policy (Sessional Paper No.6 of 1999)
- The National Environmental Action Plan (NEAP)
- The National Poverty Eradication Plan (NPEP) and the Poverty Reduction Strategy Paper (PRSP)
- The water Act of 2002
- Water Rules 2002
- Environment Management and Coordination Act, 1999
- Environmental Impact Assessment and audit regulations 2003
- The Land Registration Act 2012
- The Surveys Act
- The Public Health Act
- World Bank Guidelines
- The Water Sector Regulations

5 Approach and Methodology

The study assessed and quantified the potential impacts, both positive and negative of the proposed project. The baseline information collected was used to analyze the potential impacts of the proposed project. The EIA study team embarked on various methodologies such as field visits, literature review, consultations with the affected public and stakeholders, among others. In order to generate adequate baseline information that served as a benchmark for analyzing. Potential impacts and generating an Environmental Management Plan (EMP); the fieldwork was extensive and included several activities: A reconnaissance visit was made to the project area by the EIA team which helped the team to set out key areas of observation during the study. This was then followed by field visits to the project area and the neighbourhood, taking records of observations as well as interviewing community members. The Water Act 2002, Environmental Management and Coordination Act (EMCA) 1999 and other relevant statutes that have direct significance to the proposed project were reviewed. Other reports and reference materials on physical and biological data on the study area were also studied including the Detailed Design Report on the project. Questionnaires were administered to the community members in an attempt to get detailed individual views about the proposed project and data on the socio- economic landscape of the study area. The collected data was analysed using SPSS computer package and the data interpreted forming the basis of the findings reported.

6 Public Consultation

Public participation was mainly achieved through direct interviews, observations, questionnaire administration, holding stakeholder and public meetings. Those consulted included the relevant Government Ministries (both at National & County levels); opinion leaders within the community; local politicians; local officials of the County Commissioner's office consisting of the Assistant County Commissioners, Area chiefs and their Assistants as well as the Ward Administrators at the County level. Other people interviewed included representatives from the National Environmental Management Authority (NEMA) and Water Resources Management Authority (WRMA).

7 Study findings

The findings are that:

- 93 % of the respondents Community members are aware and sensitized about the proposed project.
- Most respondents indicated that they supported the project. The project has wide political goodwill and public support. There is strong felt community ownership of the proposed project.
- The household survey respondents perceived environmental and social impacts by the project as positive with generally 91% of the respondents believing that the project will have positive social-economical and environmental impact.
- The project **DOES NOT** pose any serious environmental concern, other than those of minor scale that accompany most development activities.

8 Potential impacts

Potential Positive Impacts

The positive impacts associated with the proposed project include:

- Improved accessibility to clean water quality that will reduce potential risks of water borne diseases, improved general hygiene in the area and encourage use of sanitation at household levels,
- Poverty reduction and improvement of livelihoods for the local residents resulting from increased incomes realized from adequate water supply.
- Improved revenue for the local Water Provider.
- Construction materials and other goods for project implementation purposes will be sourced from local suppliers thus creating a ready market leading to general economic growth.
- Provision of employment opportunities during both construction and operation phases of the project.
- Increased value of land in the project area.
- Improved infrastructural services within the project area opening it up for development opportunities.

Potential Negative Impacts associated with the Proposed Project

The negative impacts identified which need to be mitigated appropriately include:

- Increase in incidences of anti-social behavior due to the influx of workers from various locations.
- Construction yards and labor camps are likely to give rise to poor sanitation and improper disposal of human and solid waste is not well managed. In addition, noise generation and noxious gas emissions are likely to be emitted which will have adverse effect on the health of the population living in the neighboring area.
- The silt, in the river water will be conveyed into the dam, therefore reducing the capacity of storage. Soil erosion preference will be high due to the nature of the soil texture and poor natural land cover.
- Abstraction of more water from the Asega Dam might reduce flow level downstream due to ineffective downstream water compensation.
- Supply of more water to the consumers will consequently generate waste water which will cause health hazards due to lack of a sewerage system.
- Disruption of people and economical activities along the pipeline corridors and tank sites due to construction activities and during the operations of the project.

Potential Mitigation Measures

- Avoid construction camps minimize anti- social behaviours by employing locals as much as is practical.
- Compliance to the provisions of the EHS management plan to safeguard workers
- Promote collection and storage of wastes during construction and operation in accordance with the management plan
- Erosion control through conservation agriculture
- Construction of a sewerage disposal and treatment plant.

9 Conclusions and recommendations

Conclusions

In conclusion, the study recommends timely implementation of the project with strict adherence to the proposed Environmental and Social Management Plans. The mitigation measures proposed for every impact will adequately ensure that the environment and health of the operators are safeguarded, such that the overall benefits from the project will greatly outweigh the adverse impacts. Generally the proposed water supply development project will result in considerable benefits to the people in the project area and bring opportunities for development in Kwanza & Kolongolo Wards of Trans Nzoia County.

Recommendations

The proposed project is a viable venture that should be given due support, considering that there will be minimal negative impacts to the environment, and its potential to contribute to improved economic status of the area residents who will benefit from it. It is recommended that the proposed project be implemented in compliance with the relevant legislation and planning requirements during and after the implementation of the project. Clear environmental and social management plans have been developed. The proponent should ensure the implementation of the action of mitigation guidelines provided in the EMP in collaboration with the Contractor. This will ensure the safety of operators and the neighbouring communities.

10 Output

The output of the study is the production of this EIA Study Report with recommendations for submission to NEMA for purposes of seeking an EIA license.

1.0 INTRODUCTION

1.1 General

The Government of the Republic of Kenya (GoK) has mainstreamed its National Water Policy to envisage 100% access to safe water for the Country's population by 2030. To achieve this target, the GoK has been implementing a far reaching sector reform program since 2002 aimed at harmonizing the Management of Water Resources and Water Supply and Sanitation (WSS) throughout the country. This reform has been propelled by the Water Act (2002), which aims at harmonizing the Management of Water Resources and Water Supply and Sanitation Services. The World Bank has been supporting the GoK in its Water Sector Reforms through financing of programmes towards improvement of Water and Sanitation Services in the country. In this regard, the (GoK) and World Bank, through the International Development Association (IDA), have agreed on the implementation of the Water and Sanitation Services Improvement Project –Additional Funding (WaSSIP - AF). This Project aims at supporting the Water Sector Reforms effort by achieving the following three objectives namely:

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1.2 Project background

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The approximate costs for the proposed works based on the final detailed designs is **KES. 94,007,696** with a construction period of about 12 months

1.3 ESIA Study

1.3.1 Purpose of study

Environmental and Social Impact Assessment (EIA) is a methodology used to identify the actual and probable impacts of projects, plans, strategies and program on the environment and to recommend alternatives and appropriate mitigation measures. The assessment is required at all stages of project development with a view to ensuring environmentally sustainable development for both existing and proposed public and private sector development ventures. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. ESIA assesses the impacts of a proposed project before commencement of implementation. ESIA serves the following purposes:

- Integration of environmental issues into planning and decision making processes.
- Anticipation, minimization and mitigation of environmental damage and recommendation of alternatives.
- Public participation in decision making and environmental conservation.

1.3.2 Objective of the study

The main objective of the ESIA study for the proposed rehabilitation of Kwanza Water Supply Schemes is to prepare an Environmental and Social Impact Assessment (ESIA) documenting the present condition of the environment (bio-physical and socio-economic) and identifying the positive and negative impacts that may result from the design and construction of the project and in so doing, to address the necessary environmental mitigation and monitoring measures in an Environmental and Social Management Plan (ESMP).

The specific objectives of the ESIA study are:

- To review the existing environmental and social situation;
- To critically examine the possible impacts of the project on the natural and social environment and its surroundings;
- To propose and document mitigation measures of these impacts, to minimise the negative impacts while optimizing on the positive ones;
- To evaluate alternatives for the project design;
- To identify and evaluate economic and social benefits to the community;
- To provide for participation by the relevant stakeholders in the development process in order to make an informed decision;
- To produce a detailed report for submission to NEMA for approval and licensing of the project.

1.3.3 Scope of the Study

Environmental and Social Impact Assessment included:

- The analysis of the socio-economic and socio-environmental status of the affected areas during pre and post construction and thus justify development of the project.
- Assessment of the capacity to implement the proposed mitigation measures, and making appropriate recommendations, including potential capacity building and training needs and their costs.
- Based on the Environmental baseline survey, preparation of an Environmental and Social Management Plan (ESMP) that outlines:

- a) Potential environmental and social impacts resulting from the activity;
- b.) Proposed mitigation measures;
- c.) Reviewing of Institutional arrangements, training requirement and responsibilities for monitoring implementation of the mitigation measures and monitoring indicators;
- d.) Proposed work program, budget estimates, schedules, staffing and other necessary support services to implement the mitigation measures;
- e) Prediction of the impacts upon communities and individuals and prepare a Resettlement Framework and/or Resettlement Action Plan if land acquisition is found necessary;
- f) Evaluation of the Social Impact and show how the Communities in the area will benefit or lose upon implementation of the project;
- g) Based on the information collected from the Social Economic Baseline Survey, the Consultant showed how the identified adverse effects will be mitigated.
- h) Maintain a record of public consultation and other records that will indicate: surveys used to seek views of affected stakeholders; date and location of consultation meetings; a list of attendees and contact addresses.

1.3.4 Policy, Legal and Administrative Framework

This EIA report for proposed Rehabilitation of Kwanza Water Supply Project falls under Section 58 (1) of EMCA 1999 and EIA/EA Regulations 2003, which require the proponent of a project to submit a project report to NEMA in the prescribed form giving the necessary information before the commencement of the project. The main policies & legal framework that have guided the preparation of this study report include:

a) The Environmental Management and Coordination Act (1999)

The Environmental Management and Coordination Act (1999), requires that all projects listed in the second schedule of the Act must undergo Environmental Impact Assessment (EIA) and Environmental Audit and reports submitted to the National Environmental Management Authority (NEMA) for approval. The proposed rehabilitation and augmentation of Kwanza Water Supply fall under this category and thus the requirement for the study.

b) World Bank Operational Policy (OP) 4.01 on Environmental Assessment

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

c) Environment and Social Management Framework – (WaSSIP –AF ESMF)

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

1.3.5 Target group for the ESIA Report

This Environmental and Social Impact Assessment Report has been prepared for use by different stakeholders to be involved in the project, both at national and county level. The report contains useful information on policies and procedures to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various stages of the project activities. The information will be useful in planning, implementation, management and maintenance of the facility and buildings. In this regard, the report will be useful to the following stakeholders:

- Trans Nzoia County Government;
- Lake Victoria North Water Services Board;
- Local Water & Sanitation Company
- The NEMA monitoring and compliance section;
- World Bank;
- Contractors engaged in the construction works for the project;
- The project affected persons (PAPS) living within the project area;
- Beneficiaries of the project both at local and regional levels

1.4 Study methodology

The approach to this exercise was structured such as to cover the requirements under the Environmental Management and Coordination Act (EMCA), 1999, as well as the EIA regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003. The study involved understanding of the project background, the designs, interaction of the project with the other environmental and social-economic concerns within the project area. Scoping process involved the identification of significant environmental and social issues associated with the proposed improvement works for Kwanza Water Supply Project. Baseline information formed the basis of determining the degree and magnitude of impacts since they gave the conditions of the environment in terms of resources and impacts before the implementation of the project and associated infrastructure. This information will be critical in project monitoring and also brought into focus the level of the accuracy of the prediction of the specific impacts on the project.

1.4.1 Data Collection Tools

The study was conducted using the following broad methodologies:

- Desktop Studies
- Surveys and Field Observations
- Household Survey
- Key Informant Interviews
- Public Participation and Consultations

1.4.2 Desktop Studies

Desktop studies and reviews of existing project documentation related to all infrastructural facilities and designs were carried out.

The reports include the following:

- The Trans Nzoia County Integrated Development Plan (2014)
- The Final Design Report (Rehabilitation of Kwanza/Kolongolo Water Supply Project)

1.4.3 Surveys and Field Observations

Surveys were carried out to identify and assess various sectors such as hydrology, climate, soils, topography, agriculture, agro-economy and socio-economics of the area. Direct observations of the project site and its environs were also engaged to document the land use and settlement patterns, area terrain, infrastructural patterns and other relevant information regarding the proposed expansion of the project. Baseline information was obtained through physical investigation of the site and the surrounding areas including the sites proposed for rehabilitation of water intake, treatment plants, storage tanks and conveyance pipelines.

In particular, the following issues, among others were accorded special attention:

- Existing physical infrastructures within the project area;
- Existing water supply infrastructure;
- Existing land uses within the project vicinity;
- Settlement trends.

1.4.4 Household Survey

The household survey used a conventional questionnaire and face to face approach to gather data from households. The following data collection methods were employed: Interviews with a sample of surrounding community through circulated questionnaire, photography and most important discussions with the client and the ESIA Consultancy team.

1.4.5 Key Informant Interviews

Interviews and discussions with stakeholders and project beneficiaries were applied in the determining the aspects such as adequacy of water supply, awareness and ownership, willingness to pay for water and general opinions of the people. Significant issues identified through this process were applied in drawing up the impacts as well as the management plan. Introductory meetings with government agencies and local administration as well as one on one interviews in the project area were undertaken to assist in analysis of impacts to the community in the project area. These interviews were conducted to augment and confirm data and information on the proposed development of the scheme this includes but not limited to:

- Waste disposal method,
- Public health and safety during construction and operation phases,
- River regime,
- Sedimentation (soil erosion),
- Ecological issues,
- Imbalance emanating from the project,
- Pollution,
- Environmental conditions,
- Economic advantages.

1.4.6 Public Participation and Consultations

Public consultative meetings Chaired by the County Assistant Commissioner were held in the project area on 30th November, 1st & 2nd December 2015. These meetings were centered on key issues relating to the project development in order to provide the local community with understanding and involvement in all stages of the project development. This will ensure sustainability and acceptability of the project and help clear conflicts that may arise. The meetings also assisted in the analysis of impacts to the community in the project area.

1.4.7 Data Analysis

The information and data collected were analyzed to establish the project's potential impacts on hydrology, physical environment, local ecology, socio-economic environment, public health and the health and safety during the construction and operation phase of the project. Data on economic, socio-cultural and socio-economic impacts on the local community e.g. sources of income to the people and effects on the community values. Views from the public and personal observation made by the team of ESIA were weighed and harmonized to establish the possible impacts of the project on the community and environment at large.

1.5 Structure of the ESIA Report

This report has been prepared under the following chapters:

Executive summary

This chapter presents a summary of the significant findings and recommended actions, with an emphasis on expected impacts.

1 Introduction

This chapter gives description of the project background, location, purpose, objectives, NEMA reporting requirements, study methodology and the structure of the report.

2 Project Description

This chapter gives a description of the present status of the project and proposed rehabilitation works.

3 Policy, Legal and Administrative Framework

This chapter gives description of the relevant policy, legal and administrative framework that need to be considered in the preparation of the report.

4 Relevant World Bank Policies

This Chapter outlines the World Bank guidelines provides on EIA requirements on Bank funded projects. It also addresses environmental monitoring and management issues and identifies typical mitigation measures.

5 Implementation Arrangements

This chapter outlines the requirements for the establishment of an effective and functional institutional arrangement for the purpose of implementing the EMP & RAP measures as recommended.

6 Physical and Environmental conditions

This chapter describes the physical and environmental conditions of the project area such as climate, geology, vegetation, land use and other natural conditions.

7 Social Economic Status of the Project Area

This chapter gives a description of the social economic conditions of the project area such as human population, economic activities & social environment.

8 Consultations and Public Participation

This chapter gives description of the objectives, methods used and summary of results of the public consultation activities undertaken during the ESIA.

9 Anticipated Impacts & Mitigation Measures

This chapter presents the analysis of beneficial and adverse impacts of the project on the biophysical and human (social, cultural and economic) environments.

10 Analysis of Alternatives

This chapter seeks to identify project alternatives that can help achieve the desired objectives of the proposed rehabilitation of Kapenguria/Makutano water supply project while at the same time causing minimal damage to the environment and the natural resource base.

11 Environmental Impact & Social Management Plan

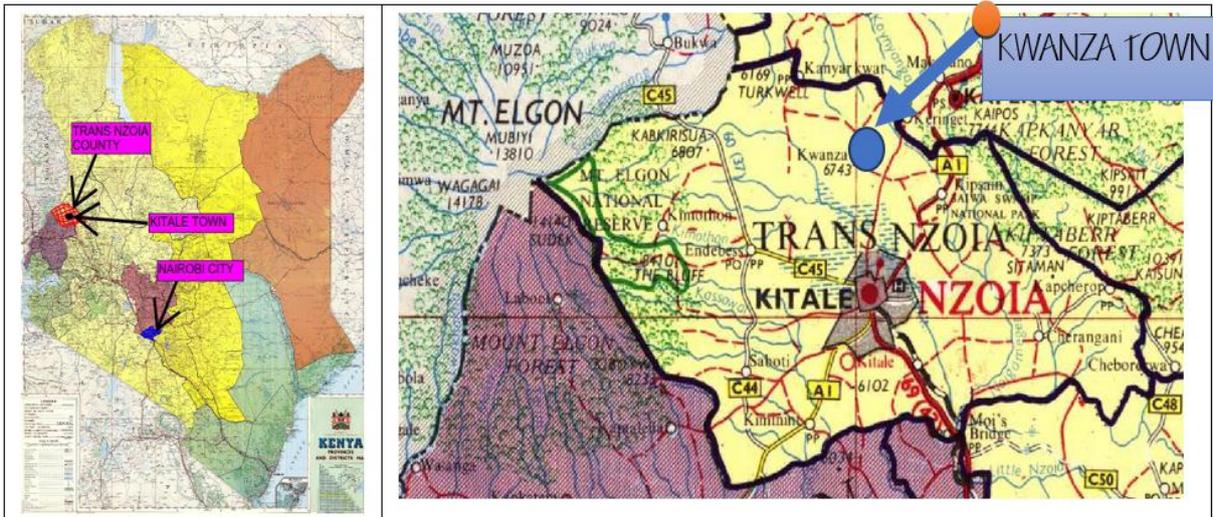
This chapter presents the proposed Environmental and Social Management and Monitoring Plan prepared for the project. Also included is the management of waste.

12 Grievance Mechanism for affected communities

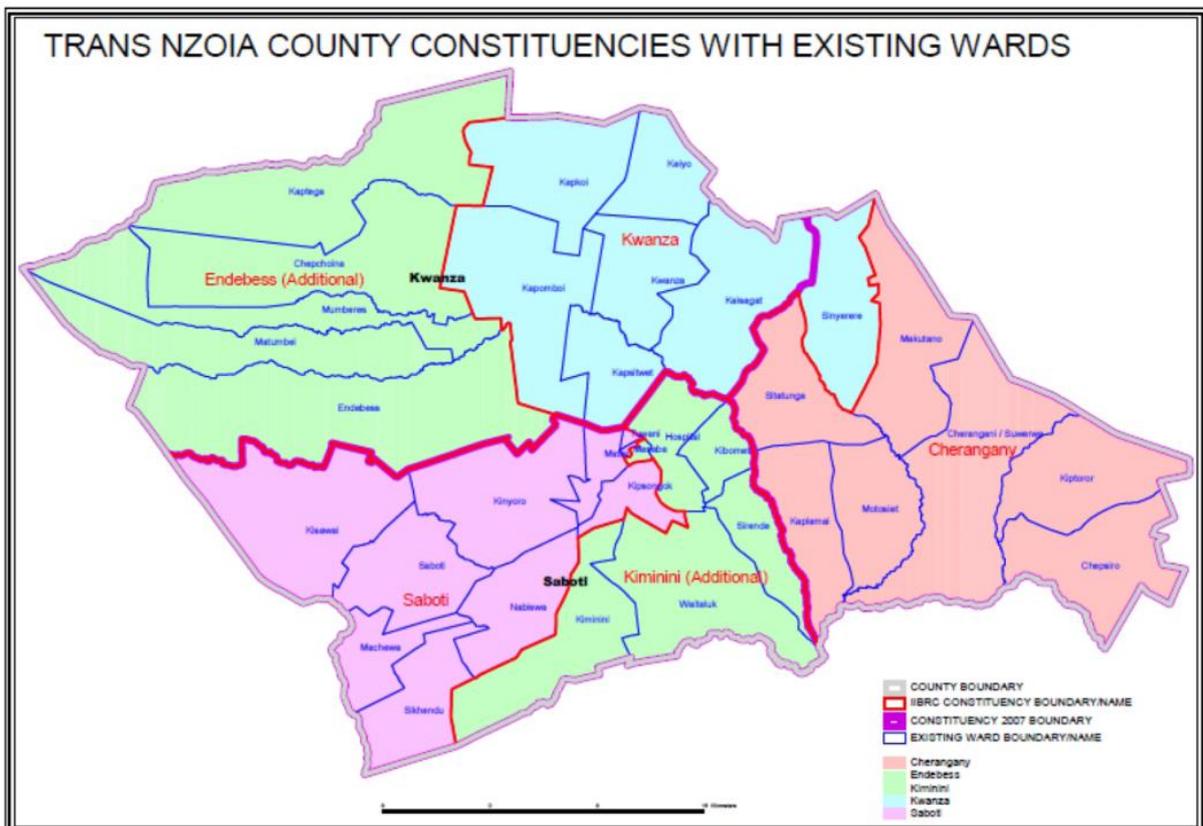
This Chapter provides procedures of addressing grievances from the affected communities arising from the implementation of ESIA/RAP

13 Recommendations & Conclusions

The conclusion briefly presents the environmental and social acceptability of the project, taking into account the impacts, measures and recommendations identified during the assessment process.



Project area map



2.2 Description of the existing water supply facilities

Kwanza and Kolongolo Trading Centres in Trans Nzoia County are currently served by a Water Supply Scheme that was constructed and commissioned between 1979 and 1985 and involved two separate intakes. The two intakes are:

- 7,190 m³ capacity Ng'eng'e dam
- 38,000 m³ capacity Asega dam

When the Scheme was operational, both intake systems used diesel-driven water pumps, where Ng'eng'e pumpsets lifted raw water to the highest location at Kwanza Centre which also acts as the central distribution point (without treatment), while Asega intake system pumped water to the Lunyu tank from where raw water was distributed to various outlets. However, due to aging of the infrastructure past its shelf life, population growth and siltation of the dams, the system has literally collapsed and no longer operates to serve the population. The Ng'eng'e scheme only serves Kwanza Boys High School who have taken over its management. As a result there

is an acute shortage of water supply in Kwanza & Kolongolo wards that has necessitated the rehabilitation and expansion of the existing water supply scheme. The estimated Supply area is 187.1 km² with a human population of 62,946 people and 12,079 households with a population density of 336 persons/km² and consisting about 7.7% of Trans Nzoia County. The proposed Kwanza Water Supply Rehabilitation Project will supply Kobos, Kolongolo, Kwanza and Keiyo sub-locations within Kwanza constituency. The project area is about 187.1 km². The study area in focus registered a total of 62,946 people in the 2009 census data, according to Trans Nzoia County Interim Development Plan (CIDP). The same body (CIDP), estimates population growth rate at 3.7%; and a poverty index of 60% for this project area. The base year (2009) population data was projected to the initial year (2015), future year (2025) and the ultimate year (2035) population using a geometric population formula, compounding the results at every stage. The livestock, health centers, and schools data was also calculated and projected to the ultimate year as guided in the Ministry of Water's Design Manual of 2005. The projections reflected a total daily water demand of 12,036; 6,402.59 and 3,952.36 m³/day in the ultimate, future and initial design years respectively. The estimated overall cost of project implementation for the initial year's demand is **KES. 94,007,696**.

The system can be described as below:

2.2.1 Coverage

The Kwanza water supply scheme presently covers Kwanza market, Lunyu Farm, Kolongolo market, Luuya area and Keiyo where raw water from Asega and Ng'eng'e dams in two different intake systems are pumped to various storage tanks across the region from where water is conveyed via gravity to various outlet points and connections. The Kwanza Water Supply Scheme was designed and constructed in 1985. The scheme covered Kwanza market, Lunyu Farm, Kolongolo market, Luuya Market and Keiyo where raw water from Asega and Ng'eng'e dams were pumped using diesel engines in two different intake systems to the Kwanza Distribution Point where the water were then gravitated (without treatment) to various supply balancing storage tanks and then to outlets placed at strategic locations and institutions around the area.

2.2.2 Ng'eng'e dam water supply intake

At the time of the ESIA study, the Ng'eng'e Intake and Pumping Scheme was partially operational. The scheme is currently operated by Kwanza Boys High School who fuels the diesel engines used to pump raw water to the school premises for consumption. The school carries out the routine operation and maintenance duties of the scheme. They disinfect using chlorine without filtration. Generally the water need to go through conventional treatment before use by humans. This is not the case currently. The dam is silted and hence reduced water capacity; the main storage tank at Kwanza was in a dilapidated state without any proper washout mechanism. The pipeline infrastructure was also in a poor condition with bursts noted along the line. Due to the low output (output potential of 500 m³/day when fully rehabilitated) of the Ng'eng'e Water Supply Scheme and limited funds, this scheme was found un-economical for rehabilitation.

2.2.3 Asega dam water supply Intake

At the time of the ESIA study, the Asega intake and pumping scheme was completely shut down owing to the siltation of the source dam. The Diesel Engine and the Pump Impellers were however observed to be in good condition. The piping network to the storage tank was observed to be unavailable owing to the vandalism by the locals.

2.2.4 Existing pipelines

The existing pipelines laid in the 1980's, before the population build up currently witnessed in the area, passed through private lands which currently serve as active farms. For this reason, it may be hard to access the alignments for rehabilitations and repairs.

2.2.5 Challenges with the existing system

The challenges experienced so far with the water supply scheme are;

- Aged pipe network, pumping system, storage tanks and kiosks have rendered the system in- efficient hence huge losses incurred in pumping costs and unaccounted for water through inefficient pumping system and pipe leakages;
- Running and maintenance of the supply system is a problem as the operations costs are not met by the meagre funds collections from the consumers;
- The consumptions of untreated water have led to numerous cases of waterborne illnesses recorded at the local health institutions in the area. Since the system has outstayed the ultimate design period, the population growth has stretched beyond limit the supply system and hence the inadequate water supply, especially to the institutions in the area.

2.3 Proposed rehabilitation

2.3.1 Asega dam intake & pumping sets

The Asega dam was proposed to serve the entire demand in the Kwanza /Kolongolo water supply scheme owing to its large size and the recent de-siltation exercise that was carried out.

These facilities will be subjected to renovations below:-

- New intake point, complete with screening materials will be constructed;
- New multistage duty pump capable of pumping the computed daily demand, complete with the corresponding powering electric driven motor will be installed;
- The existing pumping system (pump and the motor) will be re-serviced and their functionality assessed so that they act as standby facilities;
- New pipe connections will also be put in place.

2.3.2 Operator's house, pump house, fence line and the access road

The existing Operator's house and pump house at Asega dam intake point were found to be dilapidated and in need of renovation. There are no any sanitary facilities and perimeter fence.

Since these facilities will be subjected to active service, they will be subjected to renovations below:-

- Roof replacements and paintworks will be carried out on the buildings;
- The pump house will have floor (plinths) re-arrangements so as to accommodate mounting of electric motors;
- Three phase electricity connection will be tapped from the transformer at Ng'eny Primary School, approximately 600m away;
- □ 150m fence line and a steel gate, stone pitched pavements will also be constructed;
- □ Gravel standard parking, 70m long gravel standard access road will also be graded.

2.3.3 Water storage facilities

Kwanza storage tanks

The existing masonry walled tanks at Kwanza are two in number of 45 and 30 m³ capacities, the latter being unused due to poor construction standards, and the former having no defined outwash system. The tanks are located at the same location where the treatment works is proposed to be located.

These facilities will be subjected to renovations below:-

- The functional 40 m³ capacity tank (currently utilized by Kwanza Boys High School) will be reserved for the school so that they can continue using it alongside Ng'eny Damscheme for whichever purpose they deem fit.
- The non-functioning 30m³ capacity tank at the same location will be demolished so as to provide space for construction of T/works facilities.

Kolongolo storage tank and water kiosks

The existing masonry walled reservoir at Kolongolo market is 150 m³ and needs rehabilitation so as to be restored to good working condition. The adjacent water kiosk also needs rehabilitation and water connection.

Lunyu storage tank

The existing masonry walled tank at Lunyu farm is 100 m³ capacity and it is in good working condition. The tank used to receive water from Asega dam pumping scheme which is currently defunct. The tank will only need connection to the proposed Kwanza treatment works. Proposed rehabilitation will be to allow for water connection into and out of the tank.

Luuya primary school storage tank

The existing 32m³ capacity masonry walled tank at Luuya primary school tank constructed by the Indagala community development group failed on testing and will therefore require to be demolished and a new one constructed.

Indagala storage tank

The existing 512 m³ capacity masonry walled tank at Indagala market was recently renovated and will only need testing so as to establish whether it is in good working condition. It will then be connected to the inflowing water from the proposed Kwanza treatment works.

Proposed rehabilitation on the Tank: -

- Allow for water connection into and out of the tank;
- Assess structural soundness of the tank (failure assessment) once water has been allowed into the tank;
- Assess safe capacity allowable into the tank.

2.3.4 Pipe network

Asega dam's rising main to Lunyu tank

The rising main from Asega dam to Lunyu tank is composed of 160mm diameter class D (pressure rating of 1.6 MPa) uPVC pipe. However, the pipe which passes through privately owned agricultural fields has been vandalized in most sections by farm machineries. The rising main had several tap-offs.

Proposed activity on the existing pipeline: -

- The pipeline is proposed to act as a return line from Lunyu tank, up to areas which had not been vandalized (approximated to be up to 2 Km from the tank);
- Areas whose pipes could not be traced will be left for the County Government of Trans-Nzoia Water Department to augment in their routine expansion of the water connection exercises. (This is due to a fixed budget which cannot allow for the augmentation of these parts).

Kolongolo pipe

The 100mm diameter uPVC class D gravity main from Kwanza to Kolongolo was laid in the 1980's and was laid alongside the Kwanza Kolongolo road reserve. The pipe which stopped operating in the early 1990's has most of its sections vandalized by the road maintenance machineries and earth movers. At Kolongolo town, houses have been built on the alignment.

Proposed activity on the existing pipeline: -

- This pipeline is proposed to be constructed new.

Indagala distribution network

The distribution network at Keiyo sub location was initiated by the Indagala Community Development Group to serve Milimani Primary School, Muungano Dispensary and Keiyo trading centre.

Proposed activity on the existing pipeline: -

- Since the distribution pipe network are still in good conditions, they will be used for, distribution in the Keiyo, Luuya and Indagala areas.
- The gravity main from Kwanza will be laid new up to Luuya Primary school since the existing size (DN 75mm) from Asega dam could not support the gravity flow.
- The previously laid DN 75mm pipe from Asega Dam (meant to be a rising main at the time) will be used as a return line that will serve Asega intake facilities and their environs.

Gravity main to Umoja

The 63mm uPVC pipe of class C gravity main that serves Umoja trading center was laid in the 1990's by the community members. The pipeline that passed alongside the Kwanza_Umoja road has most of its sections vandalized by the road maintenance and expansion activities and could not be used currently.

Proposed activity on the existing pipeline: -

- The pipe will be constructed new.

2.4 Management of the existing scheme

Currently, the Kwanza /Kolongolo water supply scheme have no structured management framework that would ensure efficient management of the proposed scheme. The existing scheme used to be under the management of the former district water office, which later transferred to the county water ministry.

2.5 Design of the proposed scheme

2.5.1 Outline of the proposed scheme

The proposed scheme is to set to pump water from Asega dam to the central treatment works at Kwanza town (source of water is lower than the intended treatment works location). Since the proposed water treatment works is at the highest location in the study area, water distribution to various outlets will be under the natural gravity. The water will then gravitate to Lunyu tank, outlet at Kolongolo, Kwanza town outlets, Luuya tank, Keiyo outlet, Indagala tank, proposed Meza Primary School tank, and outlets at Kobos and Umoja areas. Pipelines of the scheme are however designed to accommodate up to the future year's demand of the respective area. The existing Asega dam – Lunyu tank pipeline is proposed to act as a return line serving the areas along the alignment a new rising main constructed to link up with the Ng'eng'e line. This is because the existing pipe network have been destroyed in the private farms due to farming activities and might require a lot of replacements and rehabilitations.

2.5.2 Water availability

Detailed hydrological study has been carried out on the inflows to the Asega Dam -the proposed water source. The combined inflows in the streams feeding the Asega dam is estimated at 122,026m³/day for the month of

February which is considered the driest period. The outflow from Asega Dam is estimated at about 38,307 m³/day giving a retention of about 83,319 m³/day in the dam. The proposed project shall abstract only 4,000m³/day which shall be sufficient to meet the current (2017) water demand of about 3,952m³/day. The Asega Dam inflow system has adequate capacity to provide water for the initial demand, maintain storage capacity and allow flows for downstream users. Future water demand (6,402m³/day in 2027) and ultimate demand (12,036 m³/day in 2037) are expected to be met when the proposed Kiptogot gravity water supply is implemented in the near future. Therefore, the proposed rehabilitation/augmentation works shall only address the current water demands.

2.5.3 Water quality

Water quality from the proposed source (Asega Dam) was assessed by the University of Nairobi, Department of Civil and Construction Engineering Water Lab and found to be of treatable standards as per the table below:



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NAIROBI
KENYA

CHEMICAL ANALYSIS FOR WATER SAMPLES

SAMPLE SOURCE & DESCRIPTION: ASEGA DAM - TRAZOIA KWANZA.

SAMPLED BY: CLIENT

CLIENT: ENGINEER ELISHA AKECH.

PARAMETER	RESULT	REMARK
pH	6.42	
APPARENT COLOUR °H	20	
TRUE COLOUR °H	15	
CONDUCTIVITY μS/CM, mg/l	121	
TURBIDITY, F.T.U	3.0	
CALCIUM HARDNESS AS CaCO ₃ , mg/l	18	
TOTAL HARDNESS AS CaCO ₃ , mg/l	44	
TOTAL ALKALINITY AS CaCO ₃ , mg/l	74	
CARBONATE ALKALINITY, mg/l	0	
IRON, mg/l	0.6	
FLUORIDES, mg/l	0.08	
SULPHATES, mg/l	0	
DISSOLVED OXYGEN, p.p.m	3.0	
NITRATES, mg/l	0.8	
NITRITES, mg/l	0	
CHLORIDES, mg/l	42	
TOTAL COLIFORM/100ml	-	
TOTAL FAECAL COLIFORM/100ml	-	
DISSOLVED SOLIDS, mg/l	130	
SUSPENDED SOLIDS, mg/l	30	
TOTAL SOLIDS, mg/l	160	
BIOCHEMICAL OXYGEN DEMAND, mg/l	-	
CHEMICAL OXYGEN DEMAND, mg/l	-	
RESIDUAL CHLORINE, mg/l	-	

GENERAL REMARKS: Soft water which meets the standard for development as a domestic water source.

REMARKS BY: PROF. P.M.A. ODIRA

SIGNATURE:

DATE: 10/4/15

APPROVED BY: DR. S.W. MUMENYA

SIGNATURE:

CHAIRMAN
DEPARTMENT OF CIVIL AND CONSTRUCTION ENGINEERING
UNIVERSITY OF NAIROBI

DATE: 13/4/2015

2.5.3.1 Treatment requirements

From the results, coagulation will be used to eliminate the dissolved solids, flocculation will improve aeration and miscibility of the coagulants and water. Disinfection will be carried out using chlorine; pH adjustment will

not be considered so necessary, however provision for soda ash dosing will be provided so as to be used in case a drop in pH levels (to levels below the recommended range) are recorded in the routine lab tests.

2.5.3.2 Kenyan Water Quality Standards (KS 150 – 1996)

The basic requirements of drinking water are as follows;

- Free from pathogenic (disease causing) organisms.
- Containing no compounds that have an adverse acute or long-term effect on human health.
- Fairly clear (i.e. low turbidity little colour).
- Not saline (salty).
- Containing no compounds that cause an offensive taste or smell.
- No causing corrosion or encrustation of the water supply system not staining clothes washed in it.

Water quality test to be carried out upon completion of project & during operations

After the construction and operationalization of the proposed water treatment works for Kwanza Water Supply Project, the following water quality tests shall be carried out to ensure compliant with the basic quality requirements:

a) Bacteriological quality

Under the Ministry of Water and Irrigation, (2005) Practice Manual for Water Supply, table 3.2, pg A34 the values for raw water coliforms organisms are highlighted as below;

(Number/100 ml)

0-50	Bacterial quality requiring disinfection only
50-5000	Bacterial quality requiring full treatment (coagulation, sedimentation, filtration and disinfection).
5000-50000	Heavy pollution requiring extensive treatment
Greater than 50000	Very heavy pollution unacceptable as source unless no alternative exists. Special treatment needed.

The final treated water should not have any microbiological organism.

b) Aesthetic quality

The approved aesthetic quality of drinking water are as highlighted below;

Substance or Characteristic	Drinking water	Containerized Water
Colour in True colour units (TCU), max.	15	15
Taste and Colour	Shall not be offensive to consumers	Shall not be offensive to consumers
Suspended matter	Nil	Nil
Turbidity in Nephelometric Turbidity Units, max	5	1
Total dissolved solids in mg/l, Max	1,500	1,500
Hardness as CaCO ₃ , mg/l max.	500	500
Aluminum as Al, mg/l	0.1	0.1
Chloride as Cl, mg/l, max.	250	250
Copper as Cu, mg/l max.	0.1	0.1

(Source: Ministry of Water and Irrigation, (2005) Practice Manual for Water Supply)

c) Limits for inorganic contaminants

Substance	Limit of Concentration Mg/l, max.
Arsenic as As	0.05
Cadmium as Cd	0.005
Lead as Pb	0.05
Mercury (total as Hg)	0.001
Selenium as Se	0.01
Chromium as Cr	0.05
Cyanide as CN	0.01
Phenolic substances	0.002
Barium as Ba	1.0
Nitrate as NO ₃	10
Fluoride as F	1.5

(Source: Ministry of Water and Irrigation, (2005) Practice Manual for Water Supply)

d) Limits for organic constituents

Substance	Limit of Concentration Mg/l, max.
Benzene	10
<u>Chlorinated alkanes and Alkenes</u>	
Carbon tetrachloride	3
1,2-Dichloroethylene	10
1,1-Dichloroethylene	0.3
Tetrachloroethylene	10
Trichlorophenol	30
<u>Chlorophenols</u>	
Pentachlorophenol	10
2,4,6 trichlorophenol	10
<u>Polynuclear aromatic hydrocarbon</u>	
Benzo (α) pyrene	0.01
<u>Trihalomethanes</u>	
Chloroform	30
<u>Pesticides</u>	
Aldrin/Dieldrin	0,03
Chlorodane (total)	0.3
2,4 D	100
DDI (total)	1
Heptachlor and Heptachlor	0.1
Eposide	0,01
Hexachlorobenzene	3
Lindane BHC	30
Mehtoxychlor	

(Source: Ministry of Water and Irrigation, (2005) Practice Manual for Water Supply)

2.5.4 Water Intake

The existing intake location at Asega Dam was assessed and found to be suitable for the intake point. The site was 0.6 km away from the nearest 11 kVA transformer at Ng'eny primary school (which can serve the intake pump motors); had a good access road, though the access to the previously acquired intake works plot had pending issues with the plot owner; and the 50 x 50m plot previously acquired for the intake found suitable to house the proposed intake pumps and the caretakers house. The storage dam will be adequate to supply the water demand of the scheme computed to be 3952.36 m³/day. Therefore, Asega Dam will service the entire demand in the Kwanza /Kolongolo water supply scheme.

2.5.5 Pumping system

The pumping head from the intake to the T/works based on the initial year's demand flow rate of 45.7 l/s were calculated as 175m. Hence 1 No. multistage pump; discharge = 164.68 m³/hr; dynamic head = 175m and 1 No. duty motor capable of running the pump of above specifications will be installed. The existing pumping system will be repaired to revert to a standby role.

2.5.6 Rising main pipeline

The pipeline from Asega to the proposed T/Works is proposed to move straight in South West direction, a total of 4,424 m length (along the profile of River Asega). The rising main will however pass through private lands whose wayleave permissions will be sought.

Calculations for the rising main considered initial year's demand of 3,952.36 m³/day (45 l/s), hence pipe of DN size 250mm.

2.5.7 Water Treatment works

The treatment works location was proposed to be at the location where current Kwanza tanks were constructed, approximately 4.4 Km away from the Asega Dam intake. The works are designed to be operated continuously for 24 hours each day at maximum output. The water treatment works output is taken as 3,952.8 m³/day. The main components for the treatment works will comprise:

- Receiving Well
- Flocculation Tanks
- Sedimentation Tanks
- Filters

2.5.8 Water Treatment works office

The proposed Kwanza water supply company will have its offices constructed at the proposed t/works. It will be composed of one office (4 x 4 m), laboratory provision (3 x 4), chemical store (3 x 4 m), pipe fittings store (4 x 3 m), washrooms (4 x 1.2 m) and shower facility (4 x 1.2 m).

2.5.9 Treatment works pump house

Pump house for the backwash water pumps (3m x 3m) will be constructed. This building will also be designed to be as simple as possible to accommodate the limited available funds.

2.5.10 Treatment works fence and gate and staff house

Fencing for the proposed 100 x 100m plot for the treatment works will be implemented. A shade for the gate keeper will also be constructed. 1 Nr class 9 staff house will be constructed at the proposed Kwanza treatment works.

2.5.11 Grey water septic tank and soak away pit

Standard dimensioned septic tank and soak pit for ten users will be constructed at the proposed Kwanza t/works. Spilled chemicals will be channeled directly into the soak away pit.

2.5.12 Storage tanks

Existing storage tanks in the scheme which will be improved will include Lunyu and Indagala tanks. Luuya tank will be demolished and a new one constructed in its place.

Kolongolo tank will not be utilized since the plot housing it was meant for road expansion; while one of the Kwanza tanks will be demolished to pave way for T/works construction. The other Kwanza tank will be renovated (introduction of washout system) for utilization by Kwanza Boys High School.

2.5.13 Distribution gravity mains

The gravity mains were designed to accommodate initial years design capacity for the respective areas.

➤ **Gravity main to Kolongolo /Lunyu tank**

The line to Kolongolo tank will be branched to serve Lunyu tank. The pipe therefore will cater for the initial year's demand at Kolongolo area, estimated at 854.7 m³/day, as well as the demand at Lunyu area estimated at 710 m³/day.

➤ **Gravity main to Indagala and Luuya primary water storage tanks**

The pipeline will follow the same alignment as that of Asega dam raw water rising main, before diverting at Asega dam to follow the road reserve to Luuya primary school.

➤ **Gravity main to Kobos/Umoja center**

This line is proposed to serve Kobos and Umoja trading centers initial year's demand of 717.23m³/day.

2.5.14 Connection to consumers

Due to limited funds available for the project implementation, comprehensive distribution program will not be factored in the scheme improvement agenda. Only those institutions closer to the pipe alignment will be connected in this project. The County Government of Trans Nzoia will be encouraged to allocate budget for distribution of the water from the scheme.

➤ **Water Kiosks**

Various communal water points will be put up within the water distribution system to cater for the consumers who may not have individual connections.

➤ **Learning institutions**

Public learning institutions that will be connected to the supply network are those that will lie closer to the distribution pipes. Main supply pipes will not be interrupted so as to supply the institutions.

As such, public schools and learning institutions to be connected in the scheme will include;

- Friends school Kwanza Boys high school
- Kwanza polytechnic
- Kwanza girls secondary school
- Kwanza primary school
- Kobos Secondary School
- Luuya primary and Secondary Schools

➤ **Health Institutions**

The health institutions factored in the network also are those that lie closer to the distribution pipe networks. The health centers identified included;

- Kwanza district health center
- Kobos dispensary
- Muungano dispensary
- Kolongolo mission health center

2.6 Proposed Project Management Structure

In order to ensure sustainability through individual responsibility and commitments towards water bills payment, the consultant has proposed that the scheme have various communal management structures who will answer to the larger Kwanza water supply office who in turn answer to the county government. The client (LVNWSB) will be liaising with the County Government of Trans Nzoia so as to monitor the progress of the scheme.

2.7 Implementation Cost Estimates

The following are the components to be implemented in the rehabilitation and augmentation of Kwanza water supply scheme;

BILLNO.	DESCRIPTION	AMOUNT(KES)
2	ASEGA DAM INTAKE REHABILITATION WORKS	5,286,500
3	KWANZA RAW WATER RISING MAIN	18,201,490
4(A)	KWANZA TREATMENT WORKS - CHEMICAL MIXING AND DOSING SHADE	693,850
4(B)	KWANZA TREATMENT WORKS - CHEMICAL STORE	443,000
4(C)	KWANZA TREATMENT WORKS - CHEMICAL DOSING CHAMBER & FLOCCULATION CHANNEL	1,305,050
4(D)	KWANZA TREATMENT WORKS - SEDIMENTATION TANK	4,036,600
4(E)	KWANZA TREATMENT WORKS – FILTERS	919,000
4(F)	KWANZA TREATMENT WORKS - CLEAR WATER TANK	2,352,846
4(G)	KWANZA TREATMENT WORKS - BACKWASH PUMPS & PUMP HOUSE	848,000
4(H)	KWANZA TREATMENT WORKS - WATER OFFICE AND LABORATORY	1,330,305
4(I)	KWANZA TREATMENT WORKS - STAFF HOUSE	1,296,805
4(J)	KWANZA TREATMENT WORKS - SITE AND ANCILLARYWORKS	5,251,100
4(K)	KWANZA TREATMENT WORKS - ELECTRICAL WORKS	561,500
5(A)	DISTRIBUTION NETWORK - KOLONGOLO GRAVITY MAIN AND ASSOCIATED WORKS	9,501,750
5(B)	DISTRIBUTION NETWORK - LUUYA GRAVITY MAIN AND ASSOCIATED WORKS	6,865,250
5(C)	DISTRIBUTION NETWORK - UMOJA /KOBOS GRAVITY MAIN AND ASSOCIATED WORKS	4,076,036
6	DAY WORKS	62,600
A	SUB -TOTAL 1-MAIN WORKS	73,506,683
B	Add the sum of 5% of sub-total 1 for contingencies to be expended in whole or in part or deleted as directed by the Engineer	3,675,334
	SUB -TOTAL 2	77,182,017
C	Add 5% of sub-total 2 Variation in Prices in accordance with conditions of contract, Part III, Clause 70	3,859,101
D	SUB -TOTAL 3	81,041,118
E	16% VAT (To be paid directly to KRA)	12,966,579
F	GRAND TOTAL	94,007,696

3 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 GENERAL OVERVIEW

According to the Kenya National Environment Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from industrial, economic and social development programmes that disregarded environmental sustainability. Following this, the establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. The NEAP process recommended environmental assessments in the country with among the key stakeholders being industrialists, business community and local authorities. This culminated into the development of the Policy on Environment and Development under the Sessional Paper No. 6 of 1999. The development of this project is guided and governed by a number of laws, by-laws and policies of Trans Nzoia County. The assessors reviewed the policies, legal and administrative arrangements, and local and international protocols that have a direct bearing on the proposed project, in attempt to establish the frameworks within which the significance of the various impacts anticipated from the proposed development could be evaluated. As would be expected for any water related project, emphasis has been placed on those frameworks and protocols that have a direct bearing on the water industry, which include, among others the Water Act, Environmental Management and Co-Ordination (Water Quality) Regulations, the Agriculture Act, Environment Management and Coordination Act, Environmental Impact Assessment and Audit Regulations, The Registered Land Act, the Public Health Act and Occupational Safety and Health Act (OSHA). These have been considered, and have to a large extent formed the basis for the determination of the significance of the various impacts associated with the proposed project.

3.2 NATIONAL POLICY FRAMEWORK

3.2.1 Vision 2030

The Kenya Vision 2030 recognizes the importance of development infrastructure as critical for socio-economic transformation. The Infrastructure Sector aspires for a country, and the in near future counties, with infrastructural facilities that meet international standards to make Kenya a globally competitive and prosperous country. The strategies and measures to be pursued in the medium term include; supporting the development of infrastructure initiatives around flagship projects, strengthening the institutional framework for infrastructure development, raising the efficiency and quality of infrastructure as well as increasing the pace of infrastructure projects so that they are completed as envisaged, protecting the environment as a national asset and conserving it for the benefit of the future generations and the wider international community. The Kenya Vision 2030 calls for a considerable shift in the manner in which the country deploys her resources to acquire the necessary capacity and access to infrastructure services in their wealth creation.

Relevance/compliance

Provision of safe and adequate water is one of the key infrastructural developments for the realisation of Vision 2030.

3.2.2 Sessional Paper No. 6 of 1999 on Environment and Sustainable Development

The aim of this policy is to harmonize environmental and development goals so as to ensure sustainability. The paper provides comprehensive guidelines and strategies for government action regarding environment and development. The World Commission on Environment and development (The Bruntland Commission 1987) recommends development that produces no lasting damage to the biosphere and to particular ecosystems. Economic sustainable development is that in which progress towards environmental and social sustainability occurs within available financial resources. Similarly, social sustainable development is development that maintains the cohesion of a society and its ability to help its members to work together to achieve common goals while at the same time meeting individual needs of the members. The proposed project has the objective of improving the living standard of the local community through provision of water for both agriculture and domestic use. Sound measures have been put in the design of the project so that its implementation does not negatively affect the environment and the neighbours.

Relevance/compliance

To ensure sustainability, an EIA has been carried out to ensure that the proposed project fits in in the local environmental set up.

3.2.3 Sessional Paper No. 10 of 2014 on the National Environment Policy 2014

The National Environment Policy (NEP) underscores the linkage between the environment and natural resources and the local and national economy, people's livelihoods and the provision of environmental services such as watershed protection and carbon sequestration. It therefore promotes an integrated approach towards the planning and sustainable use and management of Kenya's environment and natural resources so as to ensure better quality of life for Kenya's present and future generations. Specifically, it reiterates the constitutional right

to a clean and healthy environment and imposes on the state the duty to safeguard and enhance the environment. However, it balances this with the right to development but with due consideration for sustainability, resource efficiency and economic, social and environmental needs. In Chapter Five, it deals with emerging issues that require environmental stewardship. This includes infrastructural development, thus recognising that projects such as the proposed rehabilitation of Kwanza Water Supply Project have distinct and unique effects on flora and fauna, social and psychological disruption, vegetation clearance, excavation works and spillages during construction. This thus requires that the proposed project undergoes an Environmental and Social Impact Assessment. In addition, public participation in the planning and approval of the proposed project is mandatory.

Relevance/compliance

The proposed project will be undertaken in compliance to this policy. This ESIA report acts as a first step in fulfilling NEP requirements.

3.2.4 National Policy on Water Resources Management

The National Policy on Water Resources Management and Development (Sessional Paper No. 1 of 1999) was established with an objective to preserve, conserve and protect available water resources and allocate them in a sustainable, rational and economic way. It also desires to supply water of good quality and in sufficient quantities to meet the various water needs while ensuring safe disposal of wastewater and environmental protection. The policy focuses on streamlining provision of water for domestic use, agriculture, livestock development and industrial utilization with a view to realizing the goals of the Millennium Development Goals (MDGs) as well as Vision 2030.

Relevance/compliance

The proponent shall obtain the necessary permits from the Water Resources Management Authority for abstraction of raw water from Asega Dam for the proposed project.

3.2.5 The National Poverty Eradication Plan (NPEP) and Poverty Reduction Strategy Paper (PRSP)

The National Poverty Eradication Plan has the objective of reducing the incidence of poverty in both rural and urban areas by 50% by the year 2015, as well as strengthening the capabilities of the poor and vulnerable groups to earn income. It also aims to narrow gender and geographical disparities and create a healthy, better-educated and more productive population. This plan has been prepared in line with the goals and commitments of the World Summit for Social Development (WSSD) of 1995. The WSSD themes include poverty eradication, reduction of unemployment, and social integration of the disadvantaged people and the creation of an enabling economic political and cultural environment. The project intends to address the contents of this paper by creating opportunities for everybody for economic advancement.

Relevance/compliance

Poverty eradication through employment creation during project implementation and through supply of safe & adequate water is a significant objective of the project.

3.2.6 National Gender and Development Policy

The National Gender and Development Policy provide a framework for advancement of women and an approach that would lead to greater efficiency in resource allocation and utilization to ensure empowerment of women.

The National Policy on Gender and Development is consistent with the Government's efforts of spurring economic growth and thereby reducing poverty and unemployment, by considering the needs and aspirations of all Kenyan men, women, boys and girls across economic, social and cultural lines. The policy is also consistent with the Government's commitment to implementing the National Plan of Action based on the Beijing Platform for Action (PFA). The overall objective of the Gender and Development Policy is to facilitate the mainstreaming of the needs and concerns of men and women in all areas in the development process in the country. The Policy's concerns cover the following critical areas:

- (i) Economy - to enable men and women to have equal access to economic and employment opportunities;
- (ii) Poverty and Sustainable Livelihoods - to remove obstacles to women's access to and control over productive assets, wealth and economic opportunities, shelter, safe drinking water, and promote measures for conserving the environment;
- (iii) Law - to guarantee Kenyan men and women equality before the law, as provided for in the Constitution and under the obligations of the Kenyan State in international law;
- (iv) Political participation and decision making - to enhance gender parity in political participation and decision making;
- (v) Education and Training - to enhance and sustain measures to eliminate gender disparities in access, retention, transition and performance in education for both boys and girls;

(vi) Health and Population - to achieve the highest attainable standard of health for both men and women through addressing gender inequalities pertaining to access and use of basic health services and facilities at an affordable cost;

(vii) The Media - to increase the participation of women in the media and communications sector and promote gender sensitive portrayal of both men and women in the media;

(viii) Policy Implementation Framework and Resource Mobilization- empowering both men and women to be equal partners in development- It focuses on the elimination of existing disparities between the two genders. It also advocates for an affirmative action to address gender disparities.

Relevance/compliance

The proponent will adhere to this Policy by ensuring that there is inclusion of women in the project through employment opportunities and put in place measures to ensure that the project does not exacerbate the poverty situation of women living around the project.

3.3 LEGAL FRAMEWORK

Kenya has approximately 77 statutes that relate to environmental concerns. Most of these statutes are sector specific, covering issues such as public health; soil erosion; protected areas; endangered species; water rights and water quality; air quality, noise and vibration; cultural, historical, scientific and archaeological sites; land use; resettlement; etc. Previously, environmental management activities were implemented through a variety of instruments such as policy statements and sectoral laws, and also through permits and licenses. For example, the Physical Planning Act of 1996 empowers local authorities to request existing facilities to conduct environmental assessments, while under the Local Government Act of 1998; it is an offence to emit smoke, fumes or dust which may be a source of danger, discomfort or annoyance. The key national laws that govern the management of environmental resources in the country are briefly discussed below. It is noteworthy that wherever any of the laws contradict each other, the Environmental Management and Co-ordination Act (EMCA) 1999 prevails.

3.3.1 Constitution of Kenya, 2010

The Constitution of Kenya (CoK) 2010 is the supreme law of the Republic and binds all persons and all State organs at all levels of government. 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. It also includes the rights to have obligations relating to the environment fulfilled as stipulated in article 69 of the Constitution. In order to address such obligations, the state shall:-

- Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources and ensure equitable sharing of the accruing benefits;
- Protect genetic resources and biological diversity;
- Eliminate processes and activities that are likely to endanger the environment, among other obligations in respect of the environment; and
- Establish systems of environmental impact assessment, environmental audit and monitoring of the environment.

In Sections 69 and 70, the Constitution has inter alia identified National Obligations in respect of the environment and Enforcement of Environmental Rights respectively as follows:-

Section 69 (1): The State shall—

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

Section 69(2): Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Section 70 provides for enforcement of environmental rights thus:

(1) If a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same

(2) On application under clause (1), the court may make any order, or give any directions, it considers appropriate as below:

- a) To prevent, stop or discontinue any act or omission that is harmful to the environment;
- b) To compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or
- c) To provide compensation for any victim of a violation of the right to a clean and healthy environment.

(3) For the purposes of this Article, an applicant does not have to demonstrate that any person has incurred loss or suffered injury.

Essentially, the new Constitution has embraced and provided further anchorage to the spirit and letter of EMCA 1999 whose requirements for environmental protection and management have largely informed Sections 69 through to 71 of this document. In Section 72 however, the new constitution allows for enactment of laws towards enforcement of any new provisions of the Supreme Law.

Relevance/compliance

The applicable provisions in constitution are applied during implementation of the project

3.3.2 Environmental Management and Co-ordination Act, 1999 and Environment Management and Coordination (Amendment) Act, 2015

The National Environment Action Plan and its related policy making process resulted into the Sessional Paper No. 6 of 1999 entitled Environment and Development. Its parallel legislative process led to the Environmental Management and Coordination Act (EMCA) No. 8 of 1999. EMCA, 1999 acts as Kenya's first framework environmental law towards the sound management and utilisation of natural resources, as well as providing a focal point for the harmonisation coordination of protection of environmental rights. The 1999 Act, and its 2015 Amendment provides a legal and institutional framework for the protection and conservation of the environment (in line with Article 42 of the constitution), as well as providing the necessary mechanism to monitor that, which include environmental impact assessment, environmental auditing and monitoring as prescribed by Article 69 of the Constitution. The Rehabilitation of Kwanza Water Supply Project will be undertaken in compliance with Section 58.(1) which requires the project proponent to undertake an EIA study in the prescribed form, giving all relevant information pertaining the project and its impacts before the commencement of the project. This is reiterated in the Second Schedule in EMCA Amendment Act 2015, which highlights that water resources development projects should be subjected to an EIA study process. Public participation is required as part of the EIA process. In addition, the proponent (LVNWSB), will submit the report to NEMA, accompanied by the prescribed fee i.e. 0.1 percent of the project cost. Section 60 of EMCA gives power to NEMA to require lead agencies to comment on an EIA Report. Considering the nature of the Project, NEMA may require bodies/agencies such as the Water Resources Management Authority (WRMA) among others to comment on the EIA Report. During construction and operation, and in line with Part VII on environmental audit and monitoring, NEMA is mandated to monitor the progress of the proposed project in conformity to the law and the EIA study report. The project proponent is required to submit annual audit reports to NEMA, describing how far the project conforms in operation with the statements made in this EIA report.

Relevance/compliance

The proposed project cycle should ensure compliance with this statute all the time.

3.3.2.1 EMCA Related Regulations

To provide guidelines on how to actualize EMCA and its amendment, the government has published a host of regulations. These provide specific requirements as related to water, air, waste, biodiversity and noise.

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

These were promulgated as Legal Notice 101 on June 13th 2003. They reiterate EMCA on the need for an environmental impact assessment project report before undertaking any new project and outline mandatory requirements in undertaking an ESIA. They also highlight the minimum content of the report, information to be made available, parties to be consulted and the process to be followed in licensing. In particular, they stipulate that only individual experts or a firm of experts authorized by NEMA, which maintains a register of all experts are authorized to carry out the study. In addition, after the completion of an environmental impact assessment

study report and once the project has commenced, the proponent is required to undertake an environmental audit study. This will be conducted by a qualified and authorized environmental auditor or environmental inspector who shall be an expert or a firm of experts registered with NEMA, and acts as a baseline upon which subsequent environmental control audit studies shall be based. Thereafter, the proponent can undertake annual self-audits or engage an expert. These regulations stipulate how an EIA should be done and specify all the requirements. It highlights stages to be followed, information to be made available, role of every stakeholder and rules to observe during the whole EIA process. The proposed project must be constructed and operated based on these regulations. It should also be maintained and guided by the same regulations and an environmental audit study will be done periodically to monitor compliance with the set environmental standards.

Relevance/compliance

Water projects as an activity is listed on section 4 of the second schedule of the EMCA Act as among projects that require full Environmental Impact Assessments before commencement. The project cannot start before the license is granted, upon conducting the EIA. For this reason, this report has been prepared to provide the legal satisfaction to the requirements of the Act.

b) EMCA (Water Quality) Regulations 2006

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No. 68, Legal Notice No. 120 of September 4 2006 and became effective on July 1 2007. These regulations apply to sustainable water use for a variety of purposes. They protect lakes, rivers, streams, springs, wells and other water sources whereby contravening the regulations is an offence that attracts a fine not exceeding five hundred thousand shillings. Of immediate relevance to the project is Rule 4-6 as well as Rule 24.

- Rule 4 outlaws acts which directly or indirectly, immediate or subsequently cause water pollution.
- Rule 24 prohibits discharge or application of any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants, into water meant for fisheries, wildlife, recreational purposes or any other uses.

Storm water from the project working sites (often because it is contaminated by oil or petroleum products and other wastes) shall be channelled properly to avoid any ground and surface water pollution.

Relevance/compliance

This regulation gives a minimum distance from a water body for which any development may be undertaken. These regulations will apply to the proposed project during the construction and operational phases. The contractor will be required to ensure that all effluent from construction activities is treated in accordance with the above regulations prior to discharge into the environment.

c) EMCA (Waste management) Regulations, 2006

The Waste Management Regulations (2006) are contained in the Kenya Gazette Supplement No. 69, Legal Notice No. 121. These were promulgated on September 4th 2006 and are effective since July 1 2007. They streamline handling, transportation and disposal of various types of waste, with an aim of protecting human health and the environment. The regulations advocate for cleaner production principles, waste reduction, and segregation at source. Since the project will generate various types of waste, several sections are relevant. The contractor can only engage NEMA licensed waste handlers as required by Rules 7 -11. The waste must be transported by a NEMA licensed transporter and disposed in a waste treatment facility/site that is approved by the authority. Rule 11 provides that operators of a disposal site shall apply the relevant provisions on waste treatment under the local government act and regulations to ensure that such waste does not present any imminent and substantial danger to the public health, the environment and natural resources. Other relevant sections include:

- Rule 4 (1) prohibits disposal of water in any other place except designated waste receptacles.
- Rule 4(2) and 5 require segregation of hazardous waste and non-hazardous waste, and disposal in facilities provided by the relevant local authority.
- Rule 6 advocates for cleaner production as a mechanism to minimise waste generation which can include conserving both raw materials and energy.

In a nutshell, the contractor and proponent will take the responsibility to ensure that solid waste is properly handled, stored, transported and disposed as per the procedures provided in these regulations. On site, materials that have the potential to be recycled should be considered for reuse or recycling prior to disposal.

Relevance/compliance

During the construction of the project, the proponent is advised to ensure that the contractor implements the above mentioned measures as necessary to enhance sound waste management. The Proponent shall observe the guidelines as set out in the environmental management plan laid out in this report as well as the recommendation provided for mitigation /minimization /avoidance of adverse impacts arising from the project activities.

d) EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

These were promulgated in May 2009, thus prohibiting any person or activity from making or causing any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether noise is loud, unreasonable, unnecessary or unusual, factors such as time of the day, Proximity to residential area, whether the noise is recurrent, intermittent or constant, level and intensity of the noise, electronic or mechanical means etc. may be considered. Several sections are relevant to construction of the proposed project:

- In rule 4, the regulation relates noise to vibration effects, which can be harmful to people or the environment. Harmful vibrations are defined as exceeding 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source.
- Rule 11 requires any person wishing to operate or repair any machinery, motor vehicle, or construction equipment which is likely to emit noise or excessive vibrations to carry out the activity or activities within the relevant levels provided in the First Schedule to these Regulations.
- Rule 14 requires that all motor vehicles operated on site should not produce any loud and unusual sound.
- Rule 14 requires that where construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose on how the work is to be carried out including the machinery that may be used, and the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations.

In this case permissible levels applicable to public utility construction should be in line with Table 3.1 below.

Table 3.1: Second Schedule– Maximum Permissible Noise Levels for Construction Sites

Maximum permissible Noise levels for construction sites (measurements taken within the facility)		
Facility	Day	Night
i. Health facilities, educational institutions. Homes for disabled etc.	60	35
ii. Residential	60	35
iii. Areas other than those prescribed in (i) and (ii)	75	65

Time frame: Day: 6.01 a.m. – 6.00 p.m. (Leq, 14h) Night: 6.01 p.m. – 6.00 a.m. (Leq, 14h)

Relevance/compliance

The Proponent & Contractor will ensure compliance to the regulations and where these may be exceeded, necessary measures must be undertaken to bring the noise levels within the set thresholds. The contractor should ensure that employees are not exposed to noise levels above 85 dB (A) and in such cases provide suitable personnel protection equipment (ear protective devices).

e) EMCA (Air Quality) Regulations, 2014

The objective of these regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The overall aim is to protect human health and safety. The general prohibitions, for instance Rule 5, 6, 7 and 8 prohibit any person from causing the emission of air pollutants (such as liquid and gaseous substances) and suspended particulate matter listed under Second Schedule (Priority air pollutants) to exceed the ambient air quality levels as stipulated under the First (Ambient air quality tolerance limits) and Third Schedule (Emission limits for controlled and non-controlled facilities).

Relevance/compliance

The contractor is therefore required to keep particulate, especially dust emissions during project construction within acceptable limits. The proponent shall enforce air quality standards and be maintained as per NEMA’s Standard and Enforcement Review Committee requirements.

f) The Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009

This is a supplementary legislation to the EMCA Act of 1999 with particular emphasis on management of wetland and wetland resources, river banks, lake shores and Sea shore. Sections 4 and 5 of Part II as well as sections 16, 17, 18 of part III of the legislation provide guidelines for conservation and sustainable use and conservation of the said environmental components, and enhance them where necessary when carrying out any activity therein.

Relevance/compliance

The water project when in operation will abstract water from Asega Dam resulting on increased demand for water thereby affecting these resources. It is important this legislation is clearly enacted during the planning, construction and operation of the project. The Proponent shall comply with the provisions of the Act in protecting wetlands, preventing and controlling pollution and siltation in the dam.

g) The Environmental Management and Coordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006

This legislation aims at enhancing preservation of biodiversity and safeguarding of endangered and rare plant and animal species within any human activity area. Section 4 of the legislation expressly prohibits any activity which may have adverse effects on any ecosystem, lead to introduction of alien species in a given area or result in unsustainable utilization of available ecosystem resources.

Relevance/compliance

Implementation of the proposed project in the area will result in removal of some existing natural vegetation. For this to occur, the relevant authority, NEMA in this case, will require a detailed EIA on the proposed project and projected impacts before issuing a license for commencement. The Project shall maintain a clean and healthy environment and has a duty to safeguard and enhance environmental management, in operational phase, the project shall ensure that conservation of biological diversity shall be observed.

3.3.3 The Water Act of 2002

This prohibits the pollution of water. Part II, section 3 states “every water resource is hereby vested in the state subject to any rights of user granted by or under the Act of any law. In addition the right to any use of water from any water resources is vested in the Minister for Water Resources Development and Management except to the extent that it is alienated by or under the Act or any other written law (Section 5). Consequently a water permit must be obtained before using any water resource.” Sections 29(1), (2) and (3) stipulates the procedure for obtaining a water permit while section (4) states “except as provided in section 33, an application for a permit shall be the subject of public consultation and, where applicable, of environmental impact assessment in accordance with the requirements of Environmental Management and coordination Act EMCA, 1999.”

Relevance/compliance

The proponent should ensure that water usage in all phases of the project cycle is in line with the provisions of this Act and obtain a water abstraction permit from WARMA before abstraction of water from Asega Dam.

3.3.3.1 Water Resources Management Rules 2007

According to the third schedule of the Water Resource Management Rules 2007, any water activity that involves the under listed activities requires a water use permit.

- Temporary abstraction of water for construction
- Diversion of water from a water course
- Abstraction from surface water
- Diversion of a water course
- Abstraction from ground water, either by borehole or a shallow well
- Ground water recharge augmentation
- Water storage in dams and pans
- Effluent discharge being the disposal of wastes into a water resource
- Swamp marsh or wetland drainage
- In stream works
- Mixing of water from different water resources
- Hydro power generation

The rules Sets the standard procedures to be followed in the utilization of water resources including abstraction controls, modes of use and responsibilities in protection of the resources including effluent treatment standards.

Relevance/compliance

Valid water abstraction permits have been obtained from WRMA for the existing water projects at Asega Dam intake works.

3.3.4 The Agriculture, Fisheries and Food Authority Act, 2013

The Agriculture, Fisheries and Food Authority Act is the principle land use statute covering, among others, soil conservation and general land use. Two major parts of the acts deal with general conservation issues i.e. preservation of soil fertility and prevention or control of soil erosion. The Agriculture (Basic Land Use) rules issued in 1965 prohibit certain land use practices likely to enhance soil erosion. It prohibits cutting down or destroying vegetation or de-pasturing of livestock on any land of which the slope is 0.35, except if the activity is done within the conditions sanctioned by an Agricultural officer. The rules stipulate strict regulation on the cultivation of any land whose slope is between 0.12 and 0.35 when the soil is not properly protected from soil erosion. Watercourse and land abutting on these are also protected under the rules. Cultivation, destruction of soil cutting down of vegetation, or de-pasturing livestock land on land within two metres of a watercourse are permissible only if done with a written consent of an authorized officer. The transmission line will necessitate

destruction of agricultural plants during construction. Provisions of this Act need to be followed during that process.

Relevance/compliance

The project should adhere to the provisions of the Act during the construction and operational phases.

3.3.5 The Land Act, 2012

The Land Act, 2012 is Act of Parliament to give effect to Article 68 of the constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes. The Act provides for compensation for any damage or loss resulting from the entry onto the land. This Act repeals; The Wayleaves Act, Cap 292 and The Land Acquisition Act, Cap 295.

Relevance/compliance

The Proponent will commission a RAP study to identify land whether public, community or private that may be affected by the implementation of the proposed project. The Proponent shall comply with the provisions of the Act in acquiring land from the community.

3.3.6 National Land Commission Act, 2012

The National Land Commission Act, 2012 is an Act of Parliament which, under Articles 62(2) and (3) of the Constitution, has power to administer public land on behalf of the national government and county governments. Sections 143–147 recognize the need for a public rights of way (also called a way leave), and gives the NLC the power to create a public rights of way. The Act notes that a right of way can be created for the benefit of public authorities to enable them perform their mandate and functions, and also for the benefit of the public.

Relevance/compliance

The Proponent (LVNWSB) shall have to apply to the Commission in writing, providing all necessary information in regard to land & way leaves required for the implementation of the proposed project,. LVNWSB is also required to notify all persons affected, as well as the relevant County Governments. LVNWSB shall compensate for land, trees crops and buildings in cases of private land, on the basis of the value of the property as determined by a qualified valuer.

3.3.7 Land Registration Act, 2012

The Land Registration Act, 2012 is an Act of Parliament to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. This Act repeals; The Indian Transfer of Property Act 1882, The Government Lands Act, (Cap 280), The Registration of Titles Act, (Cap 281), The Land Titles Act, (Cap 282) and The Registered Land Act (Cap 300).

Relevance/compliance

Any land that shall be acquired for the project will be registered in accordance to the provisions of this ACT.

3.3.8 The Valuers Act, 1985 (Cap 532) (Revised 2012)

It is an Act of Parliament to provide for the registration of valuers and for connected purposes. The Act established the Valuers Registration Board, which have the responsibility of regulating the activities and conduct of registered valuers. Section 21 of the Act states that valuation of property shall be performed by registered valuers only. The project will affect land, structures and vegetation that will need to be valued for compensation.

Relevance/compliance

The Proponent will therefore adhere to the provisions of this Act to engage a valuer.

3.3.9 Public Health Act, 1986 (Revised 2012)

The Public Health Act regulates activities detrimental to human Health. An environmental nuisance is one that causes danger, discomfort or annoyance to the local inhabitants or which is hazardous to human health. Although the Act is primarily concerned with domestic water supplies and sources of water used for human consumption, its regime may be extended to cover rivers, streams, lakes and underground water resources since these are the basic water sources for the majority of Kenya’s population. It also outlines the standards of construction of various facilities of any place. In terms of air pollution thermal plants are said to emit a variety of gases, volatile organic compounds and particulate matter depending on the amount and type of fuel used and method used for burning. It is therefore necessary to monitor the air pollution. The Act prohibits activities (nuisances) that may be injurious to health. The primary purpose of the Act is to secure and maintain public health. It defines nuisances on land and premises and empowers public health authorities to deal with such conditions. Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and oilier fluids which permits or facilitate the breeding of pests shall be deemed nuisances and are liable to be dealt with in the manner provided by this Act.

Relevance/compliance

The Proponent shall observe policy and regulatory requirements and implement measures to safeguard public health and safety in accordance to the Environmental Management Plan. All health and safety measures should be in place to ensure the workers and the neighboring communities are not exposed to risks.

3.3.10 Malaria Prevention Act (Cap246)

This Act provides measures to curb the breeding of mosquitoes at development sites. Measures proposed in the Act to control the breeding of the vector include: maintenance of free drainage channels, removal of stagnant water from any land to prevent larvae breeding, removal of wastes and broken bottles, amongst others. As regards, the proponent is hereby recommended to implement measures to control the malaria disease vectors by implementing the relevant mitigation measures proposed in the regulation.

Relevance/compliance

No stagnant water as a result of the proposed project should be allowed near workmen camp, borrow sites or homesteads.

3.3.11 Occupational Health and Safety Act, 2007

The Occupational Safety and Health Act No.15 of 2007 and the Subsidiary Legislation makes provisions for the health, safety and welfare of persons employed. The provision requires that all practical measures possible be taken to protect persons employed from any injury. The provisions of the Act are also relevant to the management (including handling, transportation and disposal) of hazardous and non-hazardous wastes, which may arise at the project sites. General welfare issues are dealt with under Part X. These include provision of drinking water, washing facilities, first aid and accommodation for clothing not worn during working hours. The construction site(s) shall be registered as workplace with the directorate of occupational safety and health services under the Ministry of Labour, Social Security and Services as stipulated in Part V. A safety and health audit, fire audit, risk assessment, and safety and health audit has to be conducted for the site at least once every year. The Act has the following functions among others:

- Secures safety and health for people legally in all workplaces;
- Prevents employment of children in workplaces where their safety and health is at risk;
- Encourages entrepreneurs to set achievable safety targets for their enterprises;
- Promotes reporting of work-place accidents, dangerous occurrences and ill health with a view to finding out their causes and preventing similar occurrences in future.

Relevance/compliance

It shall be the duty of the proponent and contractor to ensure workers' safety is given priority during construction of the project. This should be achieved in several ways:

- By undertaking risk assessments and adopting preventive and protective measures.
- The contractor is required to also develop a health and safety policy and bring this to the notice of all employees.
- Formation of Health and Safety committee at the workplace.
- Ensure all dangerous situations and accidents are reported within time and appropriate action taken.
- All plants and machinery in use shall be subjected to periodical examinations as provided by law to ensure safety according to Part VII.
- Proper handling, labelling and transportation of chemicals and hazardous wastes such as petroleum, fuels etc.

The proponent will there undertake the necessary registrations, take all measures to ensure the health, safety and welfare of persons employed, as well as undertake the relevant assessments as outlined above.

In addition, several subsidiary legislation that operationalizes the Act include:

3.3.11.1 Safety and Health Committee Rules of 2004

These rules require the proponent and contractor (once they employ a more than twenty persons) to establish a committee to address the health, safety and welfare of workers. The Proponent and by extension the contractor, are required to provide space for meetings for the committee, training of the S&H Committee, appoint a S&H management representative, as well as allowing all staff to attend these meetings with no risk of loss of earnings, opportunities for promotion or advancement. They should also make legislation on occupational safety and health available to the Committee. The proponent/contractor must also:

- Develop a clearly defined safety and health policy, bring it to the notice of all employees at the workplace, and send a copy of the policy to the director. They are also required to implement and review the policy when need arises.

- Organise annual health and safety audit of all operations related to the project. This can only be undertaken by a registered health and safety advisor who should forward such a report to the Director of Occupational Health and Safety Services.

3.3.11.2 Noise Prevention and Control Rules, 2005

These rules have set minimum and maximum noise exposure limits beyond which workers and members of the public should not be exposed to without adequate means of protection. This is set at 90 dB(A) for more than 8 hours within any 24 hours duration and 140 dB(A) peak sound level at any given time. The rules also have limits for exposure out of workplaces as 55 dB (A) during the day and 45 dB (A) during the night. The rules have several recommendations on a comprehensive noise control program for workplaces that covers: noise measurement; education and training; engineering noise control; hearing protection; posting of notices in noisy areas; hearing tests; annual programme review. In addition, this should include a requirement for medical examination of workers who are exposed to noise (and compensation for impairment), regular noise monitoring and measurement, information and training of workers, proper installation and maintenance of machinery to reduce noise emission, provision of hearing protection, or plant, and posting of notices where allowed levels are exceeded. The rules have also set the minimum noise levels that should emanate from a facility to public/neighbouring areas by day or by night.

Relevance/compliance

The proponent should provide functional earmuffs for those operating the equipment/machineries at the magazine site and keep on renewing their noise and vibration permits from NEMA.

3.3.11.3 Medical Examination Rules, 2005

The rules offer a guide on the need and target of workers who have to undergo regular medical examination to identify the symptoms of hazardous exposures on the body. This is with a sole purpose of monitoring exposure for remedial action.

3.3.11.4 Fire Risk Reduction Rules, 2007

These rules were promulgated by the Minister for Labour on April 16th 2007 and apply to all workplaces. The rules apply to this sector project in several ways as enumerated below. Rule 16 requires a Proponent to ensure that electrical equipment is installed in accordance with the respective hazardous area classification system. It is also a requirement that all electrical equipment is inspected after six months by a competent person and the Proponent is required to keep records of such inspections. Rules 29 – 31 refer to the installation and maintenance of firefighting systems in workplaces. Fire extinguishers are to be mounted at least 60cm above ground while a fire hose reel must be located within a radius of 30m. Fires can arise from electrical fault at the magazine site.

Relevance/compliance

The proponent will there undertake the necessary registrations, take all measures to ensure the health, safety and welfare of persons employed, as well as undertake the relevant assessments as outlined above.

3.3.12 Employment Act, 2007 (Revised 2012)

This Act is important since it provides for employer –employee relationship that is important for the activities that would promote management of the environment within the project area. The Act provides restrictions in employing children of between thirteen and sixteen years of age to attend machinery. Section 58 states that:

- No person shall employ a child of between thirteen and sixteen years of age, other than one serving under a contract of apprenticeship or indentured learnership in accordance with the provisions of the Industrial Training Act, in an industrial undertaking to attend to machinery.
- No person shall employ a child in any opencast workings or sub-surface workings that are entered by means of a shaft or adit

The Employment Act fixes minimum standards of employment. These Acts effectively deal with issues (such as the prohibition of forced labour, child labour and discrimination in employment).

Relevance/compliance

The Proponent & Contractor will adhere to the provisions of this Act in regard to child labour & minimum terms and standards of employment.

3.3.13 The Work Injury Benefits Act (WIBA), 2007

The WIBA Act provides for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes. Section 7(a) of the Act, on the obligations of the employer, requires an employer to obtain and maintain an insurance policy with an insurer approved by the State

in respect of any liability that the employer may incur under this Act to any of his employees. Section 10(1) States that an employee who is involved in an accident resulting in the employee's disablement or death is subject to the provisions of this Act, and entitled to the benefits provided for under this Act. It also states expressly that an employer is liable to pay compensation in accordance with the provisions of this Act to an employee injured while at work. On First Aid covered in section 45(1), an employer is supposed to provide and maintain such appliances and services for the rendering of first aid to his employees in case of any accident as may be prescribed in any other written law in respect of the trade or business in which the employer is engaged.

Relevance/compliance

Significance The workers face several challenges to their health, safety and security from the equipment they use daily. The WIBA offers the legal assistance on these incidents or accidents at the workplace while on duty involving compensation. The proposed activities should therefore integrate the relevant provisions while the project takes place.

3.3.14 The National Gender and Equality Commission Act, 2011

The National Gender and Equality Commission Act, 2011 established the National Gender and Equality Commission (NGEC). The functions of the commission are stipulated in Section 8 of the Act which include, inter alia, promoting gender equality and freedom from discrimination. It inherits the status and powers of its parent Commission (the Kenya National Human Rights and Equality Commission) as outlined in Chapter 15 – Commissions and Independent Offices of the 2010 Constitution, Article 59 of Chapter 4. The NGEC is empowered by Article 252 to initiate investigations based on suspicions or claims of discrimination, and have the authority of a Court to summon a witness in the course of such investigations.

Relevance/compliance

The Proponent is therefore advised to refrain from discrimination on ground of gender and equality in the course of this project. Should such matters arise, provisions of this Act should be adhered to.

3.3.15 HIV and AIDS Prevention and Control Act, 2006

The Act which fully commenced on 1st December 2010 provides for measures for the prevention, management and control of HIV and AIDS, protection and promotion of public health and for the appropriate treatment, counselling, support and care of persons infected or at risk of HIV and AIDS infection. It requires the government (and by extension government agencies) to promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS. This can be achieved through a variety of means, including educational and information campaigns that also encourage voluntary testing. Section 7 specifically requires the government to provide basic information and instruction on HIV and AIDS prevention and control at the workplace. This should apply to all employees of government agencies and as well those of private sectors. The section further requires that such information should cover issues on confidentiality in the work-place and attitudes towards infected employees and workers. Section 31 deals with matters of discrimination and hereby prohibits any form of discrimination against qualified employees, including at the workplace, on the basis of actual, perceived or suspected HIV status unless the employer can prove to a tribunal that the job requires a particular state of health or medical or clinical condition.

Relevance/compliance

This Act therefore requires the proponent and by extension the contractor to practice fair employment practices, as well as undertake HIV/AIDS training including provision of free testing facilities for the workers on site.

3.3.15.1 Kenya National Aids Strategic Plan III

The plans whose motto is delivering on universal access to services aims to achieve the country's targets for quality integrated services at all levels to prevent new HIV infections, reduce HIV-related illnesses and deaths, and mitigate the effects of the epidemic on households and communities. The plan focuses on delivering on Vision 2030, as well as realise the targets set by the United Nations General Assembly for scaling up HIV prevention, treatment, care and support, and mitigation of its socio- economic impacts. The targets of the plan by 2013 is to have the following impact;

- Reduced number of new infections by at least 50%;
- Reduced AIDS-related mortality by 25%;
- Reduced HIV-related morbidity;
- Reduced socio-economic impact of HIV at household and community level;

Relevance/compliance

A budget for HIV awareness, prevention, training and, care have been included in the project budget. The funds will be used to undertake campaigns on disseminating HIV/AIDS information, providing prevention supplies such as condoms both male and female, training of the locals to be in a position to train other colleagues

and the local communities around the project (peer education). Collaborate with the Ministry of Health for supplies of medication on those dependent on them

3.3.16 Physical Planning Act (Cap 286)

The Physical Planning Act was enacted in 1996 and commenced operation in 1998. The Act provides for the preparation and implementation of physical development plans and other related purposes. Its provisions apply to all parts of the country except such areas as the Minister may specify. Thus the Act directs, regulates and harmonizes development and use of land all over the country. In addition, the Act provides a vital link with the Environmental Management and Co-ordination Act. Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of a county, municipal or town council and for specific control of the use and development of land. Section 29 of physical Planning Act gives County Councils powers to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development. Section 30 of the Act states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The Act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the Council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. The Act provides for the participation of the communities in the planning of their areas and accords people affected the right of appeal against adverse decisions of planning authorities. The farmers in the project area have an opportunity to plan and utilize their plots based on the advice from agro-economist and the extension officers.

Relevance/compliance

The Proponent shall secure all mandatory approvals and permits as required by the law.

3.3.17 Forest Act

The Forest Act provides for the development conservation and utilization of all the forests in a sustainable manner. The Act has addressed previous weaknesses and will therefore enhance the development and management of forestry in the country.

Relevance/compliance

This Act will be relevant in this project the trees along the river have to be conserved. Agro-forestry should also be encouraged to ensure that the soil in the area is well conserved and erosion is avoided to reduce siltation into the Asega Dam.

3.3.18 County Government Act (2012)

Under the new constitution of Kenya, County Governments have taken over what used to be previously the functions of local authorities. They have been given power to control or prohibit all businesses, factories and other activities, including the proposed project which, by reason of smoke, fumes, gases, dust, noise or other cause may be or become a source of danger, discomfort or annoyance to the neighborhood, and to prescribe conditions subject to which such business, factories, yards etc shall be carried. The new constitution grants county governments the powers to grant or to renew business licenses or to refuse the same. To ensure implementation of the provisions of the new constitution, the county governments are empowered to make by-laws in respect of all such matters as are necessary or desirable for the maintenance of health, safety and well-being of the inhabitants of its area. This includes construction and maintenance of water supply, sewage and solid waste management systems. The Act empowers county governments to control or prohibit all businesses, factories and workshops that, by reason of smoke, fumes, chemical gases, dust, smell, noise or vibration or other cause may be a source of danger, discomfort or annoyance to the neighbourhood and to prescribe the conditions subject to which business, factories and workshops shall be carried on.

Relevance/compliance

Water supply supply is now a devolved function of the County Governments and the project proponent shall work in collaborations with the County Government of Trans Nzoia during the implementation of the proposed project.

3.3.19 Urban Areas and Cities Act, 2011

This ACT gives power to the council of the city or large municipality to formulate and implement a master plan for urban and physical planning and infrastructural development and provision of essential services including; provision of water, sanitation, health care, education, housing, transport, disaster management systems and facilities for safe environment. According to section 26 (c) the council is expected to exercise control over land use, land sub-division, land development and zoning by public and private sectors for any purpose including; agriculture, industry, commerce, markets, employment centres, residential, recreational parks, entertainment, passenger transport freight and the transit stations within framework of spatial and master plans for the city and municipality. Section 44 provides for the council to form partnership on provision of social infrastructural services with companies within and outside the country. This includes; construction of roads, environment conservation and preservation, construction of health centres and promotion of tourism and cultural events.

Relevance/compliance

The County Government of Trans Nzoia County shall partner with LVNWSB on the implementation of the proposed project.

3.3.20 Penal Code (Cap 63)

The regulation provides guidelines for protecting the public against ill health and offensive trade activities such as noise and smell, amongst others. In this, the proponent should observe the regulation by mitigating against the emission of excessive noise and by controlling the pollution of land and water bodies. Prior notices must also be served to businessmen in the area.

Relevance/compliance

Construction of the proposed project will in one way or another affect the atmosphere, water resources and will make some level of noise. The Proponent shall observe the guidelines as set out in the environmental management and monitoring plan laid out in this report as well as the recommendation provided for mitigation/ minimization/ avoidance of adverse impacts arising from the project activities.

3.3.21 Standards Act, Cap 496

This Act is implemented by the Kenya Bureau of Standards who provides standards on the requirements of equipment and project materials. Standards regulating security and safety of the public also have to be observed during the design phase of the project. As regards, the proponent is herein required to implement the relevant requirements of this Act, especially those on standardization of project inputs and equipment in order to reduce waste and pollution.

Relevance/compliance

The Proponent and contractor have to ensure that all materials and equipment in use during construction as well as operation of the facility adheres to the highest standards and do not pose any human health and safety risk.

3.3.22 The Environment and Land Court Act, 2011

This is an Act of Parliament to give effect to Article 162(2)(b) of the Constitution; to establish disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes. All land disputes encountered in the course of the Project will be handled in adherence to this Act. The Land and Environment Court is established under the Environment and Land Court Act, 2011. It is empowered by law, given the status of the High Court and has the jurisdiction to hear and determine disputes, actions and proceedings concerning acquisition of land as well as matters pertaining to the environment. Article 159 on the principles of judicial authority, indicates that courts will endeavor to encourage application of Alternative Dispute Resolutions (ADR) mechanisms, including traditional ones, so long as they are consistent with the constitution. Section 20, of the Environment and Land Court Act, 2011 empowers the Environment and Land Court, on its own motion, or on application of the parties to a dispute, to direct the application of ADR, including traditional dispute resolution mechanisms.

Relevance/compliance to the proposed project

Any person whose land has been compulsorily acquired for project implementation purposes shall petition the Environment and Land Court for redress with respect to:

- The determination of such person's right over the land;
- The amount offered in compensation;
- The amount offered in compensation for damages for temporary dispossession in the case of the Government's withdrawal of its acquisition of the land.

3.4 REGULATORY FRAMEWORK

3.4.1 National Environment Management Authority (NEMA)

NEMA is the regulatory body charged with management and co-ordination of environmental issues. The object and purpose for which the Authority was established is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment.

Regulatory function:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programs and projects;
- Identify projects and programs or types of projects and programs, plans and policies for which environmental audit or environmental monitoring must be conducted under this Act;
- Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities.

Relevance/compliance

NEMA shall issue an EIA licence with conditions to be adhered to during the implementation of the proposed project and also during the operational phase. It shall also monitor the implementation of the Environmental Management Plan.

NEMA executes its mandate through the following sector institutions:

3.4.1.1 National Environmental Action Plan (NEAP), 1994 (Revised 2007)

The National Environmental Action Plan provides the framework for implementation of the Environment Policy and realisation of Development Goals and Vision 2030. The integration process involves a multisectoral approach in developing a comprehensive framework for environmental management and conservation of natural resources. The main objectives of NEAP are:

- Identifying environmental problems and issues;
- Raising environmental awareness;
- Building national consensus;
- Defining policies, legislation and institutional needs;
- Planning environmental projects.

3.4.1.2 The National Environmental Action Plan Committee

The National Environment Action Plan Committee (NEAPC) is established under Section 37 of EMCA. This cross-sectoral committee is responsible inter alia, for the development of a five-year national environment action plan. The national environment action plan shall contain among other aspects analysis of the natural resources of Kenya and their distribution, quantity and various uses. It shall also recommend legal and fiscal incentives for business that incorporate environmental requirements into their planning and operational processes as well set out guidelines for the planning and management of the environment and natural resources.

3.4.1.3 National Environmental Complaints Committee

The National Environmental Complaints Committee (NECC) is the body charged with the task of investigating complaints or allegations regarding the condition of the environment in Kenya and suspected cases of environmental degradation. The NECC also undertakes public interest litigation on behalf of the citizens in environmental matters. It is composed of seven members appointed by the Cabinet Secretary for Environment and Natural Resources headed by a chairman who is a person qualified to be appointed as a judge of the High Court of Kenya and members nominated by the Attorney-General, the Council of County Governors (Secretary), the Law Society of Kenya and the business community.

Relevance/compliance

This Committee shall investigate any complaint that may arise concerning the condition of environment as a result of implementation of the project.

3.4.1.4 Standards and Enforcement Review Committee

The Standards and Enforcement Review Committee (SERC) is a committee of NEMA and is established under Section 70 of EMCA. This is a technical Committee responsible for formulation of environmental standards, methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures. The members of the SERC are set out in the third schedule to EMCA. They consist of representatives of various relevant government ministries and parastatals that are Lead Agencies as well as those responsible for matters such as economic planning and national development, finance, labour, public works, law and law enforcement.

3.4.1.5 National Environmental Tribunal (NET)

The NET is established under Section 125 of EMCA for the purpose of hearing appeals from administrative decisions by organs responsible for enforcement of environmental standards. An appeal may be lodged by a project proponent upon denial of an EIA licence or by a local community upon the grant of an EIA licence to a project proponent. NEMA may also refer any matter that involves a point of law or is of unusual importance or complexity to NET for direction.

3.4.1.6 County Environment Committee

Under section 29 (1) of EMCA, the Cabinet Secretary shall by notice in the gazette appoint County Environment Committee of NEMA in respect of every County. The committee assist NEMA in effectively carrying out its function of proper management of the environment at these level. The membership of this committees include representatives of farmers or pastoralists, business community, women and youth. The County Environmental Committee contributes to the decentralization of activities undertaken by NEMA and thus enable local communities to have access to environmental management information. It also enables the the County Environment Committee to conduct quick site visits and review environment related reports of the project and on occasions could attend site meetings.

Relevance/compliance

The Coordination of NEMA activities on the proposed project shall be undertaken by the County Director of Environment in Trans Nzoia County.

3.4.2 Ministry of Water and Irrigation

The mandate of this Ministry is the formulation, review and implementation of policy on the water sector, the irrigation and the drainage sector and in the reclamation of land for sustainable development of the nation. The core functions include:

- Water harvesting and storage infrastructure for water conservation which help in mitigating droughts and famine
- Conservation of catchment areas
- Water resources management policy
- Urban and rural water development and supply
- Waste water treatment and control
- National water conservation and pipeline corporation
- National irrigation policy which aims to sustainably accelerate development and performance improvement of irrigation, drainage and water storage
- Irrigation and dam construction schemes
- Flood preparedness and management to mitigate impacts
- Water quality and pollution control by adopting the 'polluter pays principle' to promote water user responsibility

Relevance/compliance

Water is the primary factor in the proposed project. Abstraction of water has to be regulated so as to prevent water waste and unnecessary losses. Water abstraction should be guided by WRMA regulations.

The Ministry executes its mandate through the following sector institutions:

3.4.2.1 Water Services Regulatory Board (WASREB)

The functions of the WASREB include the issuance of licences to Water Service Boards and to approve service provision agreements concluded between Water Service Boards and Water Service Providers. The WASREB is responsible for ensuring that water services and supply are efficient and meet expectations of consumers through regulation and monitoring of Water Service Boards and Water Service Providers. To standardize service provision, the Board has the responsibility of developing among others, tariff guidelines. The Board is therefore supposed to oversee the implementation of policies and strategies relating to provision of water and sanitation services, these policies include the National Water Services Strategy (2007 -2015), Pro-Poor Implementation Plan for Water Supply and Sanitation. The specific functions of the WASREB include:

- Providing information about water and sanitation services.
- Regulating the provision of water and sanitation services; this is done through such methods as setting standards for the provision of water services, monitor compliance of facilities for water supply with the set standards.
- Licensing Water Service Boards such as the LVNWSB and other regional water service boards and approving their appointed Water Service Providers through service provision agreements.
- Setting the rules, establishing standards guidelines and monitoring the performance of Water Service Boards and Water Service Providers and enforcing regulations.

- Establishing technical, water quality and effluent disposal standards.

Relevance/compliance

WASREB has licensed LVNWSB as the institution responsible for development of water supply infrastructure within the proposed project area.

3.4.2.2 Water Resources Management Authority (WRMA)

The Water Resources Management Authority (WRMA) was formed as one of the water sector bodies under the water sector reforms; the body was established under the Water Act 2002. The overall mandate of WRMA is to protect and conserve water resources. Water resources for purposes of the Water Act include lakes, ponds, swamps, streams, marshes, watercourses or anybody of flowing or standing water both below and above the ground. The functions of the WRMA include planning, management, protection and conservation of water resources. The WRMA is also authorized to receive and determine applications for water permits and monitor their compliance. The WRMA responsibilities extend to the management of water catchments. The Water Act establishes the Catchment Area Advisory Committees whose principal functions are to advise the WRMA on water resources conservation, use and apportionment at the catchment levels.

Relevance/compliance

Valid water abstraction permits have been obtained from WRMA for the existing water project at Asega Dam intake works.

3.4.2.3 Water Services Boards (WSBs)

Water Services Boards (WSBs) are constituted under the Water Act 2002. The WSBs are responsible for the provision of water and sewerage services within their areas of coverage and are licensed by the WASREB. The WSBs are also responsible for contracting Water Services Providers (WSPs) for the provision of water services. WSB and WSP enter into service provision agreements that include but not limited to the supply area, development, rehabilitation and maintenance of water and sewerage facilities of the WSBs. The WSBs are responsible for the review of the water services tariffs proposals from WSP before submission to WASREB for consideration.

Relevance/compliance

LVNWSB is the Implementing Agency of the proposed project.

3.4.2.4 Water Services Providers

Water Service Providers are the utilities or water companies. They are commercial entities therefore are required to improve their performance and run like business within a context of efficiency, operational and financial autonomy, accountability and strategic, but minor investment.

Relevance/compliance

Upon the completion of the works on the proposed water project, a Local Water Service Provider shall be established under the County Government for operations and management of the scheme.

3.4.2.5 Water Services Trust Fund (WSTF)

The main objective of the WSTF is to assist in financing capital costs of providing services to communities without adequate water and sanitation services. The WSTF focuses on reaching those areas that are underserved or not served at all such as informal settlements, the poor and disadvantaged groups. This include providing financing support to improved water services towards capital investment to community water schemes in underserved areas, capacity building activities and initiative among communities, water services activities outlined in the Water Services Strategic Plan as prioritized by the Government.

Relevance/compliance

The WSTF may be called upon to assist in financing the expansion of water distribution system to the informal settlements, the poor & disadvantaged groups within Kwanza Sub-County.

3.4.2.6 Water Appeals Board

The Water Appeals Board is established under the Water Act to adjudicate disputes within the water sector. The Water Appeals Board can hear and determine appeals arising from the decision of the Minister of Water and Irrigation, the WASREB and the Water Resources Management Authority (WRMA) with respect to the issuance of permits or licenses under the Water Act.

Relevance/compliance

Any dispute involving the water sector institutions that may arise during the implementation of the project shall be referred to the Water Appeals Board.

4 RELEVANT WORLD BANK POLICIES

The World Bank provides guidance on EIA requirements through the Environmental Assessment Sourcebook (World Bank 1994) which includes Sectoral Guidelines. It also addresses environmental monitoring and management issues and identifies typical mitigation measures. The World Bank EIA process is implemented through a set of Operational Policies/Procedures whose primary objective is to ensure that Bank operations do not cause adverse impacts and that they “do no harm”. The following World Bank Procedures and Policies have been considered for proposed project.

4.1 OP/BP 4.01 Environmental Assessment (January 1999)

The policy requires that projects are environmentally screened to determine the extent and type of the EA process. It ensures that appropriate levels of environmental and social assessments are carried out as part of the project design. It also deals with the public consultation process, and ensures that the views of project-affected persons/groups and local NGOs are taken into account. The World Bank system assigns a project to one of three project categories, as defined below:

▪ Category “A” Projects

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. An EIA is always required for projects that are in this category. Impacts are expected to be ‘adverse, sensitive, irreversible and diverse with attributes such as pollutant discharges large enough to cause degradation of air, water, or soil; large-scale physical disturbance of the site or surroundings; extraction, consumption or conversion of substantial amounts of forests and other natural resources; measurable modification of hydrological cycles; use of hazardous materials in more than incidental quantities; and involuntary displacement of people and other significant social disturbances.

▪ Category “B” Projects

The proposed project has potential adverse environmental impacts on human populations or environmentally important areas such as wetlands, forests, grasslands, and other natural habitats - but these are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A projects. Like Category A, the environmental assessment examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. Although an EIA is not always required, some environmental analysis is necessary. Category B projects have impacts that are ‘less significant, not as sensitive, numerous, major or diverse. Few, if any, impacts are irreversible, and remedial measures can be more easily designed.’ Typical projects include rehabilitation, maintenance, or upgrades, rather than new construction.

▪ Category “C” Projects

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 projects.

Relevance/compliance

The proposed rehabilitation of Kwanza water supply scheme falls under category “B” under the World Bank EIA system.

4.2 OP/BP 4.04 Natural Habitats (June 2001)

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 which 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).

Relevance/compliance

This project has no significant interaction with natural habitats other than water abstraction from Chetambe River and the Asega Dam intake. This policy is not triggered.

4.3 OP 4.07 Water Resources Management

This deals with water resources management in terms of provision of portable water, sanitation facilities, flood control and water for productive activity. It calls for economical viability, environmental sustainability and social equitability. The policy is relevant to the project because of sound management of water resources.

Relevance/compliance

This policy is triggered by the use of water resources for provision of safe drinking water from Asega Dam.

4.4 OP 4.09 Pest Management

This policy promotes the use of ecologically based pest management practices. The policy requires that procured pesticides should meet the WHO recommendations and not be among those on the restricted list of formulated products found in the WHO Classes IA and IB or Class II.

Relevance/compliance

This policy is not triggered by the proposed project as it shall not involve use of pesticides.

4.5 OP 4.10 Indigenous Peoples

The Bank's objective is to ensure that indigenous peoples do not suffer adverse effects from Bank financed projects and that they receive culturally compatible social and economic benefits. Effectively the World Bank requires a project to develop a program for addressing issues based on the informed participation of the indigenous people themselves. Any project that affects indigenous peoples is expected to include components or provisions that incorporate an "Indigenous Peoples Plan.

Relevance/compliance

There are no indigenous peoples identified in this project area.

4.6 OP/BP 4.11 Physical Cultural Resources (July 2006)

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. Cultural property is defined to include both remains left by previous human inhabitants (e.g. middens, shrines) and unique natural environmental features such as canyons and waterfalls. Initial indications are that no observed physical or cultural resources will be affected by the project.

Chance Finds Procedures

Chance finds procedures should be incorporated into the EMP and civil works contracts. The Contractors are responsible for familiarizing themselves with the "Chance Finds Procedures, in case culturally valuable materials are uncovered during excavations. If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall:

- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Ministry of State for National Heritage and Culture take over;
- Notify the supervisory Project Environmental Consultant and Project Engineer who in turn will notify the responsible local authorities and the Ministry of State for National Heritage and Culture immediately (within 24 hours or less);

Responsible local authorities and the Ministry of State for National Heritage and Culture would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the National Museums of Kenya. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values. Decisions on how to handle the finding shall be taken by the responsible authorities and the Ministry of State for National Heritage and Culture. This could include changes in the layout (such as when finding irremovable remains of cultural or archeological importance) conservation, preservation, restoration and salvage. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities. Construction work may resume only after permission is given from the responsible local authorities or the Ministry of State for National Heritage and Culture concerning safeguard of the heritage. The Bank does not support projects that will significantly damage non-replicable cultural property and assists only those projects that are sited or designed so as to prevent such damage.

Relevance/compliance

The Proponent & Contractor shall strictly adhere to this Policy during project implementation.

4.7 OP/BP 4.12 Involuntary Resettlement (December 2001)

The overall objectives of Operational Policy 4.12 (the Bank's policy on involuntary resettlement as defined above) are: to avoid or minimize involuntary resettlement, by exploring "all viable alternative project designs; where population displacement is unavoidable, to conceive and execute resettlement activities as sustainable development programs; that displaced persons should be meaningfully. It should have opportunities to participate in planning and implementing resettlement programs; and to assist displaced persons to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

Relevance/compliance

This policy is not triggered as there will be no displacements of people in this project. However, some of their property (land, semi permanent structures, crops, and trees) shall be affected. Full compensation of affected properties shall be paid.

4.8 Forests OP4.36

This operational policy aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty, and encourage economic development. The policy recognizes the role forests play in poverty alleviation, economic development, and for providing local as well as global environmental services. Success in establishing sustainable forest conservation and management practices depends not only on changing the behavior of all critical stakeholders, but also on a wide range of partnerships to accomplish what no country, government agency, donor, or interest group can do alone. The forest strategy suggests three equally important and interdependent pillars to guide future Bank involvement with forests including harnessing the potential of forests to reduce poverty, integrating forests in sustainable economic development, and protecting vital local and global environmental services and forest values. This policy applies to the following types of Bank-financed investment projects:

- (a) Projects that have or may have impacts on the health and quality of forests;
- (b) Projects that affect the rights and welfare of people and their level of dependence upon or interaction with forests; and
- (c) Projects that aim to bring about changes in the management, protection, or utilization of natural forests or plantations, whether they are publicly, privately, or communally owned.

Relevance/compliance

This Policy will be relevant in this project since some trees and natural vegetation shall be cleared during the implementation of project.

4.9 OP 4.37 Dam Safety

This policy is triggered if the project involves construction of new dam(s), or is dependent on an existing dam, or a dam under construction. In the case of new dams, experienced and competent professionals to design and supervise construction; borrower adopts and implement dam safety measures for the design, bid tendering, construction, operation and maintenance. In the case of existing dams, any dam that can influence the performance of the project must be identified and its safety assessed. Necessary dam safety measures or remedial work are implemented. Dams over 15 metres in height are classified as large dams. High hazard dams are those under 15 metres but which are in a zone of high seismicity and /or where foundations and other design features are complex. This policy is triggered on the proposed project as the source of water is from an existing dam.

Relevance/compliance

A Consultant has been engaged to assess the current structural & operational status of the dam and advise on its safety enhancement requirements.

4.10 World Bank Policy on Access to Information

The World Bank Policy on Access to Information sets out the policy of the World Bank on public access to information in its possession. This Policy supersedes the World Bank Policy on Disclosure of Information, and took effect on July 1, 2010. This Policy is based on five principles:

- Maximizing access to information;
- Setting out a clear list of expectations;
- Safeguarding the deliberative process;
- Providing clear procedures for making information available;
- Recognizing requester's right to an appeals process.

In disclosing information related to member countries / borrowers in the case of documents prepared or commissioned by a member country / borrower (in this instance, safeguards assessments and plans related to environment and resettlement - OP / BP 4.01, Environmental Assessments, and OP / BP 4.12 Involuntary

Resettlement), the Bank takes the approach that the Country /Borrower provides such documents to the Bank with the understanding that the Bank will make them available to the public.

Relevance/compliance

This ESIA report shall be posted in the NEMA & Proponent’s websites as a way of public disclosure.

4.11 Activities Triggering World Bank Policies

The schedule below justifies the extent to which the World Bank safeguards apply to the implementation of the proposed project implementation. This implies, further investigations may be necessary to ensure compliance with the World Bank requirements.

Policy	Policy triggering criteria on the project	Justification
OP/BP4.01 Environmental Assessment	Yes	The project components will trigger EA safeguards but at category B
OP/BP 4.04 Natural Habitats	No	There are no natural habitats within the project areas.
OP 4.07 Water Resources Management	Yes	This policy is triggered by the use of water resources from Asega Dam for provision of safe drinking water to residents of Kwanza Sub-County.
OP4.09 Pest Management	No	The project will not utilize pesticides
OP4.10 Indigenous Peoples	No	There are no indigenous people affected by the project within in Kwanza and Kolongolo areas
OP/BP 4.11 Physical Cultural Resources	No	No potential cultural resources are anticipated in the project area
OP/BP 4.12 Involuntary Resettlement	No	There shall be no displacement of persons in this project.
OP 15.50 Disclosures	Yes	Banks requirements for making operational information available to the public.
OP 4.36 Forests	yes	Some trees and natural vegetation shall be cleared during the implementation of project.
OP 4.37 Dam Safety	Yes	The Project will utilize Asega dam as the water source. A dam expert has been contracted to assess the dam safety features and make recommendations.

5.0 IMPLEMENTATION ARRANGEMENTS

5.1 Organization Structure

The Environmental Implementation Plan (EMP) and the Resettlement of Affected Persons (RAP) are usually major issues in the project implementation process and these calls for an appropriate institutional framework for all concerned parties including the client. It is always important to ensure timely establishment and effective functioning of appropriate organizations mandated and is capable to plan and implement the EMP, land acquisition, compensation, relocation, income and livelihood restoration programs. The organizational structure or the institutional capability should be elaborate on the role of various stakeholders in the implementation and administration of the EMP & RAP. It further clarifies the role of PAPs and their responsibility in the entire process.

5.2 EMP & RAP Unit

LVNWSB has put in place a Project Implementing Unit (PIU) dedicated to the implementation of EMP/RAP, under the leadership of a manager. The aim of this unit is to involve other key stakeholders and institutions who will play collective roles in implementation of the EMP & RAP Action Plan including undertaking all mitigations measures proposed in the EMP, land acquisition, award of compensation and resettlement for the project. This unit will comprise the following;

- Environmentalist
- Social Economist
- Legal Advisor
- Land Valuer
- Land Surveyor
- Project Accountant

Further, LVNWSB has set aside adequate resources for implementing the EMP/ RAP as outlined in the budget.

5.3 Local EMP/RAP Implementation Committee

The local EMP/Resettlement Action Plan for Project Affected Persons Committee will be formed under the guidance and coordination of PIU. It will be formed two to three weeks after the formation of the PIU and will act as the voice of the PAPs. The committee shall comprise of the following:

- Government officials such as (NEMA, Housing, Lands, Agriculture, Water & Environment, Health, Social Services among others)
- PAPs Representatives – to be appointed by PAPs.
- County Government Administration
- National Government Administration
- Project Contractor's representative
- Project Consultants' representative
- Interested NGOs/CBOs representatives

The Committee shall have a Chairperson and a Secretary appointed or elected by PAPs. The chairperson ought to be from the local area. The roles of committee will include:

- Conducting extensive Public Awareness and consultations with the affected people so that they can air their concerns, interests and grievances. This consultation will ensure that they own up the whole process of EMP implementation & resettlement so that they do not oppose the implementation of the project.
- Ratifying compensation rates and resolving disputes that may arise relating to resettlement process. If it is unable to resolve any such problems, will channel them through the appropriate grievance procedures laid out in this RAP.
- Monitor the implementation of the EMP.
- Over see resettlement process
- Ensure efficiency of resettlement
- Conduct training and counseling the PAPs both socially and economically.

6 PHYSICAL ENVIRONMENTAL CONDITIONS

6.1 Physical and Topographic Features

Trans Nzoia County is generally flat with gentle undulations rising steadily towards Mt. Elgon in the northwest with an altitude of 4,313 metres above the sea level. It is the second highest mountain in Kenya. Mount Elgon is an important ecosystem shared between Trans Nzoia and Bungoma Counties in Kenya and the Republic of Uganda hence it is a unique resource for environmental and wildlife conservation. On average the County has an altitude of 1,800 metres above sea level. The altitude varies from 4,313 metres above sea level in Mt. Elgon and gradually drops to 1,400 metres above sea level towards the north. Because of the hilly nature, especially the northwest and the eastern parts of the county, there are difficulties in communication especially during the rainy season when roads sometimes become impassable. The County has two major rivers namely Rivers Nzoia and Suam. River Nzoia and its tributaries Sabwani, Ewaso, Rongai, Koitobos and Noigamet flow into Lake Victoria while Suam River drains into Lake Turkana, through River Turkwel. The water from the rivers could be utilized for the generation of hydroelectric power for use to support rural electrification, irrigation, fisheries and domestic consumption. These activities could also contribute towards flood mitigation. River Nzoia catchments and its tributaries are however threatened by encroachment, agriculture and other human activities along the riverbanks. Most of the natural forest cover is found in Mt. Elgon and the Cherangany Hills. However, continued pressure from human activities has had a significant negative effect on the forest cover. The forests in the County are critical to the climatic conditions of the territorial boundaries of the county and beyond as they form part of the water catchments for Lakes Turkana and Victoria.

Kwanza town is located on a hilly terrain, about 30 Km from Mount Elgon, at an altitude of 2,049m ASL; while Kolongolo Market is at a relatively lower altitude of 1,997 m ASL.

The study area has an altitude ranging from 1400 – 2,100m ASL with the highest location registering about 2,058 m ASL at Kwanza town (at the site where Kwanza water storage tanks are located).



Agricultural land in the project area

6.2 Climatic Conditions

The County has a highland equatorial type of climate with fairly well distributed rain throughout the year and an annual precipitation of between 1000 - 1200 mm. The areas around Cheranganyi Hills and those bordering Mount Elgon receive the highest rainfall while the region bordering West Pokot County receives the least since it lies on the windward side of both the Cheranganyi Hills and the Mount Elgon. The County experiences bi-modal rainfall pattern. The long rains occur between March to July while the short rains fall between September and November. The mean temperature in the County stands at about 18.6⁰C. It however varies between 10⁰C and 30⁰C. Permanent wetlands and dams, like Asega and Ng'eng'e dams exist in the area and act as water reservoirs.

6.3 Geology

The study area comprises of rocks of the Pre-Cambrian basement system, the Tertiary lavas-Mt. Elgon volcanics and the Recent lateritic and the black cotton soils. The Basement System rocks in the study area consists mainly quartzites and schists derived from argillaceous and arenaceous sediments which have been transformed by metamorphism and recrystallization into quartz and feldspar-rich rocks with much muscovite, biotite, and hornblende minerals. Road sections in the neighborhood of Kitale show irregular bedded layers of coarse pebbles, coarse sands, fine sands and sills. These Pleistocene, sediments form part of old river terraces deposited during the period of glaciations of Mount Elgon when abundant water from the melting glaciers not only incised deep gorges through the volcanic rocks but, on reaching the flat Kitale Plains, spread out into broad torrential rivers, of which the limits are shown by the outcrop of black cotton soil.

Ecological Conditions

The County is divided into three major agro-ecological zones which include: the Upper Highland Zones, Upper Midland Zones and the Lower Highland Zones.

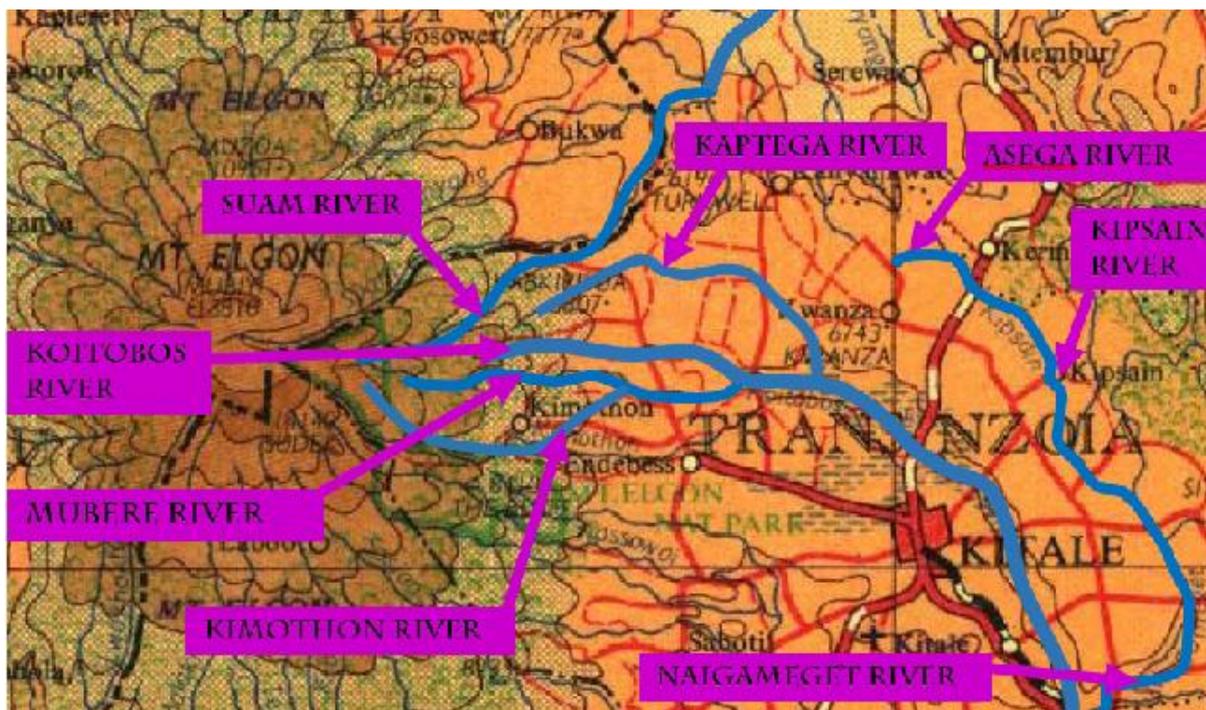
Upper Highland Zone: The Upper Highland Zone covers the hills and slopes of Mt. Elgon, Cherangany hills and the boundary zone towards West Pokot County. This zone lies between altitude 2,400 and 4,313 metres above sea level and constitutes about 16 percent of the county land area. The area is covered with high vegetation, shallow stony soils with rocky outcrop. Mt. Elgon National Park situated in this zone is a major tourist attraction. Establishment of a transition zone around the Mount Elgon National Park would play a significant role as a buffer zone for the protected area and mitigation against human-wildlife conflicts. The area also has limited potential for sheep and dairy especially at the transition area.

Lower Highland Zone: The Lower Highland Zone covers the slopes of Mt Elgon and Cherangany Hills with an altitude ranging from 1,800 - 2,400 metres above sea level. This zone covers 848.64 km² and it constitutes 34 percent of the total area of the County. The soils found in this zone are red and brown clays derived from volcanic ash. These soils are fertile with a high content of clay mineral which gives a continuous supply of plant nutrients. This is mainly a transitional zone in the county with high potential for various agricultural and livestock activities. The activities in this region include growing pyrethrum, wheat, tea, maize, barley, sunflower, coffee and horticulture as well as rearing of cattle and sheep. Despite the high potential of these areas the major set-back to the exploitation of this potential is the poor communication network for efficient transportation of the farm produce to the markets.

Upper Midland Zone: This zone which covers 1,248 km² comprises about 50 percent of the total area of the County. The zone lies between altitudes 1,700 and 2,000 metres above sea level. The mean annual rainfall in this zone is between 900 to 1,400 mm per annum. The region includes the Endebess Plains stretching east to the Kitale Plains and further towards the areas below the slopes of Cherangany Hills. To the south, the zone stretches to the border of Tongaren Scheme in Bungoma County and northwards towards West Pokot County. The Zone is covered with well drained deep red and brown clays and sandy clays derived from the basement complex. There is a considerable size of land with black cotton soil along the Koitobos River in the Endebess Plains. Land use in this region includes cultivation of maize, sunflower, coffee, wheat and barley as well as dairy, beef, sheep and horticulture production.

6.4 Water resources, and drainage

Trans Nzoia county lies in the Nzoia catchment zone with all the rivers originating from Mount Elgon link up to those from Cheranganyi hills to form River Nzoia which later drain its waters into Lake Victoria. The specific study area has a divided drainage pattern where streams at the south of Kwanza town drain into River Koitobos which flows southwards while those at the north (including Asega and Chetambe Rivers) drain into river Kipsain which flows northwards. The two rivers join Naigameget River which later drain into River Nzoia.



Main rivers in the project area

6.5 Environmental conditions

6.5.1 Protection of Water Catchment Areas

The county has two water towers namely Mount Elgon and Cherangany Hills. Conservation of these water catchments is crucial for the County's ecosystem. Conservation of forests is currently being undertaken by various government agencies such as the Kenya Wildlife Service, Kenya Forest Service, departments of environment and agriculture, the surrounding communities and the Lake Victoria Basin Commission through the Mount Elgon Regional Ecosystem Conservation Program (MERECP). Increasing the tree cover in the water catchment areas of Mount Elgon and Cherangany Hills is a priority. In addition, the Water Resources Management Authority (WRMA) has facilitated the formation of Water Resource Users Associations (WRUAs) which are tasked with protection of the various water resources in their surrounding areas.

6.5.2 Prevention of Soil Erosion

Excessive soil erosion leads to desertification, decrease in agricultural productivity as a result of land degradation, sedimentation of waterways, and ecological collapse due to loss of the nutrient rich upper soil layers. This therefore calls for programmes on prevention of soil erosion; especially on the Mt. Elgon and Cherangany Hill slopes where farmers are being encouraged to adopt better farming practices and increase the tree cover on their farms.

6.5.3 Provision of Wood Fuel and Generation of Energy for Industries

The KIHBS (2005/2006) indicates that 74 percent of the 129,376 surveyed households use firewood as the main source of energy for cooking. Wood fuel is mostly used by the rural households in the county. The forests in the county are a source of wood fuel mainly through harvesting of the dead wood. In addition, Kapsara and Kapretwa Tea Factories are heavy consumers of wood fuel as a source of energy. The increased demand for wood fuel from the high population and the tea factories pose a threat to the forest cover in the County, on the other hand, this however, provides a ready market for agro forestry products from private forests.

6.5.4 Improvement of Soil fertility by Growing Fertilizer Trees

The fertiliser trees growing in the County are mainly the nitrogen fixing trees such as sesbania, calliandra species, lucena species which are exotic trees and acacia species which are indigenous trees. These trees are mainly found in Endeless and Kaibei in Kwanza, Saboti in Trans Nzoia West and in the areas around Cherangany Hills. Other agro forestry trees grown include dombeyagoetinezii, markhamialutea, grevillea robusta, and cordial abyssinca among others.

6.5.5 Growing of fruit trees for improved nutrition both for domestic use and surplus for markets

Fruit trees in the County are grown in both small scale and large scale. Small scale fruit trees are mainly found in homesteads and individual farms. Passion fruit (*passiflora edulis*) is grown in large farms in Perkeria along the Nzoia River in Cherangany Constituency and in Waitaluk in Saboti Constituency. Mango trees are grown in large scale in Sinyereri in Cherangany Constituency. Other fruit trees grown in the County include avocado, mango, lemon and orange trees. They are grown for domestic consumption and the surplus is sold in markets; mostly in Kitale Town. The Horticultural Crops Development Agency (HCDA) has played a lead role in promoting horticultural crops notably passion fruit growing in the county.

6.5.6 Provision of Carbon Sinks such as Carbon Trading

There are a number of initiatives in the county which promote a forestation to encourage carbon sequestration. The Mount Elgon Ecosystem Conservation Program has greatly promoted tree planting as an income generating activity with emphasis on environmental conservation. There is great potential for investing in carbon trading especially around Mt. Elgon National Park and the Mount Elgon Forest Reserve that can be replanted with indigenous trees thereby restoring the natural forest and ecosystem connectivity which can be described as the carbon zone for sequestering carbon over a longer period of time.

6.5.7 Beautification Activities in Towns, Highways, Schools, Homes and other Public Places

Tree planting in urban areas has gained popularity in recent times as they provide good scenery hence makes urban centres beautiful. Tree cover within Kitale Town is very limited hence the need to plant more trees in town and in the highways notably the Kitale– Eldoret Road and Kitale –Webuye – Kakamega Road and the other major roads. In addition, Kenya Forest Service has facilitated the distribution of seedlings to public schools and other public institutions so as to help increase the tree cover and beautify the environment.

6.5.8 Growing and Processing for Medicinal Purposes/ Value Plants and Products

The medicinal trees growing in the Mount Elgon and Cherangany Hills ecosystem include *prunusafricanum*, *olea hotstetteri*, *croton megalocarpus* and *dombeya*. Most of the trees grow naturally in the forests though some medicinal trees are also grown by tree farmers. However, processing of forest products for medicinal purposes has not been fully exploited as a business venture as there is no formal established industry for processing medicine from the medicinal trees and plants.

6.6 Environment and Climate Change

6.6.1 Major Contributors to Environmental Degradation in the County

The main causes of environmental degradation in Trans Nzoia County are:

- Poor farming practices, including residues from fertilizers, poor disposal of chemical waste, farming that promotes soil erosion, farming along river banks,
- Destruction of forests; mainly for human settlement and wood fuel
- Unplanned land use; the County does not have a comprehensive land use plan
- Natural causes such as landslides; especially in the hilly mountain slopes.

There is great need to discourage these activities which cause environmental degradation within the County. In addition, there is need to address the already existing negative impacts that have already occurred.

6.6.2 Effects of Environmental Degradation

The effects of environmental degradation in the County include reduced forest cover, soil erosion, reduced agricultural productivity, landslides, frequent droughts, flooding and erratic rainfall patterns.

6.6.3 Climate Change and its Effects in the County

Although a comprehensive study is yet to be conducted on the effects of climate change in the county, the following effects have already been experienced; more frequent and severe droughts, More and frequent floods and increased prevalence of malaria in an area where malaria was previously not considered as a major illness. It is now the leading disease in the county.

6.6.4 Climate Change Mitigation Measures and Adaptation Strategies

The County is currently undertaking the following measures to mitigate against the effects of climate change:

- Lake Victoria Basin Commission through the Mt. Elgon Regional Ecosystem Conservation Programme (MERECP) is preparing a strategy on climate change adaptation and disaster management.
- The MERECP is also developing a strategy to reduce production of greenhouse gases
- Efforts are ongoing for increasing forest cover
- An NGO- VI Agro-forestry is encouraging communities to use solar energy for heating and lighting.

7 SOCIAL ECONOMIC STATUS OF THE PROJECT AREA

Trans Nzoia County is one of the forty seven (47) counties in Kenya and it has three subcounties. The County comprises five constituencies namely Endebess, Cherangany, Saboti, Kwanza and Kiminini. The county borders the Republic of Uganda to the West, Bungoma and Kakamega Counties to the South, West Pokot County to the East and Elgeyo Marakwet and Uasin Gishu Counties to the South East. The county lies approximately between latitudes 00°52' and 10° 18' north of the equator and longitudes 340° 38' and 350° 23' east of the great Meridian. The County covers an area of 2,495.6 square kilometres which forms 0.42 percent of the total land area of the Republic of Kenya.

7.1 Population

The 2009 population census estimated the total population of the Trans Nzoia County at 818,757 persons with the study areas in focus registering a total of 62,946 people in the same (2009 census) study. The County is largely rural with a high number of the rural population engaging in agricultural production as the main economic activity. This high number in the rural areas has continued to put pressure on agricultural land thereby reducing the per capita family agricultural output. There are also large numbers of populations living in the main towns/centers of the County, with the highest number living in the major town center of Kitale. Other centers are Kiminini, Kachebora, Endebes, Kolongolo, and Kwanza, among others. There are others that live in settlement schemes like Geta Settlement scheme among others. The County is a highly cosmopolitan one with almost all communities in the country almost evenly distributed.

The study area as proposed by the key stakeholders during the field feasibility stage tour clearly identified the study specific influence area as being in Kwanza Constituency within the following listed sub-locations;-

- Kobos Sub location
- Kolongolo Sub location
- Keiyo sub location
- Kwanza sub location

The consultant obtained the demographic data from the Trans Nzoia County Integrated Development Plan (CDIP) prepared by planning department which also estimated the population growth rate at 3.7%. The 2009 Kenya National Population Census data was then projected to the ultimate design year.

Table 7.1: Study area projected population

Sub location	Population		
	2009 (actual)	2015 (projected)	2020 (projected)
KOBOS	14,020	17,836	26,392
KWANZA	26,139	32,338	41,705
KOLONGOLO	10,393	13 946	19,285
KEIYO	12,144	15,173	21,455
TOTAL	62,696	79,293	108,837

7.2 Socio economic status

The area is largely agricultural with a mix of both large scale and small scale wheat, maize and dairy farming methods being practiced by the inhabitants. Horticulture is also widely practiced in the region. The area plays an integral part in the nickname of the Trans Nzoia County as being '*the bread basket of Kenya*' owing to her role in abundant food particularly maize production for the country. Bee keeping is also practiced in the Mount Elgon Forests. The residents also practice small scale trade in Kwanza, Kolongolo and Luuya Markets where they sell mostly farm produce, basic farm utilities (equipment, fertilizers, seeds, animal feeds, etc.), clothing, domestic goods, etc. Tourism, industrialization and cross-border trade have huge business potential in the area owing to the proximity to Mount Elgon, abundant agricultural produce and the nearby Kenya/Uganda border.

7.2.1 Water supply and sanitation

Trans Nzoia County is blessed with adequate fresh water supply. According to the 2009 Census, out of the 170,117 households enumerated for water use, 19,702 had piped water as their main water source, 1,119 had ponds, and 34,441 depended on streams, 110,386 on spring/wells and boreholes. This situation has improved and

in 2013, 28,855 households have access to piped water, while 5,813 households get their water from shallow wells. In water supply, the county has 12 water supply schemes; (Kitale water works, Kapolet, saboti, Kiminini, Kwanza-Kolongolo, Kiboroa, Masaba, Kimondo, Endebess, suam-Orchad, Matumaini and Chepkoiyo). The sources of the water for the schemes are River Nzoia, Kapolet Forest and Mt. Elgon. The average distance to water points in the County is one kilometre where, 40.6 percent of the households have access to safe sources of water while 59.4 percent of the households have access to unsafe water sources.

In sanitation, the main modes of human waste disposal by households are pit latrines, main sewer, septic tanks and cess pools. Other waste disposal modes include bucket and bushes as indicated in the table provided below. The County has over 18 percent of the total county surface area forest cover with a total area of 45, 454.37 ha as gazetted forest and none gazetted forest of 252.53 hectares. The major county forests include Kapolet forest, Kitale town forest, Saboti forest, Sosio forest, Suam forest, and Kiptogot forest. Other forests include Kitalale and Kimothon forests. The county has not been spared from environmental degradation arising mainly from Poor farming practices, destruction of forests, unplanned land use and natural causes such as landslides especially in the hilly mountain slopes. The resultant effects of environmental degradation in the County include reduced forest cover, soil erosion, reduced agricultural productivity, landslides, frequent droughts, flooding and erratic rainfall patterns.

Water Supply Schemes

The county has 12 water supply schemes; (Kitale water works, Kapolet, saboti, Kiminini, Kwanza-Kolongolo, Kiboroa, Masaba, Kimondo, Endebess, suam-Orchad, Matumaini, and Chepkoiyo). The sources of the water for the schemes are River Nzoia, Kapolet Forest and Mt. Elgon.

7.2.2 Health Access and Nutrition

Morbidity -The disease prevalence in the County is as follows: malaria constituting 34.8 percent of reported cases, flu accounting for 22.8 percent, respiratory tract infections accounting for 9.5 percent, stomach ache accounting for 5.3 percent and diarrhoea constituting 2.8 percent of reported cases. The high incidence of malaria is of great concern as it has been increasing in the recent past a situation attributed to low usage of mosquito nets. For instance, only 46.3 percent of children who are under five years use mosquito nets. The County's Infant Mortality Rate (IMR) at 58/1,000 is higher than the national average of 54/1,000.

Health Access-There are 74 health facilities in the County consisting of eight hospitals of which four are public owned and the other four are private owned, nine public health centres, 57 public dispensaries and ten mission/NGO dispensaries. The average distance to health facilities is five kilometres for rural health facilities and an average of two kilometres for urban facilities. The county has 52 doctors and 441 nurses. The doctor patient ratio is 1:18,257 while the nurse patient ratio is 1:2,153

Nutritional Status-Nutritional status of children within the county is average. According to the KIHBS 2005/2006 data the prevalence of underweight in children is 14.1 percent and stunting in children is 30.5 percent while the prevalence of wasting in children is 6.2 percent. The county is regarded as the food basket of Kenya yet the prevalence of food poverty is 62 percent and this is a result of majority of the residents owning small parcels of land while a considerable number is landless.

Immunization Coverage -Child Immunization currently stands at 53.6 percent (source: County Health strategic Plan). During the plan period, the County shall endeavour to achieve a Child Immunization Rate of 90 percent. Under immunization is a major contributor of child mortality. The government has done a lot to improve access to family planning but the County uptake has been low. The family planning uptake in the county is 16 percent (source: County Health strategic plan). During the plan period the uptake is expected to increase from 16 percent to 80 percent. The average household size in the County is six compared to the average national household size of 4.4.

Delivery at Healthcare Centres -Despite the good access to healthcare facilities, the county has got a very low percentage of mothers giving birth in healthcare facilities. This is very low and is the main cause of high Infant and Maternal Mortality Rates. Trans Nzoia Count Infant Mortality Rate (IMR) is 58/1,000 and the national IMR is 54/1,000. This is relatively high when it is compared to the IMR in Malaysia which is 6.2/1,000 live births. Improved maternal health care and reduction in infant mortality are key MDGs targets and hence the County needs to improve in this area

Table 7.2: Health institutions in the study area

FACILITY	DESCRIPTION
Kwanza Health Center	Sub-District Hospital
Kobos Dispensary	Community health center
Muongano Dispensary	Community health center

7.2.3 Education and Literacy

Pre-School Education

This is the only level of education that has been devolved to the counties. As at the end of 2012, the number of pupils in the Early Childhood Development Centres (ECD) was 36,185 with 956 teachers. At the start of 2014, the County had 813 ECD centres with 478 centres being public and 335 centres being private. The teacher pupil ratio was 1:38

Primary Education

Primary school education is a very important stage in the development of the person and the country. It is so important that UN has made it the second millennium development goal. Kenya on its own part has made primary school education free. There are 525 primary schools in the County of which, 336 are public schools and 189 are private schools. The County has 220,019 pupils enrolled in its primary schools. Out of these 109,477 constituting 49.7 percent are boys and 110,542 constituting 50.3 percent are girls with 4,559 teachers. The teacher to pupil ratio is 1:48 which is above the recommended ratio of 1:40. The dropout rate is 22 percent and the main reasons for drop out/ not going to school includes lack of school fees and other expenses and little appreciation of education among some residents

Secondary Education

The county has 178 secondary schools of which 163 are public and 15 are private. The enrolment is 44,734 of which 23,753 are boys and 20,981 are girls. Teachers are 999 and the teacher pupil ratio is 1:45 which is above the Ministry of Education recommended range of 1:40 and a transition rate of 52.7 percent. In the County, 10.9 percent of the residents have secondary school education.

Tertiary Education

In the last few years, the country has witnessed an explosive expansion of university education especially in terms of establishing new campuses across the country. The County has benefitted from this expansion and to date the Universities of Nairobi, Mt. Kenya University, Jomo Kenyatta University of Agriculture and Technology and Moi University have satellite campuses in the major towns of the County. In addition there is Kitale Technical Training Institute, Nzoia Teachers Training College and Kenya Medical Training College.

Literacy

According to the KIHBS 2005/2006 on literacy, 76.8 percent of the population aged 15 years and above can read. On the other hand 14.6 percent cannot read. The higher improvement on the rates of ability to read and write in the County can be attributed to free primary education and adult literacy classes.

7.2.4 Infrastructure and Access

Road, Rail Network, Ports and Airports, Airstrips and Jetties

The County has a total road network of 4,060.94 kilometres comprising of 154 kilometres of bitumen roads, 167.07 kilometres of gravel, and 786.37 kilometres earth roads and 2953.5 kilometres of rural access roads. Most of the roads are in poor condition and are usually impassable during the rainy season. The poor condition of the roads is a major bottleneck to development in the County which is rich in agricultural produce. It makes it difficult for farmers to access the market; especially for perishable produce. Maintenance of the existing roads shall be a major consideration in resource allocation in the prioritization of development programmes in the County during this plan period.

Trans Nzoia County has 23 kilometres of railway line that ends in Kitale Town (from Eldoret). The rail transport has been dormant but there is a possibility of revival if the national plans on the revival of the railway transport will be implemented as planned. The County anticipates benefiting from railway transport through transportation of bulky goods to and from the County in addition to its strategic position in road transportation to and from South Sudan.

The County has only an air strip but the Eldoret International Airports is within its proximity which provides an opportunity for the growth of horticulture as well as reduced travel time for air passengers.

Posts and Telecommunications

Development of the telecommunications industry has resulted to a decline in the use of postal services. The postal services will however remain important in the County until a time when majority of the people will have access to the other technologies. The county has 3 post offices and 6 sub post offices. Increasingly, courier services have taken over postal services and filled a gap that could have hampered delivery of parcels and letters. The main type of telephone communication is the mobile telephone and its coverage for households is over 60 percent; according to the 2009 Population and Housing Census. This coverage must have increased in recent years as the mobile phone has become the preferred medium for money transfers in and outside the country.

Energy

The main sources of energy in the County are firewood, kerosene, charcoal and electricity. Access to energy however varies in different parts of the County (rural and urban access). In terms of usage, different sources of energy are used for lighting and cooking purposes.

Lighting

According to the 2009 Population and Housing Census, in Trans Nzoia County, 84,035 of the 170,117 households comprising of 49.4 percent of the households use tin lamps for lighting, while 65,971 comprising of 38.8 percent of the households use lanterns, 977 (0.6 percent) of the households use pressure lamps, while, 15,121 that's 8.9 percent of the households use electricity, On the other hand, 914 that's 0.6 percent of the households use gas lamps while 994 households which consist of 0.6 percent of the household use fuel wood. 1,291 households comprising of 0.9 percent of the households use solar while 489 household-that's 0.3 percent households use other sources of energy for lighting.

Cooking Fuel

According to the KIHBS 2005/2006, 70.4 percent of the households interviewed use firewood for cooking, 18.4 percent use charcoal, 4.9 percent use paraffin, 3.7 percent use biogas residue, 0.8 percent use gas and 0.9 percent of the households use electricity. Another 1.0 percent uses other sources of energy for cooking. The above figures clearly indicate that majority of the residents use non-renewable sources of energy for lighting and cooking fuel. The biggest type of energy used for lighting and heating is wood fuel yet the County intends to increase her forest cover in the foreseeable future. This is a development challenge that needs to be addressed before it becomes a crisis in the future.

7.2.5 Crops and Livestock

Main Crops Produced

The main crops produced in the Trans Nzoia County are maize, beans, wheat, tea and potatoes. Other crops include coffee and a variety of horticultural crops. The total acreage under food crops is 143,807.5 hectares while that under cash crops is 1,477.12 hectares. Most of the land being under cash crop production is in Kwanza Constituency.

Average Farm Sizes

The average farm size in the County is 0.607. However, this varies across the constituencies within the County. For instance in Saboti Constituency, the average farm size is one and half hectares for small scale farming and thirty hectares for large scale farming. For Cherangany Constituency, the average farm size for small scale farming is 0.60705 hectares and 80.94 hectares for small and large scale farming respectively, while for Kwanza Constituency the average farm size for small scale farming is four hectares and 30 hectares for large scale farming.

Main Storage Facilities

The main on farm storage facilities in the County is ordinary stores/cribs and in the houses while go-downs and National Cereals and Produce Board silos are used for off farm storages. Some of the produce is also stored in the traditional farm stores (granaries).

Main Livestock Bred

Main livestock bred in the Trans Nzoia County include: cattle, goats, chicken, and Sheep. The total acreage under food crops is 143,807.5 hectares while that under cash crops is 1,477.12 hectares. Most of the land being under cash crop production is in Kwanza Constituency.

7.2.6 Forestry and Agro Forestry

The County has over 18 percent of the total county surface area forest cover as compared to the country which has a cover of 1.7 percent (Kenya National Climate Change Strategy 2010). This places the county at an enviable position in Kenya as one of the top 10 forested counties. The main forest types in the county are natural (indigenous forests), plantation forests, bamboo, moorland and grass.

The total area of gazetted forest in the county is 45,454.37 ha and the area of non gazetted forest is 252.53 hectares. In addition, there are many other undocumented forest areas under private and institutional ownership including the Mount Elgon National Park. The Main forest products include; timber, electricity posts, raw materials for paper and pulp industries among others. There are a number of farm forests within the County with plantations for commercial purpose. Forest products are mainly sold for timber, electricity posts and for industrial use (paper making).

7.2.7 Land and Land Use

The country's land tenure system has evolved overtime. At the time of independence the whole of Trans Nzoia County was Crown Land reserved for the 'white farmers'. After independence the ownership was transferred to the Government of Kenya.

Land Tenure

The County has two types of land ownership; public and private. The government owns the land where government facilities are erected, and also river and road reserves. The privately owned land was previously owned by the government but it has now been allocated or sold to individuals and institutions.

Land ownership is as follows:

- **Free hold land** – this is mainly agricultural land
- **Leasehold** – the leases are for a period ranging from 33, 66, 99 and 999 years.
- **Temporary occupational licenses** – these licenses are for up to 9 months and non permanent structures may be put up on the land parcels and are normally in urban areas.

Mean Holding Size

Small scale farmers on average have 0.607 Hectares of land while the large scale farmers hold an average of 12.15 Hectares. The increased sub division of land, due to land inheritance, has considerably reduced the mean holding size of land for small scale farmers. In addition most of the land in the County is acquired through cooperatives societies and with the subsequent sub division to members into smaller units, this has greatly reduces the mean holding size.

Percentage of Land with Title Deeds

The percentage of persons with title deeds in the county is 45 percent. This means that a 55 percent of the county residents owning land have no title deeds. This is very significant statistic as it implies that the majority of the county residents (mostly farmers) cannot get credit against their land as collateral.

Incidence of Landlessness

The instances of Landlessness in Trans Nzoia County have risen in the last 7 years. This can be attributed to internal displacement of persons. The 2007 post elections violence caused displacement of people in Kiboroa in Trans Nzoia West Sub-County; Salama, Balale and parts of Chepchoina in Kwanza Sub County. Landlessness has also resulted from evictions in Sabot, Sosio and Kapolet Forest Reserves.

7.2.8 Cooperative Societies

The County has 234 registered cooperatives but only 110 of these are active while 120 are dormant and four have collapsed. Most of these are formed by employees of government departments, farmers groups, private sector organizations and transport associations. The main types of cooperative societies in the County include dairy and coffee farmers SACCOS; transport SACCOS, rural SACCOS, urban SACCOS, land purchasing SACCOS, housing, consumer and investment SACCOS. The land buying, dairy consumer, housing and investment cooperatives are spread across the entire County, the coffee cooperatives are found in the coffee producing areas such as Muroki in Saboti Constituency. The transport and urban SACCOS are found mainly in the urban areas such as Kitale Town. The registered membership for the cooperatives societies is 39,655 and the turnover is KShs. 77,310,588 while the share capital is KShs. 1,266,596,246.

7.2.9 Non Governmental Organizations

There are many Non Governmental Organisations (NGOs) in the County undertaking various projects mainly on environment, food security and health. They include, among others, African Medical Research Foundation (AMREF), Health Right International, VI agro forestry and Handicap International.

7.2.10 Self Help, Women & Youth Groups

During the last few years, there has been unprecedented number of groups formed mainly as a result of the establishment of youth and women enterprise development funds. The Economic Stimulus programme also resulted in groups being formed to access state funds set aside for the purpose.

7.2.11 Markets and Urban Centres

Its only Kitale town which is classified according to the Urban Areas and Cities Act 2011, however, the other upcoming major urban centre is Kimini. The main market centres include Kachibora, Endeless, Gitwamba, Maili Saba, Sikhendu, Mucharage, Sibanga, and Kesogon. The number of trading centres in the County is 169. The development of markets and urban centres lead to an influx of people and increase in economic activities thereby leading to higher demand for facilities, services therefore exerting pressure on available facilities and space. This implies that there is an increased demand for employment creation, innovation and markets for goods and services. These issues are therefore critical in planning for the County. If not provided for, there will be possibilities for crime, pestilence and other undesirable social habits.

7.2.12 Housing

Housing is a basic need for human beings. The 2009 Kenya Housing and Population Census classified the distribution of housing in terms of main roofing, walling and flooring material as well as by urban and rural settings. The main roofing materials used in the County are corrugated iron sheets comprising of 81.6 percent of the household, 31.6 percent use grass while 2.9 percent use asbestos sheets. One percent uses Tiles another 0.2 percent uses concrete while one percent uses mud/dung. Another 0.5 percent uses other types of materials for roofing. The main types of walling material include mud/wood accounting for 68.1 percent, brick/block accounting for 15.8 percent, mud/cement accounting for 12.95 percent and stone accounting for 1.4 percent of the dwelling units in the county. Other types of walling material used in the County include wood only, corrugated iron sheet, grass straw, tin and others.

7.2.13 Access to Finance

In the last few years the country has experienced an explosion in financial inclusion mostly driven by the mobile money transfer. The bank mobile money interface has greatly reduced the costs of transactions especially for small to medium money transactions. Traders can borrow bank money through mobile money without going to a banking hall. 14 banks have an established branch network in the County, this include Kenya Commercial Bank, Barclays Bank of Kenya, Cooperative Bank, National Bank, Trans National Bank, Standard Chartered Bank, Equity Bank, Family Bank, Postbank, Diamond Trust Bank, K-Rep Bank, Kenya Women Finance Trust, Oriental and Eco-Bank.

7.2.14 Employment and Other Sources of Income

According to the 2009 Housing and Population Census, the County had 202,658 male workers and 208,321 female workers. 80 percent of the County's workforce is engaged in the agricultural sector.

Self-employed

Self-employed people are found in *jua kali*, hawking, professional occupations (lawyers, auditors and consultancy), retail and wholesale trade. A fast growing industry in terms of self employment is the bodabodatransporters. This is an important source of employment which requires low capital and is spread across the county; in both urban and rural areas. The bodabodaindustry has been able to absorb several young people who were hitherto previously not engaged in gainful employment.

Wage Earners

There are two types of wage earners in the County. Those employed by formal organizations such as the public service institutions and those employed in the informal sector. The latter are mostly in the urban areas employed in trade or in the *jua kali* sector. Casual labour is very common and it's seasonal and tends to vary with crop production cycles. For example there is heavy demand for labour during the season for harvesting maize and very little demand when the maize is growing. The horticultural sector which has steady crop production throughout the year is slowly gaining prominence. This source of employment should be encouraged as it has significant potential in Trans Nzoia County.

Unemployment Levels

From the 2009 Population and Housing census, 11,164 persons were seeking employment in urban areas, of these 5,027 were females and 5,137 males. On the other hand 15,331 males and 13,865 females were seeking employment in the rural areas bringing the total seeking for work in the rural area to 29,196. Thus the total populations seeking for employment both in the rural and urban area were 40,460 persons resulting to a 10 percent level of unemployment for the county. It should also be noted that most of the rural employment is seasonal and would follow the cycle of crops being produced. A case in point is maize growing. Employment is high when cultivating and harvesting seasons. There are about 5 months when the maize is growing and very little activities happen during this period. This is very significant as maize farming is the major economic activity in the county.

7.2.15 Industry

Trans Nzoia County is a major producer of agricultural products and has great potential for investments in agro industries, but very little of the produce is processed within the county. There are two tea processing factories in the County: Kapsara and Kapretwa. There are also two milk cooling plants, New KCC and Brookside. There is also one maize mill. During the plan period, the County shall focus on value addition of the major agricultural produce including Tea, Coffee, Maize, Milk and a variety horticultural product.

7.2.16 Tourism

Main Tourist Attractions, National Parks/Reserves

The county has a high potential of development of the tourism sector given its endowment with rich tourism attraction features. It is part of the western tourism circuit which has of late been a key marketing focus by the Kenya Tourism Board. The main tourism attractions in the county are around the Mt. Elgon ecosystem and the Saiwa Swamp with a variety of key attractions such as elephants, sitatunga antelopes, buffalos, waterbucks, primates, leopards, among others.

Main Sites

The main sites are: beautiful scenery, nature trails around Mt. Elgon, Kitale nature conservancy, river Nzoia, agro tourism (maize plantations like no other in the country) and Kitale Museum (snakes, artefacts and nature trail). The photos provides snapshot of what the county can offer.

7.3 Major Development Challenges

7.3.1 Poor Infrastructural Facilities

Poor and inadequate infrastructural facilities are a challenge especially roads considering that the County is the country's bread basket. The bad state of the roads hinder the transportation of the agricultural products, some of which are highly perishable and must be transported to the markets immediately after harvest leading to high transportation costs and wastages. Poor infrastructure also hinders the transportation of inputs to the farmers especially during the rainy seasons.

The County has a total road network of 4,060.94 kilometres comprising of 154 kilometres of bitumen roads, 167.07 kilometres of gravel, and 786.37 kilometres earth roads and 2953.5 kilometres of rural access roads. If not improved, it will hold back agricultural farm produce such as maize, beans, sunflower and milk from markets thus demoralizing farmers as they sell their produce at throw away prices to middlemen.

7.3.2 Declining productivity

These is as a result of continuous use of chemical fertilizers leading to acidity, non application of certified seeds and other farm inputs due to the high cost of agricultural inputs and the population pressure leading to subdivision of land into smaller uneconomical units hence decrease in productivity.

7.3.3 Insecurity

The County has been faced with insecurity problems; this includes cattle rustlers from West Pokot County and insecurity from Mt. Elgon in Bungoma County and from the neighboring country-Uganda. The County also experiences periodic animosity among the ethnic groups leading to clashes especially during electioneering periods. This insecurity has made the people to live in fear thus affecting their daily activities. Destruction of properties and displacement of people leads to retarded development. There are only three police stations in the county against total population 912,134. This is minimal hence the challenge on provision of adequate security.

7.3.4 Inadequate Social Facilities

The health and education sector are affected by inadequate and poorly maintained social infrastructures. For instance the county has only 7 hospitals (inclusive of sub district hospitals and private hospitals) despite having a very large population. Inadequate health facilities have thus affected provision of services in the health sector. In addition, a number of educational facilities in the county are in dilapidated state leading to lack of motivation and poor performance in national examinations. Over 70 percent of both primary and secondary schools going pupils walk between 1.1km and 5 km to the nearest school. Though the CDF and other devolved funds have invested heavily in these sectors there is need for more stakeholder involvement to improve the infrastructural facilities. The recreational facilities in the county are also inadequate hence there is need to expand and upgrade the facilities such as social halls and sports grounds.

7.4 Cross cutting issues

7.4.1 HIV/AIDS

HIV/AIDS has a serious effect on the economy including among others; reduction of available human capital, draining on resources as resources are diverted from Development programmes to support health care services for the affected, growing number of orphans thus increasing dependency; and decreasing man-hours and workforce productivity as sick offs increase at work places.

7.4.2 Climate change

While Kenya and indeed Trans Nzoia has made little contribution towards climate change, its effects have been felt all over, this includes among others; the occurrence of more frequent and severe droughts, more and frequent floods and increased prevalence of malaria in an area where malaria was previously not considered as a major illness.

7.4.3 Gender Inequality

Trans Nzoia County like the rest of the country experience different forms of gender biasness against women. While the county government has made considerable progress in addressing this inequality through the political appointments, women still hold lower political, social and economic status irrespective of their enormous contribution towards the economic development of this county. They have little access to land ownership, limited participation and representation in decision making forums, among other forms of inequality. To ensure equal participation and representation at all levels of development, there is need to fully implement the one third gender rule in employment, initiate programmes to support affirmative action projects and hold county sensitization forums in order to increase awareness and understanding of gender balance and women empowerment in socio-economic and political development of the county.

7.5 Community engagement

The rehabilitation and augmentation of Kwanza /Kolongolo water supply scheme is meant to serve those living in the study areas highlighted above. The water supply is in line with the County Government of Trans Nzoia strategic plan in supplying the larger Kwanza and Endebes constituencies with treated piped water, a project dubbed Kiptogot – Kolongolo water supply scheme. In order to develop the study up to implementation stage, the County's environment, water and natural resources department was consulted widely and their plans and proposals for the scheme subjected to feasibility analysis. The local communities and various development groups (like the Indagala community water supply group) in the respective areas of study were also consulted and their views and plans regarding the water supply scheme subjected to a feasibility study.

8 CONSULTATIONS AND PUBLIC PARTICIPATION

8.1 Introduction

Public Participation is a facilitative process of strengthening the organizational and management capacities of people in such a way that they become self-reliant in solving their own problems. It connotes the organized action of the people towards the resolution of issues or acquisition of what they desire and what may benefit them. Effective public participation requires the availability of adequate information in public inputs. The latter involves various values, critiques, questions, information, suggestions and other inputs, which are expressed by individuals, groups or organizations among the general public in an attempt to influence decision-making. Public consultations with Interested and Affected Parties (IAPs) were done with the following aims:

- Improve project design and thereby minimize conflicts and delays on implementation
- Facilitate the development of appropriate and acceptable entitlement options
- Increase long term project sustainability and ownership
- Reduce problems of institutional coordination
- Make the resettlement process transparent
-

Objectives of Public Participation

The main objective for the public participation process was to involve the community at the early stage of design so as to identify likely negative impacts and find ways to minimize negative impacts and enhance positive impacts within the project.

The main objectives of public participation were to:

- Provide clear and accurate information about the project to the beneficiary community
- Obtain the main concerns and perceptions of the community and their representation regarding the project
- Obtain options and suggestions directly from the affected communities on their preferred mitigation measures
- Identify local leaders with whom further dialogue can be continued in subsequent stages of the project.

8.2 Methodology

Public participation was mainly achieved through direct interviews, observations, questionnaire administration, holding a stakeholder workshop and a public meeting. The EIA team began the public consultation process by holding preparatory meetings to strategize on how to engage the stakeholders in the EIA process. This was done in consultation with the County Water Director, who helped in the process of identification of the significant actors/stakeholders who could provide data relevant to the proposed project. The following is a detailed discussion of public consultation methodology used by the EIA team.

8.2.1 Direct Interviews

Direct interviews were used to get responses relevant Government officials at both the National and County levels. Interviews were also carried out with opinion leaders within the community; local politicians; local members of the National Government Administration including area chiefs and their assistants as well as the Ward Administrators at the County level. Their comments were sought through engaging them in discussions about the proposed project and the benefits that are likely to accrue as a result of its implementation. This kind of engagement gave the respondents the opportunity to give insights and details about the issues at hand.

8.2.2 Questionnaire Administration

Questionnaires were prepared and administered to the various stakeholders identified at the initial stages of the study. The team then organized visits to meet the representatives of all the stakeholders identified, whom they met and spent considerable time with, and held discussions with them on their opinions about the proposed project.

8.2.3 Consultative meeting

A consultative meeting with various stakeholders who included Trans -Nzoia County Departmental Heads, County Assistant Commissioner, chiefs, assistant chiefs, and officials from LVNWSB was held at Kwanza Centre on 30th November 2015. The Objectives of the consultative meeting were:

- To brief the key stakeholders on the proposed project
- Obtain views and concerns of the County Departmental Heads in regard to the proposed project.
- To accommodate the inputs of the Government officers in preparations for a public Baraza.





Consultative meeting in progress at Kwanza Centre held on 30th November 2015

8.2.4 Public Barazas

Two public Barazas were held at the Asega Dam site on 1st December 2015 and at Kwanza Centre on 2nd December 2015 as way of reaching as many stakeholders as possible. The meetings were meant to give more members of the local community opportunity to express their views, fears and expectations, if any, about the proposed project. These meetings, which was chaired by the County Assistant Commissioner, was attended by members of the local community, National & County Administration, Heads of Departments in West Pokot County and representatives from LVNWSB.

Objective of the Public Barazas

The main objective of these meetings was to inform the local people, leaders and other stakeholders about the proposed project and its objectives and to initiate public involvement processes, in a bid to induce and cultivate a sense of peoples' belongingness to the project. The other objectives were:

- To create awareness about the project to the community with respect to the development approach that will be employed in the project and the roles and responsibilities of the community.
- Informing the community about the anticipated project management structure in relation to effective project operation, management and maintenance.
- Inclusion of the community in the development of the project at the planning stage.
- Getting feedback from the communities on their views on the project and issues of concern.





Participants at Public Baraza held at Asega Dam site on 1st December 2015



Participants at Public Baraza held at Kwanza Centre on 2nd December 2015

Gender Participation

During the public meeting held at Kwanza on 2nd December 2015, 17 No. (22%) were female while 61 (78%) were male

8.3 Emerging issues from Public Consultations

Table 8.1: A summary of main issues raised and responses

S/No	Issue	Response provided
1. Mr. Shem Wekesa – Secretary, Asega Dam WRUA	Compensation of private land to be taken for the works at the Asega Dam Intake.	A RAP exercise is being undertaken and land and property that will be affected by the project will be fully compensated for after the necessary assessments and valuations.
2. Ms. Jane Andai – Farmer, Asega area	How will the land owners adjacent to the dam know if their land has been affected?	A survey will be carried out to establish the original area set aside for the dam and fix the beacons in accordance to survey records.
3. Mr. Boniface Swahili – Chairman, Asega Dam WRUA	Will the work on the rehabilitation of dam be completed since the previous contractor did only part of the work?	Some works have been earmarked under this project to rehabilitate the intake works at the dam.
4. Mr. Simon Nabiba, Resident, Kolongolo area	Will Kolongolo area be covered since the area has had no water for over 10 years?	Kolongolo area as well as the original supply area under Kwanza water supply scheme will be supplied with water upon completion of the proposed rehabilitation works.
5. Mrs. Terry Wafula, Farmer Kwanza	Will there be cases of diseases from water supplied?	Water will be treated before supply to the public. There shall be routine water quality testing to ensure the quality of water supplied meet acceptable standards.
6. Mr. Benjamin Kiplagat – Resident Kwanza	Is there adequate land at the proposed water treatment site and who owns the land?	About 1 ha. of land has been set aside for the works which is adequate for the proposed works. The proposed site is within public land under the County Government.
7. Mrs Susana Nafula – Farmer Luuya	Will the water now be enough for all the people?	After the rehabilitation of the project, the areas covered by the project will be served with regular supply of water to meet their needs in the short term while long term solutions are sort.
8. Mr. Stanley Mwangi – Maridadi Horticulture farms	Will the water supplied be metered?	The local water provider will have the water connections metered to improve on revenues and hence ensure sustainability.
9. Mr. Geoffrey Olwenyi – Farmer, Keiyo area	How will the implementation of this project be beneficial to the locals?	The local people will be engaged as workers by the contractor while the business in the area will thrive as a result of the construction activities.
10. Mr. Patrick Wanjala – Resident, Kobos area.	Who will be in charge of the water supply scheme?	After, the rehabilitation works, LVNWSB will hand over the project to the County government who will appoint a water service provider to manage the project.

8.3.2 Acceptance of the Project

97% of the people interviewed during the survey carried out between 16nd to 24th October

2015 did not have any objection to the proposed project. However the acceptance was with a rider in form of a condition that the project be implemented in time for the members to benefit from it as there have been various promises in the past but with no action taken.

8.3.3 Water supply

There were some concerns on whether all communities within the project area will have access to the water.

They were assured that the design will ensure that water will be accessible to as many people within the project area.

8.3.4 Land issues

The community expressed their fears of being displaced from their land and their businesses interrupted due the implementation of the project. This issue was addressed by explaining to the community that the proposed project is of rehabilitation in nature and no new lands will be required. Those who will be affected will be compensated.

8.3.5 Employment

The proposed project will present many employment opportunities both during construction and operation phases and the community members proposed that people from the households within the affected area should be given priority during recruitment.

8.3.6 Environmental Impacts

There was concern that the increased amount of water will increase the volume of waste water from households and businesses in Kwanza and Kolongolo Wards since there is no sewerage system.

8.3.7 Operation and Maintenance of the Project

The community was concerned if they will be involved in the construction phase of the project. They were encouraged that the community will be involved in all phases of the project development and this project can be an avenue for youth involvement. The community was also made aware that the scheme will be handed over to the local water company once construction is completed for operations & management.

8.3.8 Health

Concerns of an increase in malaria in communities due to stagnant waters which act as breeding grounds for mosquitoes commonly associated with irrigation.

8.3.9 Gender Issues

The women noted that the project will assist them by bringing water sources closer to them. Currently the women and girls have to go long distances in search of water

9 ANTICIPATED IMPACTS & MITIGATION MEASURES

Economic, social and environmental change is inherent to development. Whilst development aims to bring about positive change it can lead to conflicts. In the past, the promotion of economic growth as the motor for increased well-being was the main development thrust with little sensitivity to adverse social or environmental impacts. The need to avoid adverse impacts and to ensure long term benefits led to the concept of sustainability. This has become accepted as essential feature of development if the aim of increased well-being and greater equity in fulfilling basic needs is to be met for this and future generations. The Environmental and Social Impact Assessment (ESIA) has been systematically conducted to determine whether or not the proposed project will have a diverse impact on the environment. The Environmental Management and Co-ordination Act (EMCA) No.8 of 1999 provide the legal and statutory guideline for the Environment and Social Impact Assessment process in Kenya. Therefore this ESIA is a formal process to predict the environmental consequences of the proposed developments and to plan appropriate measures to eliminate or reduce adverse effects and to augment positive impacts. The ESIA thus has three main functions:

- To predict problems/ impacts;
- To find ways to avoid them,
- To enhance positive effects / impacts.

Water projects like the one covered in this study induce and generate a wide range of physical, biological and social changes with consequences to the environment during both the construction and operation phases of the project. This chapter will highlight impacts which will be induced by the proposed Kwanza Water Supply Rehabilitation Project. To this end, the focus of this chapter will be:

- To identify and analyze the extent of the environmental and social impacts from the project;
- To assess the environmental impacts of the operation and maintenance activities;
- To assess the social impacts from the project;
- To discuss the decommissioning of the project.

9.1 Definition and Classification of Environmental Impacts

An environmental impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be:

- Positive (beneficial) or negative (adverse);
- Direct or indirect, long-term or short-term in duration, and wide-spread or local in the extent of their effect.

Impacts are termed cumulative when they add incrementally to existing impacts. In the case of the project, potential environmental impacts would arise during the construction and the operations phases of the project and at both stages positive and negative impacts would occur.

9.1.1 Impact significance

The purpose of this ESIA study report is to identify the significant impacts related to the project or activity under consideration and then to determine the appropriate means to avoid or mitigate those which are negative.

Significant impacts are defined, not necessarily in order of importance, as being those which:

- Are subject to legislative control;
- Relate to protected areas or to historically and culturally important areas;
- Are of public concern and importance;
- Are determined as such by technically competent specialists;
- Trigger subsequent secondary impacts;
- Elevate the risk to life threatening circumstances; and
- Affect sensitive environmental factors and parameters.

9.1.2 Impact Identification

The study has predicted and evaluated anticipated impacts using acceptable standard methods of impact prediction and evaluation. The study team used several approaches such as brainstorming and use of checklists and matrices, to identify the main sources and establish the potential impacts from the proposed main project activities. Public participation and consultation with a wide sector of the community were conducted to reduce uncertainty.

9.2 Positive Impacts during Construction

9.2.1 Employment Opportunities

The construction phase of the project will be characterised by recruitment of significant numbers of people to work with the contractors. In order to improve employment opportunities and make the project attractive to the people living in the area, the following are vital:

- Capacity building and training of men, women and youth on specialised labour that will be required during construction;
- Gender mainstreaming during the recruitment process of workers to work in the construction process;
- Open recruitment without bias to any gender, clan would enhance the project acceptability.

9.2.2 Influx of the people to the project area

There will also be an influx of new people into the project area. An increase in population will create a corresponding increase in demand for goods and services such as food for construction workers, housing, healthcare and need for transport. These needs will be satisfied by people living within the project area where local women will provide food vending services, homes will rent out spaces for the new population and shops will also benefit from increase of sales. All these avenues are bound to create new employment opportunities. Indirect employment will therefore be created in form of selling foodstuff to the construction workers.

9.2.3 Creation of a market for construction

The Project will require materials, some of which will be sourced locally and some internationally. These include plant (pump sets, switch gear, instrumentation) steel pipes, valves, cement, sand, hardcore and chemicals. This will provide a ready market for suppliers in and outside the project area.

9.2.4 Creation of wealth

The proposed development will ultimately provide revenues to the exchequer and expand the wealth base for the nation as a whole. It will pump both liquefied and tied up wealth hence making the nation gain. It will also go a long way in cementing the value of the Project area and its neighbourhood as a whole.

9.2.5 Gender Mainstreaming

Women as well as men will benefit equally from the employment opportunities that will be created and from convenient and safe access drinking water. During the construction period, it is anticipated that there will be further income generating activities for women such as food catering/restaurants for workers on the construction sites and the selling of local products to construction camp workers. These activities will benefit mainly women who are very often the sole supporters of their families. It is also recommended for the contractor to give equal employment opportunities to women as well as men within the project skills requirements, and to maximize the procurement of local products and services.

9.3 Assessment of Negative impacts during Construction

The negative impacts during construction phase are discussed below:

9.3.1 Impacts of displacement on PAPs

Without proper planning and management, involuntary resettlement may result in long-term hardship for affected people and environmental damage. Social impacts of resettlement are expected to arise from the social upheaval and effects on the social fabric. These impacts include effects on access to social services such as schools, hospitals, water supply, access roads and communication. A number of structures have been erected along proposed pipeline routes and at tank sites and will require to be removed to facilitate construction works. Some crops and trees along pipeline routes will be destroyed. Majority of the PAPs are subsistence farmers and small scale traders whose incomes will be greatly affected.

Mitigation

- PAPs shall be given a 6 months' notice prior to relocation of the affected semi permanent structures;
- The PAPs will be compensated at full replacement cost for their structures;
- Payment of compensation will be done prior to commencement of any construction activities;
- Valuation report will be produced during full RAP study which will detail the extent of economic loss by PAPs for compensation purposes;
- PAPs will be given an opportunity to salvage remains of the structures that will be removed;
- In case of loss of asset, both husband and wife and the local administration will be involved to ensure that money given is used for the intended purpose so that the household does not suffer. In this case, money should be paid into a joint account in the name of husband and wife.
- Compensation for loss of crops and trees is cash at full replacement cost;
- For farmers who grow seasonal crops LVNWSB will issue a 3 months' notice to the farmers to harvest their crops;
- As a gesture of good practice, after compensation for trees, LVNWSB will allow the PAPs to use the chopped trees products.

9.3.2 Increased water demand

During the construction phase of the proposed [roject, both the construction workers and the construction works will create demand for water in addition to the existing demand. Water will mostly be used for construction. It will also be used by the construction workers to wash and drink.

Mitigation

- The Contractor shall ensure that water is used efficiently at the site by sensitising construction staff to avoid irresponsible water use;
- The Contractor shall ensure that any water handling equipment, facility and systems shall be appropriate for the intended usage. Water used on the construction shall reflect the level of conservation achieved by the Contractors. Documentation of amounts of water used will therefore be mandatory.

9.3.3 Interference with the physical setting

The proposed project could result into the following negative impacts to the physical setting:

- Significant change in local topography during site grading and laying of pipes;
- Blockage of natural drainage system at valley crossings;
- Excavation for creation of access routes and related structures; and
- Development of informal business depending on the intensity of labour import.

Mitigation

- The design shall in no way propose to implement developments that will hinder drainage, change the topography or introduce physical changes that are not in harmony with the physical setting of the project area;
- The structures to be developed should be aesthetically acceptable to blend in with the surrounding. These structures should not form or end up being used by the resident population as access or bridges.
- No residential facilities shall be erected on site and the proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations.
- Restoration shall be undertaken to ensure that the original setting is as much as possible retained.

9.3.4 Interruption of existing infrastructure

The pipeline follows several existing roads within Kwanza & Kolongolo Wards and there is basically going to be interference of transport in these areas during excavation and laying of pipes albeit to a small extent due to low traffic volumes in the areas. If not properly managed the project could lead to accidents. The water line is going to pass through various road reserves and in most cases there are;

- Underground utilities e.g. electricity and communication links; and
- Fences, buildings and structures.

These services are critical and have implications with spillover effects on the social and economic performance.

Mitigation

The following should be done for all crossings of installations:

- Formal engagement of key land and other property owners neighbouring the pipeline;
- Passing of relevant information to each of the affected parties;
- A work plan with clear responsibilities for each party should be developed to ensure smooth execution of the construction; and
- On completion of works, each property owner should be contacted again to give views and if complains arise the contractor asked to address the same.

9.3.5 Flooding during construction

The project involves excavation and laying of pipelines. The construction activities, during rainy seasons, could act as artificial drainage trenches for runoff, and redirect water to people's farms and homes. Moreover, blockages of these water distribution channels during construction may lead to water stagnation, a recipe for flooding and destruction of crops.

Mitigation measures

- Ensure water pipelines are properly excavated;
- Regularise checks and inspection of the pipelines to avert blockages;
- The Resident Engineer should inspect all pipeline connections and joints.

9.3.6 Vegetation loss

The vegetation of the area covered by the main pipelines mainly involves transformed vegetation, with a few thorny bushes. The thorny bushes, grass and transformed vegetation will be cleared for the works. These developments therefore will disturb the existing vegetative cover to some extent.

Mitigation

- The contractor should ensure that vegetation is cleared only where necessary and in the process mature trees are cut, new trees should be planted in areas adjacent to the cleared one;
- The contract should provide for planting of indigenous trees in the buffer zone, for landscaping, absorption of nuisance gases during operations.

9.3.7 Soil erosion & Soil compaction

Excavation of soil for laying of pipelines as well other works as are major activities during the construction phase of the project. They are bound to result in significant amounts of loose residual. High traffic, especially the heavy trucks within the project area as a result of construction activities is likely to lead to compaction of the soil structure. The net result will be reduced percolative and infiltrative capacity of the soil leading to reduced soil-water balance in the affected soils.

Mitigation

- The contractor must implement erosion control measures to avoid erosion in areas that are prone to erosion, e.g. steep slopes and drainage lines;
- Topsoil must be reinstated and rehabilitated on top of sub soil;
- All excavation works must be properly backfilled and compacted.
- Vehicles must be kept on existing roads or tracks where possible;
- Minimize compaction during stockpiling by working the soil in the dry state;
- Avoid unnecessary vehicle movement;
- Rip compacted areas to reduce runoff and re-vegetate where required

9.3.8 Contractor's camps

The construction contractor will need to establish camps including site offices, workshops, stores, vehicle parking, and staff accommodation. The camp sites are bound to have high human activity, material storage facilities, sanitary facilities, waste generation and disposal.

Mitigation

- The camps should have comprehensive waste management and sanitation plan and facilities.
- All storage tanks and equipment should have correct labels and Material Safety Data Sheets.
- Adequate emergency response plan should be in place in the camps.
- The contractor should employ best practice management "housekeeping" (site cleanliness, waste disposal etc.) in all the camps.
- The contractor's facilities should be completely removed from site after use and the land restored to its previous condition or better.

9.3.9 Extraction of natural resources

The contractor will require bulk materials for construction works. These materials include sand, gravel and aggregates (rock). Preliminary Survey indicates that significant quantities of naturally occurring sand are available in the project area and there are existing sources near the project area which is currently used for local construction. Sourcing, and transport of these materials are likely to result in ground structure distortion, vegetation loss, dust emission, oil spills from trucks, noise and even accidents or driving related incidents both to the workers and the general residents of the area.

Mitigation

- The construction contract should stipulate that the Contractor sources materials from an approved site;
- Maximise the re-use of excavated materials in the works, as fill;
- Close all borrow pits and quarries in accordance with an approved plan to maximize their long-term biological productivity (capacity for plant growth) and minimise health and safety hazards.

9.3.10 Construction wastes

(a) Solid wastes

Construction will result in the creation of various solid wastes, principally surplus earth and rock (soil debris), metal scraps, plastics (wrappings and containers), cardboard, paper, wood, office wastes including e.g. used toner cartridges, kitchen (canteen) wastes, workshop wastes including e.g. used oil filters, and waste concrete. Effects of mismanaged wastes include public nuisance due to littering or smell from rotting and creation of breeding grounds for vermin like rats and roaches. Unmanaged disposal of spoil can result in sterilization of productive land and the creation of ongoing erosion, sedimentation or drainage problems.

Mitigation

- The contractor must enforce the appropriate management methods based on the three Rs (reduce, reuse, and recycle).

- For waste handling the contractor should provide litter collection facilities such as bins;
- Final disposal of the site waste should be done at a location that shall be approved by Resident Engineer in accordance with the waste management plan after consultation with the relevant stakeholders, including the local community.
- The disposal site need to be more than 100 meters from watercourses and in a position that will facilitate the prevention of storm-water runoff from the site from entering the watercourse;
- The tender documents should specify proper solid waste handling as provided in the waste management plan during site preparation phase of construction prior to project works commencing in identifying optimal waste re-use options and licensed disposal areas. This should strictly be adhered to by the Contractor;
- The Contractor should not burn chemical or hazardous wastes on site or dump in open pits;
- Maximise the re-use of all excavated materials in the works;
- Dispose of surplus material ("spoil") only at designated sites using approved methods; if agricultural, these methods must consider topsoil conservation and quality; if infrastructural, these methods must consider long-term soil stability against shrinking and swelling. In both cases the fill platforms must be secure against erosion, and not interfere with floodwaters;

(b) Wastewater

During the construction phase, various liquid wastes including grey and black water (respectively washing water and sewage), concrete washings, runoff from camp and workshop areas, and various liquid waste streams from washing construction vehicle and equipment washing will be generated.

Mitigation

- All grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) to water courses should be contained and properly channeled;
- Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site;
- Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered;
- Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted.

The standards below for waste water treatment shall be maintained:

WORLD BANK GUIDELINES: Indicative Values for Treated Sanitary Sewage Discharges

Pollutant	Units	Guideline Value
pH	pH	6 –9
BOD	mg/l	30
COD	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	MPNb/ 100 ml	400

9.3.11 Oil spills

The construction phase will involve the use of stationary and mobile plant and equipment requiring refuelling and the construction of permanent and temporary fuel storage facilities. As with any construction activity this will increase the possibility of accidents and spills, the two most likely impacts being contamination of soil by used engine oils and the spillage of diesel from mobile browsers. Contaminated soil is injurious to plant growth and must be removed. Contamination of water is potentially more serious since pollutants may move fast destroying aquatic life and rendering water unsafe for domestic and livestock use

Mitigation

- Vehicle maintenance should be done on purpose-built impervious concrete platforms with oil and grease traps.
- Standard operating practices for refuelling mobile equipment such as a minimum 15m from any water channel should be practised.
- Operator training is an important aspect of preventive approach and should be put into used before assignment or in the course of duty.
- All above surface tanks should be bounded and mounted on paved surfaces.
- Ensure that all equipment is in good condition, clean and free from leaks.
- Oil spill containment and cleanup equipment should be kept at the contractor's camps.

9.3.12 Air quality and dust

Principal dust sources during construction will be generated during blasting and excavation works and possibly from project borrows pits and quarries and also during haulage of construction materials over distances. Gases from construction equipment and vehicles will also be emitted. The dust may cause respiratory complications to workers and nearby residents. Fumes and carbon compounds from the equipment and machines inhibit visibility and form deadly compounds in the air. If inhaled, severe respiratory complications are imminent.

Mitigation

- Workers shall be trained on management of air pollution from vehicles and machinery;
- Vehicles delivering soil materials should be covered to reduce dust emissions;
- Activities generating dust (excavation, handling and transport of soils) to be carried out in calm weather. The Resident Engineer shall suspend earthworks operations wherever visible dust is affecting properties adjoining the work site;
- The contractor should provide dust masks to all personnel on dust-prone work sites;
- Records of related complaints should be kept by the contractor and communicated to the Resident Engineer;
- All construction machinery should be maintained and serviced in accordance with the equipment specifications and manufacturer's standards;
- The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible.

Air quality shall be monitored against standards indicated below:

World Health Organisation (WHO) Ambient Air Quality Guidelines

Pollutant	Averaging Period	Guideline value in µg/m ³
Sulfur dioxide (SO ₂)	24-hour	125
	10 minute	500
Nitrogen dioxide (NO ₂)	1-year	40
	1-hour	200
Particulate Matter PM ₁₀	1-year	70
	24 hour	150
Particulate Matter PM _{2.5}	1-year	35
	24-hour	70
Ozone	8-hour daily	160
	Maximum	100

9.3.13 Noise and vibrations

Emissions are likely to arise from the movement of heavy equipment for trenching and transport of building materials, trenching activities including storage of excavated materials, blasting, and movement of personnel / vehicles. Increased noise levels around schools, churches, market centres and homes will be a nuisance and may disrupt day to day activities.

Mitigation

- Noise levels shall be kept within acceptable limits and construction activities shall, where possible, be confined to normal working hours;
- Equipment should be maintained regularly to reduce noise resulting from friction;
- Workers in the vicinity of high-level noise to wear Personal Protective Equipment;
- Limit pickup trucks and other small equipment to an idling time, observe a common sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible;
- No unnecessary hooting by project and resident vehicles;
- Noise levels should be kept within acceptable limits preferably as stipulated within the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Control Regulations, 2009.
- Any complaints received by the Contractor regarding noise will be recorded and communicated to the Resident Engineer.

IFC/WB Noise Level Guidelines

Noise impacts should not exceed the levels presented below:

Receptor	One Hour LAeq (dBA)	
	Day time 07:00 -22:00	Night time 22:00 -07:00
Residential; institutional; Educational	55	45
Industrial; commercial	70	70

9.3.14 Occupational health and safety

The construction process is estimated to take 1 year. These activities may involve employment of hundreds of workers in site, increasing chances of workplace accidents, injuries and illnesses. Health and safety of workers at the work place is a sure motivator to enhance productivity. It will thus be paramount that the contractor adheres to best practices in occupational health and safety. Moreover, the public may be involved in accidents arising from contractor's vehicles.

Mitigation

- Contractor to establish a comprehensive Health and Safety Policy.
- Ensure compliance with all standards and legally required health and safety regulations;
- Include standard best practice health and safety provisions in the construction contract. The provisions should include insurance to enable the contractor to pay for any and all treatments required by his workers including those of all sub-contractors, together with any subsequent lifelong disability payments;
- Include a specific task in the supervision contract concerning H&S supervision and compliance, together with the staff resources to carry this out, and possibly including a training task for the Employer's staff;
- Establish and enforce a strict code of conduct for all project drivers including outside suppliers delivering materials. The code should focus on safety, especially speed, and loading, especially banning all carriage of staff, workers and passengers except in seats;
- Implement the specified H&S programme throughout the construction period;
- Establish an emergency response procedure and display on all work areas. This is likely to require one vehicle on site equipped as an ambulance and a paramedic on site at all times during construction activities
- Provision of a standard first aid kit at the site office at all times;
- Provision of fire-fighting equipment available at the workers camp;
- Medical check-ups before employment including AIDS test (and TB) for all staff and workers, and provide anti-retroviral drugs to all workers testing HIV+;
- Provision of medical facilities for staff

9.3.15 HIV/AIDS

The HIV/AIDS prevalence rate in the area is high. During construction, the project is likely to bring in a significant population of new people in the project area chances are high that new infection rates will increase. This is due to the fact that the traders, workers and farmers will have money to spend and some may use it to attract women from the project area in a bid to solicit for sex, thereby creating avenues for spread of HIV/AIDS.

Mitigation

- The Resident Engineer should ensure that prevention and management of sexually transmitted diseases as a result of social interaction between immigrant workers and local populations is conducted;
- Selecting appropriate locations away from concentration of human settlements for construction camps;
- Education and sensitisation of workers and the local communities on STIs including provision of condoms to the project team and the public.
- Where possible conduct regular sensitisation campaigns and monitoring and evaluation of the modes used during the two year course of the project;
- Formation of peer groups from among the project staff to ensure continuity in training and awareness raising;
- The contractor has to institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at prominent locations as specified by the Resident Engineer;

- The contractor has to ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases;
- The contractor should ensure that the project workers are sensitised on the local culture;
- The contractor should ensure the mobilization and sensitization of the general population on reproductive health and STIs.
- Sensitize workers and the surrounding community on awareness, prevention and management of HIV / AIDS through staff training, awareness campaigns, multimedia, and workshops or during community Barazas.

9.3.16 Traffic management

Construction activities may result in a significant increase in movement of heavy vehicles for the transportation of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities.

Mitigation

The incidence of road accidents involving project vehicles during construction should be minimized through a combination of education and awareness-raising, and the adoption of procedures.

- Emphasizing safety aspects among drivers;
- Improving driving skills and requiring licensing of drivers;
- Adopting limits for trip duration and arranging driver rosters to avoid overtiredness;
- Avoiding dangerous routes and times of day to reduce the risk of accidents;
- Use of speed control devices (governors) on trucks, and remote monitoring of driver actions;
- Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present. Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaigns);
- Using locally sourced materials, whenever possible, to minimize transport distances;
- Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure..

9.3.17 Child Labor

Due to the high poverty level within the project area, there could be cases of child labour hired for construction works which is against National & International Conventions against abuse of children rights.

Mitigation

- The Proponent/Contractor will not employ children in any manner that is economically exploitative, or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.
- The Proponent/Contractor will identify the presence of all persons under the age of 18 & no children under the age of 18 will not be employed in any work.
- Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the police.
- The Proponent/Contractor should ensure that all the employees sign a code of conduct to be used during their employment.
- WB guidelines for protection against child labour are strictly adhered to.

Applicable Standards: Performance Standard 2 - Labor and Working Conditions IFC January 1, 2012

- To promote compliance with national employment and labor laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- To avoid the use of forced labor.

9.3.18 Gender Equity/Sexual Harassment

Negative gender impacts would arise from discrimination in hiring construction workers if preference is given to men who are perceived to be stronger and more resilient. Social norms restrict women's sphere of activity

Mitigation

- The Proponent & Contractor should practice the Non-Discrimination and Equal Opportunity principle in hiring of workers.
- The Proponent/Contractor will not make employment decisions on the basis of personal characteristics unrelated to inherent job requirements.

- The Proponent/Contractor will base the employment relationship on the principle of equal opportunity and fair treatment, and will not discriminate with respect to any aspects of the employment relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotions, termination of employment or retirement, and disciplinary practices.
- The Proponent/Contractor will take measures to prevent and address harassment (including sexual harassment, intimidation, and/or exploitation, especially in regard to women. The principles of non-discrimination apply also to migrant workers.
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labor laws.
- To avoid the use of forced labor.
- Gender mainstreaming in employment at the worksite with opportunities provided for females to work, in consonance with local laws and customs.
- Ensure positive discrimination in job allocation to construction workers whereby women are given tasks they would do best, based on their potential.
- The works contractor should be required, under its contract, to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national law where applicable.
- Women could also take advantage of the influx of population in the area to be involved in small and medium enterprise/trade that would boost their economic well-being.

Applicable Standards: Performance Standard 2 - Labor and Working Conditions IFC January 1, 2012

- To promote the fair treatment, non-discrimination, and equal opportunity of workers
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labor laws.
- To promote safe and healthy working conditions, and the health of workers.

9.3.19 Labour influx

Some of the skilled labourers will have to be brought in from outside the project area, and this may cause some resentment among the local people. Generation of employment opportunities by the project could result into conflict between local residents and new comers or outsiders, if not appropriately managed. A concern expressed during consultations was that unskilled labour may be available to men more than women leading to gender discrimination.

Mitigation

- To avoid conflicts with the local people on employment, it is proposed that the Contractor employs the locals in liaison with local administration in unskilled and semi-skilled duties;
- Unskilled construction and skilled (if available) labor to be hired from the local population as far as possible to minimize on influx of foreigners into the community.
- Use of manual labor during trenching works where possible to ensure more employment of locals and hence ensure project support throughout the construction process.

9.3.20 Crime management

The influx of workers, typically young males seeking construction jobs will be associated with a series of social challenges such as crime, alcoholism/illicit drug abuse and prostitution. These are often related to the spread of sexually transmitted diseases including HIV/AIDS. Vices such as drug abuse and prostitution would affect social coherence and security in project communities tarnishing the image and intent of an otherwise good project.

Mitigation

- Community sensitization on respect of public property; community policing during project implementation.
- Removing any employee who persists in any misconduct or lack of care, carries out duties incompetently or negligently, fails to conform to provisions of the contract, or persists in any conduct which is prejudicial to safety, health, or the protection of the environment.
- Taking all reasonable precautions to prevent unlawful, riotous or disorderly conduct by or amongst the contractor's personnel, and to preserve peace and protection of persons and property on and near the sites.
- Prohibiting alcohol, drugs, arms, and ammunition on the worksite among personnel.
- Security arrangements must be included in the Bills of Quantities to avoid any delays which might be caused due to insecurity.
- The Supervising Engineer and Contractor in liaison with the security organs must create awareness to the security situation on the ground all the times.

- Appropriate fencing, security gates, shelter and security guards are to be provided at the construction sites to ensure the security of all plant, equipment and materials, as well as to secure the safety of site staff.
- The Contractor must ensure that good relations are maintained with local communities and their leaders to help reduce the risk of vandalism and theft.
- Site staff that are found to be involved in incidences of theft or pose other security risks to the local community are to be dismissed and reported to the authorities.
- It is expected that the Contractor will make arrangements for security of its properties, equipment and worker's. This will curb on incidences of theft which may lead to loss of property and delay in project completion.
- The contractor shall involve local leaders in labour recruitment to ensure people hired have no criminal records.
- Local governments and the contractor shall collaborate with police to contain criminal activities.

9.4 Positive Impacts during operations

Safe drinking water and adequate environmental sanitation are preconditions for health and for success in the fight against poverty, hunger, child deaths and gender inequality. They are also central to the human rights and personal dignity of every human being. The adverse impacts of poor environmental sanitation can extend well beyond the direct impacts on health. Therefore, investment in water and sanitation is a highly cost-effective policy option, taking into account that the additional expected benefits, such as reduced morbidity, time spending, and environmental hazards, would further increase the benefit-cost ratio. The specific positive impacts during operations are therefore discussed below:

9.4.1 Improved Water Quality and accessibility to clean water

Improved water quality will in turn reduce exposure to water borne diseases to the consumers. General hygiene in the served area will improve through use of acceptable water quality. Majority of the population in Kwanza & Kolongolo Wards will have access to clean water. Extension of the distribution networks will make more people access clean water as compared to the number that is currently accessing. Access to water will in the long term result in improved income levels and health of the people, this consequently leads to poverty reduction. Reduced distances travelled and time used to collect water is then put to economic activities.

9.4.2 Reduced Exposure to Health Risks

Improved water quality for domestic consumption reduces the risk to the health of the consumers that could translate into financial saving through less health related expenditures.

9.4.3 Sustainability of Local Water and Sanitation Company

Increased revenue collection will help the company to be sustainable in terms of meeting their own operational cost which are currently being subsidized by the Government.

9.4.4 Enhanced Gender and Participation in Development

Female form a high percentage of the area population but are in-adequately participating in development activities due to the burden of fetching water. The resultant safe drinking water, reduced distance to water will profoundly benefit women and create more time for them to engage in other productive activities.

9.4.5 Improving access to basic sanitation to institutions

The project will promote sanitation and hygiene in schools and other public places.

9.4.6 Increased investments

Improved supply of water to Kwanza & Kolongolo Wards will encourage the investors especially in the small hotel industry to build more hotels. This would increase growth and expand the Kwanza & Kolongolo Centres thereby create more employment to the community.

9.4.7 Promoting adolescent education

Providing safe and separate sanitation facilities for girls, particularly adolescents, is one of the key factors in promoting greater school attendance particularly to the girl child.

9.5 Negative impacts during operations

9.5.1 Impacts on water sources

- Possibility of over abstraction of water from the existing Asega Dam.

- Reduced flow of water downstream of Asega Dam with effects of water shortage for users and capacity of the river to assimilate and dilute wastes downstream.
- Supply of water to the consumer will consequently generate waste water. However it is not easy to quantify how much of the waste water will reach the water bodies.

Mitigation

- Ensure water abstraction does not exceed permitted quantities as per the WRMA licence.
- Ensure waste water is properly treated before discharge to the water bodies.

9.5.2 Impacts on Drainage and Hydrology

- Abstraction of more water from the Asega Dam intake might reduce river flow downstream due to ineffective compensation
- Specific consumption points will require discharge point for the waste water, improper drainage will lead to pools and channels with stagnant water harboring vector diseases.

Mitigation

- Ensure water abstraction does not exceed permitted quantities as per the WRMA licence.
- Ensure waste water is properly treated before discharge to the water bodies & proper drainage system is in place.

9.5.3 Impacts on public health

- During project's facilities repairs/maintenance, network improvement, metering and treatment enhancement will disrupt the hygiene and availability of clean water and hence potential water borne infection.
- There is a likely hood that with increased water availability probability of water borne diseases will increase.

Mitigation

- Ensure adequate water storage to cater for water requirements during system maintenances
- Effective surveillance of water quality

9.5.4 Impacts on soil

- Possibility of erosion at burst pipes along the steep slopes.
- Siltation of rivers as well as pollution of water due to soil erosion.

Mitigation

- Prompt repair of any reported water pipes bursts
- Encourage & support farmers to practice proper methods to reduce siltation & pollution of water bodies.

9.5.5 Impacts on cost of water

- Added water cost will be received negatively by the consumers especially the poor, this may lead them to go for cheap available water sources hence cases water borne diseases might increase.
- Metering of water distribution may also be associated to an increase of cost of living which has a negative impact especially on the poor.

Mitigation

- Consider subsidies on water costs to the vulnerable & poor people so that safe water from the project reach to as many residents as possible.

9.5.6 Local water vendors

Local water vendors who had also ventured in the same business will loss market.

Mitigation

- Consider the existing water vendors for allocation of water kiosks to be constructed under the project.

9.5.7 Sludge generation and disposal

During operation of the treatment plant, the system will generate sludge that will require being disposed in safe manner. The frequency of de-sludging and volume of sludge generated will depend on the quality of the raw water in Asega Dam. Sludge is expected to be high during rainy season when water is turbid.

Mitigation

- Ensure a properly constructed sludge treatment facility is constructed under the project and disposal of the sludge is done in accordance with NEMA guidelines on waste disposal.

9.5.8 Chemical handling (Chlorine and Aluminum Sulphate)

In conventional water treatment plants, Aluminum sulphate is used to assist in flocculation, coagulation and sedimentation processes. Part of it will end up in the sludge. Chlorine is used to disinfect water and ensure bacteriological safety during transmission of water to the consumer. Proper storage and handling measures will need to be put in place to avoid accidents associated with poor handling/disposal of the same.

Mitigation

- Proper treatment of the sludge before disposal
- Training of staff on proper handling of water treatment chemicals

9.5.9 Backwash Water from Water Filters

It is normal for sand filters to clog after some time during operation of the water treatment plant. Routine maintenance requires backwashing using treated water is usually carried out. The backwash water may contain some chemicals used in the water treatment process that will require to be pre-treated before releasing into Natural River.

Mitigation

- Effective treatment & proper disposal of backwash water.

9.6 Potential Negative Impacts from Decommissioning

Decommissioning of the project is not anticipated in the near future. However, in the event of decommissioning the following impacts are anticipated:

9.6.1 Loss of Livelihood and Economic Ruin

The establishment and operation of the proposed project will bring about a lot of positive change to the lives of the people around it and also to the surrounding economy. Many will lose their source of livelihood from jobs to business ventures hence directly leading to a decline of the area's economic stature and a drawback to the economy at large.

Mitigation

Safe & adequate water supply in the area shall contribute to improved livelihood through emergence of small business such as hotels, Chicken rearing, dairy farming hair saloons etc. The residents who loose jobs after completion of construction works shall be encouraged and supported to consider other income generating activities.

9.6.2 Noise Pollution

The decommissioning related activities such as demolition works will lead to significant affect the acoustic environment within the project site and the surrounding areas. This will result from noise and vibration from machinery and works that will be associated with demolishing the proposed project buildings and related components.

Mitigation

- Noise levels shall be kept within acceptable limits and construction activities shall, where possible, be confined to normal working hours;
- Equipment should be maintained regularly to reduce noise resulting from friction;
- Workers in the vicinity of high-level noise to wear Personal Protective Equipment;

9.6.2 Dust and Exhaust Emissions

Large quantities of dust will be generated during demolition works. Particulate matter pollution is likely to occur during demolition and transportation of the construction waste. There is a possibility of suspended and settle-able particles affecting the site workers and the surrounding neighbours' health. Exhaust emissions are likely to be generated during the demolition period by the various machinery and equipment to be used as well as motor vehicles used for the exercise.

Mitigation

- The contractor should provide dust masks to all personnel on dust-prone work sites.
- All construction machinery should be maintained and serviced in accordance with the equipment specifications and manufacturer's standards.

9.6.3 Occupational 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.

Mitigation

- Ensure compliance with all standards and legally required health and safety regulations.

10 ANALYSIS OF PROJECT ALTERNATIVES

10.1 Introduction

The existing Kwanza Water Supply System that dates back to mid 1980s when population was still low and available water infrastructure was adequate for the population. Other factors that have remained constant are water pipe network and lack adequate investment in water investment in the area. The proposed project will involve rehabilitation and augmentation of the existing systems. This chapter seeks to identify project alternatives that can help achieve the desired objectives of the proposed rehabilitation of Kwanza water supply project while at the same time causing minimal damage to the environment and the natural resource base. Other considerations include project sustainability in terms of management capabilities and technology used.

10.2 Project Alternatives

Various alternatives have been considered for proposed project as below:

10.2.1 Kiptogot gravity water supply scheme

In the proposal, the water intake was located on Mubere River in the Kiptogot forest of Mount Elgon. The water from the intake was to be channelled to the proposed treatment works, at Kiptogot sub location from where it was to be filtered and disinfected before piping it to various consumer outlet points across the Endebes and Kwanza constituencies. The feasibility analysis carried out on this project found the scheme to be feasible with the implementation cost estimated at KES 1.2 billion. However, the client could not raise the said amount as they only had KES 82 million grant from the donor agency (the World Bank) which is a grant.

10.2.2 Rehabilitation & Augmentation of the existing Kwanza /Kolongolo water supply schemes

The existing water supply schemes in the Kwanza area are the Ng'eng'e and Asega dams pumping schemes. These schemes were constructed in the 1980's and have since worn out and could not serve the existing population. As a result, only Ng'eng'e scheme is still operational but only serves Kwanza boys high school who took over the management of the scheme. Rehabilitation & augmentation of these existing schemes has been considered as an option to address the current water supply situation. The development of the scheme is definitely better than a 'do nothing' scenario since it will go a long way in addressing the water stress currently witnessed in the area.

10.2.3 The No Action Alternative

The proposed rehabilitation of Kwanza water supply schemes is aimed at improving the health, living and hygiene standards of the residents of the two towns by provision of improved water supply and sanitation services. The no action alternative implies that the status quo is maintained. This means that there will be no interference with the environment, however, the socio-economic problems facing the residents of the project area will persist worsening the situation at the moment. This alternative is crucial in the assessment of impact because other alternatives are weighed with reference to it. This alternative would mean that the project does not proceed.

10.2.3.1 Benefits of the No-Project Option

The minor benefits of the No-Project Option are:

- i) Present flow regimes of the proposed water supply sources (Chetambe River), would be maintained.
- ii) Short term impacts caused by construction activities e.g. noise, dust generation, vibrations, etc, would be avoided.
- iii) Loss of the relatively small amounts of agricultural land to be used for construction of water works, water storage reservoirs, pipelines etc, would be avoided.
- iv) Temporary inconvenience caused by construction activities in town e.g. temporary road closure for pipeline crossings, would be avoided.
- v) The health risks associated with water treatment plants i.e. handling of slightly harmful water treatment chemicals would be avoided

10.2.3.2 Negative Effects of the No-Project Option

The negative effects of the No-Project Option are:

- i) The growing population of Kwanza & Kolongolo Wards in Trans Nzoia County would continue to suffer from acute water shortages caused by a grossly inadequate existing water supply system with high pumping energy costs. A large percentage of the population living outside of the area of coverage of the existing water supply would continue having no access to safe water.
- ii) Occurrence of diseases caused by consumption of untreated drinking water would continue to be high.
- iii) Employment opportunities connected with the project during and after implementation would not be available. Economic development of the targeted areas expected as a result of the project would also be missed.

- iv) The operation of the existing water supply scheme based on pumping of untreated water to consumers would continue with high energy demand and costs.
- v) The existing appurtenances will not be rehabilitated and will go on deteriorating with all associated environmental risks.
- vi) Time used in search of water will not be saved for utilisation in economical activities.
- vii) There will be loss of productivity and reduced ability to create wealth.

This scenario is not acceptable on either the social or environmental grounds due to this option leading to major negative impacts such as loss of productivity and reduced ability to create wealth.

10.3 Alternative technologies

10.3.1 Location of the water treatment plants

Location of the treatment plants is an important aspect considered during the preliminary design and conceptualization of the project. A number of factors were considered to ensure proper site is selected for the treatment systems, factors considered include;

- Elevation of the area which allows gravity flow of treated water through distribution lines to consumers.
- To minimize resettlement and land acquisition, sites for new Kwanza water treatment are all located at land belonging to Trans Nzoia County Government.

The selection of water treatment plant site near Kwanza Boy's Secondary is ideal as it will facilitate gravity flow to a wider area within the water distribution network.

10.3.2 Energy source options

The source of energy for water pumping for the proposed project is considered from two main sources, which are the diesel pumped and electric power. When diesel pumps are considered in this project, the main limitation is the sustainable cost of running the engines and environmental risks of oil and greases and fire due to its use. The availability of a three phase electricity line in the project vicinity means that the connection to the line will be a worthy course. The initial connection cost may be relatively high as compared to diesel pumps. However, the amount of water that would be pumped for storage and distribution would lead to high returns. On the other hand the use of hydro- powered electricity leads to limited environmental degradation

10.4 Proposed Project Option

The proposed Project option (Rehabilitation & Augmentation of Kwanza Water Supply Project) shall address the negative effects of the 'No Project Option mentioned above (10.2.3.2). Development of the the project will improve water provision to the communities living within the water supply areas and improve on the social economic status of the population. The estimated costs of this project is also within the available budget while the other proposal (Kiptogot Scheme) shall require a colossal amount of funding for implementation. Therefore, the rehabilitation and augmentation of the existing Kwanza /Kolongolo water supply scheme option is recommended for implementation.

11 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan stipulates actions and measures to be put in place in order to mitigate impacts that the project is likely to cause to the environment. The assessment report has been prepared to comply with the requirements of the Environmental Management and Co-ordination Act 1999. EMP presented in this chapter summarizes significant impacts identified and proposes remedial measures for their remedy. The EMP has included various actors responsible for executing the recommended actions, estimated cost for the action and measurable indicators. This Environmental Impact Assessment Report complies with the requirements of the Environmental Management and Co-ordination Act (EMCA) of 1999 and takes into consideration the applicable local and international standards and best practices. As a requirement in EMCA, the report should provide for a detailed EMP. The EMSP's presented in this Chapter summarises the key impact elements identified and the remedial measures, the actions to be taken by various parties and the monitoring activities.. The implementation of the EMSP shall be done within the provisions of the law and for the ultimate benefit of the stakeholders in the Project area. The effectiveness of the EMSP shall be monitored and assessed during spot checks, formal inspections and at the end of the Project when an overall audit of the works shall be carried out.

The proposed project is geared towards meeting the water demand for the residents of Kwanza & Kolongolo Wards in Kwanza Sub-County of Trans -Nzoia County. The project will observe environmental conservation requirements in accordance to the established laws and regulations. To realize this goal, an Environmental Management Plan (EMP) has been prepared. Major factors that were considered in this EMP include;

- Enhancing integration of environmental, social and economic functions in the project implementation.
- Compensations or appropriate acquisition process of any land and/or property affected by the project in accordance with the laid down guidelines.
- Ensuring the water resources conservation throughout the project area and downstream.
- Ensuring soil erosion control and prevention of siltation into the water sources.
- Ensuring prevention of pollutants discharge into the water sources, and
- The contractors and other players in the project activities will be prevailed upon to implement the EMP through a sustained supervision and continuous consultations.

11.1 Construction Phase: Environmental ManagementPlan

A construction Environment Management Plan (CEMP) is a practical and achievable plan of management to ensure that any environmental impacts during design, planning and construction phase are minimized. The main issues during construction are:

- Loss of fauna and flora
- Noise and vibrations
- Water pollution
- Air pollution
- Waste generation
- Soil contamination

Table 11.1: CONSTRUCTION PHASE: ENVIRONMENTAL MANAGEMENT PLAN

	Anticipated Impact	Management and Mitigation	Actors	Cost (KSH)
1	Displacement on PAPs	<ul style="list-style-type: none"> - PAPs shall be given a 6 months' notice prior to relocation of their assets. - The PAPs will be compensated at full replacement costs for the affected assets. - Payment of compensation will be done prior to commencement of any construction activities. 	LVNWSB	4,200,000
2	Increased water demand	<ul style="list-style-type: none"> - The Contractor shall ensure that water is used efficiently at the site by sensitising construction staff to avoid irresponsible water use. 	Contractor	150,000
3	Interference with the physical setting	<ul style="list-style-type: none"> - The structures to be developed shall be aesthetically acceptable to blend in with the surrounding. - Restoration shall be undertaken to ensure that the original setting is as much as possible retained. 	Contractor Environment Department	600,000
4	Interruption of existing infrastructure	<ul style="list-style-type: none"> -Re-location of underground utilities e.g. electricity and communication links during laying of water pipelines -Re construction of fences, other structure affected by pipe laying works. 	Contractor Service Providers	1,500,000
5	Flooding during construction	<ul style="list-style-type: none"> - Proper excavations for pipelines & other project works 	Contractor	300,000
6	Vegetation loss	<ul style="list-style-type: none"> - Minimize vegetation clearance at construction sites. - Planting of indigenous trees in the buffer zone, for landscaping. - Landscaping and beautification of the project site after project completion with local flora and fauna 	Contractor	120,000
7	Soil erosion & Soil compaction	<ul style="list-style-type: none"> - Implementation of erosion control measures to avoid erosion in areas that are prone to erosion, e.g. steep slopes and drainage lines; - All excavation works shall be properly backfilled and compacted. - Vehicles shall be kept on existing roads or tracks where possible; 	Contractor Local community/farmers Agriculture Department	80,000
8	Contractor's camps	<ul style="list-style-type: none"> -The camps should have comprehensive waste management and sanitation plan and facilities. -Adequate emergency response plan should be in place in the camps. -The contractor's facilities should be completely removed from site after use and the land restored to its previous condition or better 	Contractor Public Health Department	360,000
9	Extraction of natural resources	<ul style="list-style-type: none"> - The construction contract shall stipulate that the Contractor sources materials from an approved site - Maximise the re-use of excavated materials in the works, as fill - Close all borrow pits and quarries in accordance with an approved plan to maximize their long-term biological productivity (capacity for plant growth) and minimise health and safety hazards. 	Contractor	650,000
10	Construction wastes	<p>Solid wastes</p> <ul style="list-style-type: none"> - The contractor shall enforce the appropriate management methods based on the three Rs (reduce, reuse, and recycle). - Contractor to provide litter collection facilities such as bins. - Final disposal of the site waste should be done at a location that shall be approved after consultation with the 	Contractor NEMA	450,000

		<p>relevant stakeholders, including the local community.</p> <ul style="list-style-type: none"> - The disposal site need to be more than 100 meters from watercourses and in a position that will facilitate the prevention of storm-water runoff from the site from entering the watercourse; - Dispose of surplus material ("spoil") only at designated sites using approved methods. <p>Wastewater</p> <ul style="list-style-type: none"> - All grey water runoff or uncontrolled discharges from the site/working areas to water courses shall be contained and properly channeled. - Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered; - Compliance to set standards on treatment & disposal of waste water. 	<p>Contractor</p> <p>NEMA</p> <p>WRMA</p>	300,000
11	Oil spills	<ul style="list-style-type: none"> - Vehicle maintenance shall be done on purpose-built impervious concrete platforms with oil and grease traps. - Ensure that all equipment is in good condition, clean and free from leaks. - Oil spill containment and cleanup equipment should be kept at the contractor's camps. 	<p>Contractor</p> <p>NEMA</p>	120,000
12	Air quality and dust	<ul style="list-style-type: none"> - Vehicles delivering soil materials should be covered to reduce dust emissions - Activities generating dust (excavation, handling and transport of soils) to be carried out in calm weather. - The contractor should provide dust masks to all personnel on dust-prone work sites - All construction machinery should be maintained and serviced in accordance with the equipment specifications and manufacturer's standards - The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible. - Compliance to standards on air quality. 	<p>Contractor</p> <p>NEMA</p>	600,000
13	Noise and vibrations	<ul style="list-style-type: none"> - Noise levels shall be kept within acceptable limits in accordance to set standards and construction activities shall, where possible, be confined to normal working hours. - Equipment should be maintained regularly to reduce noise resulting from friction. - Workers in the vicinity of high-level noise to wear Personal Protective Equipment. 	<p>Contractor</p>	90,000
14	Occupational health and safety	<ul style="list-style-type: none"> - Contractor to establish a comprehensive Health and Safety Policy. - Ensure compliance with all standards and legally required health and safety regulations. - Implement the specified H&S programme throughout the construction period; - Establish an emergency response procedure and display on all work areas. - Provision of a standard first aid kit at the site office at all times. - Provision of fire-fighting equipment available at the workers camp. - Provision of medical facilities for staff 	<p>Contractor</p> <p>Public Health Department</p>	450,000
15	HIV/AIDS	<ul style="list-style-type: none"> - Selecting appropriate locations away from concentration of human settlements for construction camps; 	<p>Contractor</p>	500,000

		<ul style="list-style-type: none"> - Sensitize workers and the surrounding community on awareness, prevention and management of HIV / AIDS through staff training, awareness campaigns, multimedia, and workshops or during community Barazas including provision of condoms to the project team and the public. - Strengthening of healthcare system to provide voluntary counseling and testing for workers / members of host communities. 	<p>Health Department</p> <p>Local Community</p>	
16	Traffic management	<ul style="list-style-type: none"> - Avoiding dangerous routes and times of day to reduce the risk of accidents. - Use of speed control devices (governors) on trucks, and remote monitoring of driver actions. - Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present. - Using locally sourced materials, whenever possible, to minimize transport distances. - Regular maintenance of vehicles. 	<p>Contractor</p> <p>Local Community</p>	450,000
17	Child Labor	<ul style="list-style-type: none"> - The Contractor will not employ children in any works. - Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the Authorities. - The Proponent/Contractor should ensure that all the employees sign a code of conduct to be used during their employment. - WB guidelines for protection against child labour are strictly adhered to. 	<p>Contractor</p> <p>Labour Department</p> <p>Children Department</p> <p>Local Administration</p> <p>Local Community</p>	200,000
18	Gender Equity/Sexual Harassment	<ul style="list-style-type: none"> - Contractor shall practice the Non-Discrimination and Equal Opportunity principle in hiring of workers. - The Contractor will take measures to prevent and address harassment (including sexual harassment, intimidation, and/or exploitation, especially in regard to women - Compliance with national employment and labor laws. - Gender mainstreaming in employment at the worksite with opportunities provided for females to work, in consonance with local laws and customs. 	<p>Contractor</p> <p>Labour Department</p> <p>Gender/Social Services Department</p>	150,000
19	Labour influx	<ul style="list-style-type: none"> - Contractor to employ the local as much as is practical. - Use of manual labor during trenching works where possible to ensure more employment of locals and hence ensure project support throughout the construction process. 	<p>Contractor</p>	150,000

20	Crime management	<ul style="list-style-type: none"> - Community sensitization on respect of public property; community policing during project implementation. - Taking all reasonable precautions to prevent unlawful, riotous or disorderly conduct by or amongst the contractor's personnel, and to preserve peace and protection of persons and property on and near the sites. - Prohibiting alcohol, drugs, arms, and ammunition on the worksite among personnel. - Appropriate fencing, security gates, shelter and security guards are to be provided at the construction sites to ensure the security of all plant, equipment and materials, as well as to secure the safety of site staff. - Contractor to make arrangements for security of its properties, equipment and the workers. 	Contractor Local Administration Government Security Agencies Local Community	600,000
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Adequate budget provisions have been provided in the project budget for implementation of EMP.

11.2 Operational Phase: Operation Environmental Management Plan (OEMP)

An operation EMP focuses on sound environmental management practices that will be undertaken to minimize adverse impacts on the environment throughout the economic life of the facility. The EMP also captures measures that should be taken in event of an emergency during the operation phase.

The OEMP has been developed to deal with the following problems :

- Sludge generation and management
- Noise and vibrations
- Energy / fuel Consumption
- Occupational health, Safety and Environment
- Overall management strategy expenditure and project maintenance

Table 11.2: OPERATIONAL PHASE: ENVIRONMENTAL MANAGEMENT PLAN

	Anticipated Impact	Management and Mitigation	Actors	Cost (KSH)
1	Over abstraction of water sources	<ul style="list-style-type: none"> - Water abstraction shall not exceed permitted quantities as per the WRMA licence. - Ensure waste water is properly treated before discharge to the water bodies. 	County Water Department WRMA WRUA	350,000
2	Effect on drainage and hydrology – reduced flows for downstream users (Conflicts over water use)	<ul style="list-style-type: none"> - There shall be due adherence to the safest maximum abstractable water quantities throughout the project life - Adherence to WRMA water use permits. 	County Water Department WRMA WRUA	100,000
3	Impact on public health – water quality & availability	<ul style="list-style-type: none"> Ensure adequate water storage to cater for water requirements during system maintenances Effective surveillance of water quality 	County Water Department Public Health Department	3000,000

4	Impacts on soil due to erosion	- Prompt repair of any reported water pipes bursts - Encourage & support farmers to practice proper methods to reduce siltation & pollution of water bodies.	County Water Department Agricultural Department Local farmers	550,000
5	Increase in cost of water	- Consider subsidies on water costs to the vulnerable & poor people so that safe water from the project reach to as many residents as possible.	County Water Department	400,000
6	Impact on Existing local water vendors – loss of business	- Consider the existing water vendors for allocation of water kiosks to be constructed under the project.	County Water Department	250,000
7	Sludge generation and disposal - Impact on water and soil quality	- Ensure a properly constructed sludge drying facility is constructed under the project and disposal of the sludge is done in accordance with NEMA guidelines on waste disposal.	County Water Department Public Health Department NEMA	2,500,000
8	Chemical handling (Chlorine and Aluminum Sulphate) - Impact on water and soil quality	- Proper treatment of the sludge before disposal - Training of staff on proper handling of water treatment chemicals	County Water Department Public Health Department NEMA	300,000
9	Backwash water from the filters - increased chemical pollution into water into rivers	- Effective treatment & proper disposal of backwash water..	County Water Department Public Health Department NEMA	450,000

The County Water Department shall ensure an annual budget is set aside for the implementation of EMP during the project operational phase

11.3 Decommissioning Environmental Management Plan

The economic life of a water treatment plant is at least 25 years. It is not practical to estimate at the moment the cost implications of the decommissioning phase. It is however, recommended that before decommissioning is executed, a comprehensive decommissioning plan has to be developed by all the stakeholders. The decommissioning action plan has to capture all the issues that need to be handled during the dismantling exercise. The management has to notify responsible authorities in this case NEMA on the intentions to decommission the facility within 1 year in order for the authority to carryout assessment and determine potential negative impacts on environment and therefore giving recommended mitigation measures.

12 GRIEVANCE REDRESS MECHANISM FOR AFFECTED COMMUNITIES

Where there are affected communities, the proponent (LVNWSB) will establish a grievance mechanism to receive and facilitate resolution of the affected communities' concerns and grievances in regard to the environmental and social performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the project and have affected communities as its primary user. It shall seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate and readily accessible, and at no cost and without retribution to the party that originated the issue or concern. The mechanism shall not impede access to judicial or administrative remedies. The proponent will inform the affected communities about the mechanism in the course of the stakeholder engagement process.

12.1 Reporting to the affected communities

The proponent will provide periodic reports to the affected communities that describe progress with implementation of the project Action Plans on issues that involve ongoing risk to or impacts on affected communities and on issues that the consultation process or grievance mechanism have identified as a concern to those communities. If the management program results in material changes in or additions to the mitigation measures or actions described in the Action Plans on issues of concern to the affected communities, the updated relevant mitigation measures or actions will be communicated to them. The frequency of these reports will be proportionate to the concerns of affected communities but not less than annually.

12.2 Disclosure of Information

Disclosure of relevant project information helps affected communities and other stakeholders understand the risks, impacts and opportunities of the project. The proponent will provide affected communities with access to relevant information on:

- The purpose, nature, and scale of the project;
- The duration of proposed project activities;
- Any risks to and potential impacts on such communities and relevant mitigation measures;
- The envisaged stakeholder engagement process;

12.3 The grievance mechanism consultations.

When affected communities are subject to identified risks and adverse impacts from a project, the client will undertake a process of consultation in a manner that provides the affected communities with opportunities to express their views on project risks, impacts and mitigation measures, and allows the client to consider and respond to them. The extent and degree of engagement required by the consultation process shall be commensurate with the project's risks and adverse impacts and with the concerns raised by the affected communities. Effective consultation is a two-way process that should:

- Begin early in the process of identification of environmental and social risks and impacts and continue on an ongoing basis as risks and impacts arise;
- Be based on the prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information which is in a culturally appropriate local language(s) and format and is understandable to affected communities;
- Be free of external manipulation, interference, coercion, or intimidation;
- Enable meaningful participation, where applicable;
- Be documented.

The proponent will tailor its consultation process to the language preferences of the affected communities, their decision-making process, and the needs of disadvantaged or vulnerable groups. If the proponent has already engaged in such a process, it will provide adequate documented evidence of such engagement.

12.4 Informed Consultation and Participation

For the project components with potentially significant adverse impacts on affected communities, the client will conduct an Informed Consultation and Participation (ICP) process that will build upon the steps outlined above in consultation and will result in the affected communities' informed participation. ICP involves a more in-depth exchange of views and information, and an organized and iterative consultation, leading to the proponent's incorporating into their decision-making process the views of the affected communities on matters that affect them directly, such as the proposed mitigation measures, the sharing of development benefits and opportunities, and implementation issues. The consultation process should:

- Capture both men's and women's views, if necessary through separate forums or engagements;
- Reflect men's and women's different concerns and priorities about impacts, mitigation mechanisms, and benefits, where appropriate.

12.5 Grievance Redress Procedures

The involvement of the public in the process of compiling and implementing the Resettlement Action Plan will be adhered to strictly. It is essential to prevent grievances than go through the grievance redress system that can be lengthy, cumbersome and leave the affected persons dissatisfied despite the benefits that would accrue from the project for the community. For an effective grievance prevention mechanism, it will be imperative to keep constant consultation with the project affected persons and maintain reliable and transparent registers of all the complaints received by the project implementation team.

a) Once a complaint is received at the project office, a register with all particulars of the complainant and the nature of the complaints will be opened and the entry identified with a reference number for ease of tracking and management.

b) The complaint will be reviewed by the secretariat at the project office with a relevant documentation in possession of the complainant and a time for addressing the issue advised to the complainant. If the office cannot deal with the issue as necessary, the matter will be referred to the office of the Grievance Redress Committee established for the purpose under the auspices of the project inclusive of all parties involved in the project. An independent Grievance Redress Committee will be established at the headquarters of the project for referral cases on appeal by the complainants

c) The applications notifying the grievance will be submitted to the project office, grievance desk; during normal working hours in writing using the national or official language. In cases where the affected person is not literate, he/she will be assisted by the office in the presence of a local representative (Village Elder or Sub-Chief) to file the complaint at the project office.

d) All decisions of the grievance redress committee will be communicated promptly after deliberations but not later than seven (7) days unless the complainant is informed immediately where the issue requires further investigations to the complaint raised. The matters will be resolved and decision communicated within twenty-one (21) working days to the complainant.

e) LVNWSB will ensure that all procedural guidelines are explained to the community and published in national and official languages. Copies will be displayed at the project offices and at the offices of local administration where members of the public have easy access to them. The project offices will also prepare and disseminate all relevant information regarding the road improvement project and the salient components touching on negative social and economic impacts with proposed mitigation measures.

13 RECOMMENDATIONS AND CONCLUSIONS

13.1 Findings

The proposed project is acceptable to a majority of the local residents, most of whom appreciate the value it will have on the social and economic wellbeing of the area as a result of improved water supply. Overall, the Proposed Rehabilitation of Kwanza Water Supply Projects has the following benefits:

- Improved access to water will contribute to better health status of the population.

Employment and skills transfer/improvement opportunities will be created for the local population; this will improve the general socio-economic wellbeing of the community

13.2 Recommendations

From the foregoing, the following recommendations are made:

- To enhance social Integration, the local communities and all the stakeholders involved should be sensitized on the benefits and risks of the project so that they are all on board in advance for effective participation and sustainability. A social component, therefore, needs to be built into the overall project implementation. Entrench ownership of the project upon the residents through participation during construction and thereafter when they can report negative activities within the project area. In this endeavor, local sensitization committees should be developed from the communities to act as liaison between the project implementation group and the stakeholders.
- There is need to undertake capacity building for the local communities so as to enable them to competitively exploit opportunities that arise from construction of the project (employment, supplies, etc.) as well as utilization of their resources.
- Compensation and resettlement of the project affected persons (PAPs) should be finalized before commencement of the project to ensure minimal social conflict over the project in future. Land matters are rather a sensitive and thorny issue. Acquisition and related compensation aspects should be approached with caution through a well-defined inclusive process involving identification of the true target beneficiaries, awareness creation and political will. Consultations especially with all affected landowners, household members, valuation processes, negotiations, awards. Within the compensation component, there is also need to develop livelihood restoration.
- There is need for strengthening and promotion of the role of community groups, women and youth to fully participate in health, sanitation, water resources and environmental management and conservation.
- The design and the quality of construction of the project need to be strictly controlled to ensure the maximum life of the dam in order to get value for money from the investment. All activities concerning dam construction and maintenance such as, work execution, site inspection, and material testing, shall be strictly monitored by an engineer or a designated official. This is important to ensure the quality of maintenance works. Engineers and/or designates official shall be trained and experienced enough to judge the appropriateness of the work executed in order to carry out the monitoring properly.
- The new water mains and other transmission pipelines should be monitoring to avoid illegal connections and preventable leakages to ensure all water reaches the treatment works and also enhance control of non-revenue water.
- Provide public water access points (water kiosks) for the residents particularly in the informal settlements. It may also require that the Water Service provider considers public awareness and education on how to get connected.
- Ensure minimum destruction of vegetation. If possible, all project –related activities should be done within the designated project alignment areas.
- Ensure that worker’s occupational health and safety standards are maintained through capacity building, proper training providing protection, clothing and managing their residential camps up to the required health standards.
- Annual environmental audits should be carried out on the project in order to ensure compliance of the project with the mitigation measures outlined in the Environmental Management Plan (EMP). To ensure that the impact on the environment can be completely minimized, a monitoring and training activity should be carried out as outlined in the report.
- The contractors and other players in the project activities be prevailed upon to implement the EMP through a sustained supervision and continuous involvement of the stakeholders,
- Involvement of the community in the project implementation to enhance ownership and capacity building for long term operations of the facility

13.3 Conclusions

Based on the findings, it is evident that construction of the proposed project will result in overall economic growth and development as a result of the improvement in the availability of water for use especially in Kwanza Sub- County of Trans Nzoia County. The Environmental Impact Assessment (EIA) study for the proposed project indicates that, the potential positive impacts can be easily mitigated without any major effect to the environment. However, some important resources may be affected negatively. These impacts vary from temporary to short term impacts and can be mitigated as shown in the Environmental Management plan. The ESIA concludes that the project will have substantial positive environmental benefits. The adverse impacts on the physical and natural environment are mostly confined to the construction phase of the project and will be largely not significant, and can be avoided or managed through the recommended mitigation measures and monitored during programme implementation. To ensure sustainability of the proposed project, it is necessary to ensure timely allocation of funds to environmental and social management aspects as identified in this assessment.

**APPENDIX - MINUTES OF STAKEHOLDERS CONSULTATIVE MEETINGS
PREPARATION AND IMPLEMENTATION OF RE-SETTLEMENT ACTION PLAN (RAP) AND
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR KWANZA/KOLONGOLO
WATER SUPPLY SCHEMES**

Minutes of stakeholders consultative meeting held on 1st December, 2015 at Asega Dam site

No	Names	organization	contact
1	SHEM WEKESA	SEC. ASEGA DAM	0723893369
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3	JANE ANDAI	ASEGA	0720832548
4	FINIKE AMBEI	ASEGA	
5	JANEROSE KULETE	TONYOTO	
6	JANEROSE WANYONYI	TONYOTO	
7	ALBERT OMBISI	INDAGALA SEC.	0727749736
8	LWANGALE REAGAN		0717503840
9	REUBEN MMASI	NGENY	0710922478
10	JOSEPH YATOR		0726992624
11	SUSANA NAFULA	LUUYA	0725480927
12	PAMELA NAFULA	TONYOTO	
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14	DANIEL KURGAT	NGENGE	0726984704
15	CHARLES WEKESA	INDAGALA	0726679531
16	JOHN VICTOR MUTORO	TONYOTO	
17	ALEX KIYAI	NGENGE	0701903088
18	NASANA NAMKURU	LUUYA	
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24	JOSEPH WABOYEZE		0729834594
25	BINITO KHISA		
26	MISIKO KHISA		0718679408
27	HENRY KIGAME		0726337903
28	PST. MUSA		0711272825
29	HARON WANJALA		
30	JOSEPH WANYONYI		0724569070
31	TITUS JUMA		0727912257
32	RICHARD MUKUYUNI		0729098385
33	PAUL EBU SAMSON		0700908978
34	DANIEL MWOMBE		0715508635
35	MOSES WAMALWA		0738134620
36	PHILIP MUNANDI		0729090812
37	KIPNGETICH M.		0700758182
38	SETH SMITH		0708037803
39	AINEA WANJALA		0711291941
40	JOSHUA MUGANDA		0716859913
41	TITUS MAGERO		0715405979
42	JOSEPH SAIDI		0703764033
43	FRANCIS MUNYORE		0725416511
44	BONFACE WALUBENGO		0725121830
45	PATRICK BULUNYA		0726927877
46	HUDSON SIMIYU		0713018090
47	STEPHEN NYONGESA		0713311622
48	ANN LUCHEKA		
49	MORINE MAKONYWE		

50	ANN ORIKI		0718185448
51	FLORENCE BARASA		0720789943
52	SUSAN NAFULA		0725480927
53	RICHARD MBIRO		0726136722
54	NAFTALI		0714421293
55	EMMANUEL WANYONYI		0718570864
56	DOMINIC KHAEMBA		0712858314
57	ERICK WANAMBUKO		0716302043
58	GEOFFREY WACHIYE		0710910812
59	KENNEDY SIMIYU		
60	CHARLES KHAMESI		0703939191
61	WANYONYI SIMEON		0711443887
62	DAVID NYONGESA		0729277795
63	BENJAMIN NDOLI		
64	JOTHAM MATILI		0725934108
65	SAMSON RUMI		
66	SOSTEN WASIKE		0718409207
67	SAMSON WANYONYI	MUUNGANO	0724135425
68	LUCAS SAMOEI		0721216722
69	PETER WANGALA	LUNYU	0726664840
70	GEORGE LISANZA	KEIYO	0706205927
71	SILAS MUKITE	AMUKA	0728038102
72	MARTIN MULONGO	LUNYU	0710721088
73	WILLIAM NABUTOLA	TONYOTO	0710915079
74	JOSPHEAT EKIDOR	MARIDADI	0722127604
75	MAURICE WEKESA	METEITEI	0724318908
76	DANIEL KOECH	NGENGE	0725948530
77	ROSEMARY MISIKO	ASEGA	0713092431
78	ALFAYO WASWA	LUNYU	0726530351
79	ALFRED MUKANDA	MUTUA	0728610194
80	SAMMY WAFUKHO	SIAMBE	0729413142
81	FREDAH KIRAGU	METEITEI	0727035126
82	RETEMUDAH FUCHAKA	ASEGA	0713766455
83	PATRICK MWASAME	KEIYO	0721749263
84	SAMWEL WANYAMA	KEIYO	0729378458
85	MEPO SOITA	KEIYO	0726472896
86	METRINE JUMA	KEIYO	
87	PATRICK BUSOTA	TONYOTO	0717087440
88	PETER JUMA	MUTUA B	0721252468
89	JOSEPH MUTORO	LUUYA	0700636401
90	MOSES KHASABULI		0717671437
91	EBBY AVUNGA		0726400467
92	JANE NYONGESA		
93	FRANCISCA OKIRU	METEITEI	
94	PHOEBE NYONGESA	TONYOTO	0729290720
95	ANNAH WANJALA	TONYOTO	0728381563
96	DIVINAH WANYAMA	TONYOTO	
97	PENINAH JUMA	ASEGA	
98	SARAH .N. BULUMA	ASEGA	0714588780
99	FLORENCE KIYAYI	ASEGA	
100	ABRAHAM SIMIYU	ASEGA	0711132623
101	BONIFACE SWAHILI	ASEGA	0726488606
102	ISAAC KAPELION	Consultant- EISA/RAP	0727507236
103	JAMES NGUGI	LVNWSB	0726526883
104	IBRAHIM OLUOCH	LVNWSB	
105	DAVIES O. OINDO	CONSULTANT- design	0726691417
106	ISAAC KAPELION	Consultant- EISA/RAP	0727507236

Agenda

- **Opening remarks and introductions**(Chief (MC) invites the County Commissioner)
- Presentation of the project design
- Presentation of ESIA/RAP
- Questions and Answers session- Consent of the project
- A.O.B

Minute 1/12/2015- Opening remarks and introductions

Discussion-The meeting started at 10.00 am being chaired by Assistant County Commissioner-Kwanza, the MC being the area Chief Mr. Juma welcomed key leaders stakeholders, then followed by introduction of each member present within the meeting.

Min 2/12/2015 Presentation of project brief

Discussion- Eng. Oindo gave a brief description of the design to be covered in the proposed rehabilitation of Kwanza-Kolongolo water supply project. He reiterated that the project involves rehabilitating already existing water supply infrastructure by pumping water from Asega dam (intake), to Kwanza water tank where treatment works will take place. Then the water will be piped to Lunyu-Kolongolo-Keiyo-Indagala-Luuya tanks.

NB: - 3.9million l/d is the production rate.

Min 3/12//2015 Presentation of ESIA/RAP briefs and MOA

Discussion- the Consultant- Eng. Wainaina gave a brief explanation of the ESIA/RAP with emphasis to the proposed rehabilitation project. He explained that so many benefits will accrue in the adoption of the rehabilitation of the project (agricultural in dairy/ human consumption/reduction of water borne diseases/employment locally).

Also the adoption of the project might bring negative effects though minor (mosquitoes' effect- malaria)

NB:

- ✓ The project will have so many benefits than the negatives.
- ✓ Need of clear demarcation of the project area by confirming by map area, no one will be compromised by implementation of the project.
- ✓ Mr. Oluoch emphasized that individuals with issues will be handled individually by the client

Mr. Owuor (**Ministry of Agriculture**- Kwanza) emphasized that the project has come at the right time; the water will not be used for irrigation (Use of such water will have acidic effect to soils thereby impacting negatively to soils). It will encourage zero grazing thereby limiting vector diseases by ticks, cases of brucellosis will be reduced also. Requested for proposal on zero grazing as soon as project kicks starts

Minute 4/12/2015 Question and Answers Session

Discussion-During the meeting, the Chairperson madam D.O asked the public if the project is to be implemented or not. They answered in ***affirmative yes***.

Queries

During the meeting the community asked various questions summarized as follows?

- Will the intake area be renovated to fit to pump machine or not?
- What are the distribution points?
- Mr. Ekidor- asked Ibrahim of other areas of Gidea/Sabwani/Maridadi are going also to be covered or not?
- What is the assurance of the project funding and implementation?

Responses

- Mr. Wekesa (Indagala) thanked and welcomed the proposed project to be implemented without delay since they are the beneficiaries especially from the intake area.
- Eng. Oindo- the contractor did not complete desilting, but the project will be sorted out. Distribution will be given to nearby consumers' not far flung for now. Implementation of the project will incorporate safety measures too. As per the calculation of the demand it covers all areas. About quality of works is to cover 20years. Employment opportunity is equal for all no bias to any individual.

NB: Madam D.O requested for people to attend Polytechnic meeting on **2nd December, 2015**.

Sub County Admin-welcomed the project

Hon. Waswa (Keiyo) – Welcome the project on issues where land is affected to be sorted out and compensation to be effected where deemed possible.

Hon. Lukovero (Kwanza) - hospital will benefit a lot, this is a national project and he endorsed it to be implemented.

Min 5/12//2015 A.O.B

There being no other business the meeting ended at 1.00pm. The next meeting was scheduled for **1st December, 2015** at the intake (Asega Dam) & Kwanza Polytechnic on **2nd December, 2015**.

Prepared by: - Isaac Kapelion



Stakeholders affirming the proposed project to be implemented

Minutes of stakeholders consultative meeting held on 2nd December, 2015 at Kwanza Polytechnic

No	Names	Organization	Contact
1	JOSEPH JUMA	CHIEF KWANZA	0720449809
2	SHEM WEKESA	SEC. ASEGA DAM	0723893369
3	LUCAS SAMOEI	FARMER	0721216722
4	MATHIAS WEKESA	FARMER- LUNYU	0726986272
5	ELIUD TORMOI	HOSPITAL BOARD	0720994111
6	JOSEPH EKIDOR	MARIDADI	0722127604
7	JOEL MATELONG	FARMER	0722635925
8	BONIFACE SWAHILI	CHAIR-ASEGA DAM	0726488606
9	JOEL MADEGWA		0717837808
10	ROBINSON KEMBOI		0710131358
11	NELSON ESHITEMI		0711340026
12	CLEPHAS TANUI		0717837879
13	DANIEL WANJALA		0715692206
14	MARTIN MULONGO	MCA rep	0710915079
15	Christopher SEBULEI		0722429884
16	ELLY BITANDE		
17	SAMMY WAFUKHO		0729413142
18	SAMMY YATOR		0707309880
19	EDWARD MCHANGWA		0713150032
20	STANLEY MWANGI		0771425764
21	CONSTANTINO CHEPCHUMBA	COUNTY WATER DEPT	07727256848
22	JOSEPH MATHE	„	0720345062
23	PST. J.W .MAKOKHA		0727545308
24	BERNARD OWUORI	MOA KWANZA	0726428373
25	CHRIPINUS SAKWA		0718068895
26	AKIFUMA BERNARD	MARIDADI	0705876099

27	SETH SMITH		0708037808
28	JOSEPH TANJI	MARIDADI	0700443284
29	SIMON NABIBA	KWANZA	0714570199
30	TERRY WAFULA	KWANZA	0729876298
31	BENJAMIN KIPLAGAT	KWANZA	0729856865
32	CHARLES WEKESA	ASEGA DAM	0726793531
33	JULIANA WAFULA	KEIYO	0721405385
34	MOSES WAMALWA		0738134620
35	JULIANA WAFULA	KEIYO	0721405385
36	MOSES WAMALWA		0738134620
37	DON ISAAC	MARIDADI	0707656185
38	DANIEL RONOHEGON	KOROS II	0710816744
39	DANIEL KOECH	NGENGE	0725948530
40	DANIEL OMASETE	METEITEI	0702273505
41	MUKUA FRED	KWANZA	0711297453
42	JOSEPHAT WAFULA	LUNYU	0729329108
43	MARY WANJALA	KOBOS	0706421443
44	MILCAH KOECH	KOROS II	0714766928
45	MAJUMA DORCAS	KOBOS	0703887729
46	GEOFFREY OLWENYI	KOBOS	0788330547
47	HON. EMMANUEL WASWA	MCA KEIYO	0712796013
48	MUDACHI A.K.	WATER- T/NZOIA	0733854365
49	ENG. J.K. WAINAINA	ESIA/RAP Consultant	0722987824
50	JAMES NGUGI	LVNWSB	0726526883
51	ISAAC KAPELON	ESIA/RAP Consultant	0727507236
52	JOSEPH KIDOYI	COUNTY ADMIN	0722896336
53	GEORGE LISANZA	KEIYO	0706205927
54	JACKSON MASAI	LUNYU	0704764832
55	PASCALINE SANGA	KWANZA	0727790037
56	JUDITH BARASA	KWANZA	0716063108
57	DENNIS TOMNO	DRIVER	0722979116
58	SIMON NYONGESA	FARMER	0728815215
59	MOHAMMED IDI		0724550700
60	ROBERT MUNANGA	POLYTECHNIC INSTR.	0725104662
61	WANJALA W.H		
62	JOSEPH KAMAU		0720100668
63	COSM AS BARASA KHISA		0713133897
64	WILSON OTWANE		0712410505
65	CHRISPINUS SAKWA		0718068895
66	MARK BIRIR		0727790037
67	JUMA EKESA		0728761258
68	BRENDA LUSANZA	FARMER	0715530045
69	FLORENCE AMOITI	SEC- INDAGALA	0703952855
70	PATRICK WANJALA M.	KEIYO	0721749263
71	SAMUEL WANYAMA	KEIYO	0729378458
72	DANIEL MWOMBE	TONYOTO FARM	0715508635
73	ANDRWE KIPNGETICH		
74	KIPSUM BUSHENEI		
75	ARIMED WANJALA	LUNYU	0729329108
76	ANDREW AMUNZE	BIKETI FARM	0713394680
77	REV. G. BIKETI	KOROS II	0723836586
78	DAVIS OINDO	DESIGN- Consultant	0726691417
79	FREDAH KIRAGU	METEITEI	0727035126
80	ABEDNEGO MUTAMBA	KWANZA	0729821575
81	JOAN SIMIYU	KWANZA	0711209433

Agenda

- **Opening remarks and introductions** (Chief (MC) invites the County Commissioner)
- Presentation of the project design
- Presentation of ESIA/RAP
- Questions and Answers session- Consent of the project
- A.O.B

Minute 1/12/2015- Opening remarks and introductions

Discussion-The meeting started at 11.30a.m being chaired by Deputy County Commissioner Mr. Maina-Kwanza, the MC being the area Chief Mr. Juma who welcomed key leaders stakeholders, then followed by introduction of each member present within the meeting.

Min 2/12/2015 Presentation of project brief

Discussion- Eng. Oindo gave a brief description of the design to be covered in the proposed rehabilitation of Kwanza-Kolongolo water supply project. He reiterated that the project involves rehabilitating already existing water supply infrastructure by pumping water from Asega dam (intake), to Kwanza water tank where treatment works will take place. Then the water will be piped to Lunyu-Kolongolo-Keiyo-Indagala-Luuya tanks. **NB:** - 3.9million liters/day is the production rate.

Min 3/12//2015 Presentation of ESIA/RAP

Discussion- the Consultant- Eng. Wainaina gave a brief explanation of the ESIA/RAP with emphasis to the proposed rehabilitation project. He explained that so many benefits will accrue in the adoption of the rehabilitation of the project (agricultural in dairy/ human consumption/reduction of water borne diseases/employment locally). Also the adoption of the project might bring negative effects though minor (mosquitos' effect/outsideers coming to interfere negatively may be with the local community life style)

NB:

- ✓ The project will have so many benefits than the negatives.
- ✓ Need of clear demarcation of the project area by confirming by map area, no one will be compromised by implementation of the project.
- ✓ Mr. Oluoch emphasized that individuals with issues will be handled individually by the client

Mr. Owuor (MOA- Kwanza) - emphasized that the project has come at the right time; the water will not be used for irrigation. Since use of such water will have acidic effect to soils thereby impacting negatively to soils. It will encourage zero grazing thereby limiting vector diseases by ticks, cases of brucellosis will be reduced also. He requested for proposal on zero grazing as soon as project kicks in

Minute 4/12/2015 Question and Answers Session

Discussion-During the meeting, the Chair Deputy County Commissioner started by informing the stakeholders that according to; **Environmental Management and Coordination Act (1999)**, public participation is key to any project implementation. He asked the public if the project is to be implemented or not. They answered **in affirmative yes** (*meaning acceptance of the project to proceed as proposed*). The following were the queries and responses raised

Queries

- Mr. Eliud Tormoi- Will the renovation fit to pump machine or not. Because desilting was not done completely?
- Mr Matelong- what are the distribution points and what is the assurance of the project funding and implementation?
- Mr. Shem Wekesa- who is the project going to be handed over to after implementation?

Responses

- Eng. Oindo- the contractor did not complete desilting, but the project will be sorted out. Distribution will be given to nearby consumers' not far flung. Implementations of the project will incorporate safety measures too. As per the calculation of the demand it covers all areas. About quality of works is to cover 20years. Employment opportunity is equal for all no bias to any individual.
- Eng. Ngugi- informed again the stakeholders that once the project is finished, it will be handed over to County Government and the service provider will be sourced by them (County government).
- Hon. Waswa (Keiyo) – Welcome the project on issues where land is affected to be sorted out and compensation to be effected where deemed possible.
- Hon. Lukobero (Kwanza) –so many people will benefit/ cases of water borne diseases will be reduced, this is a good project and he welcomes it

Min 5/12//2015 A.O.B

There being no other business the meeting ended at 2.30pm through a word of prayer.