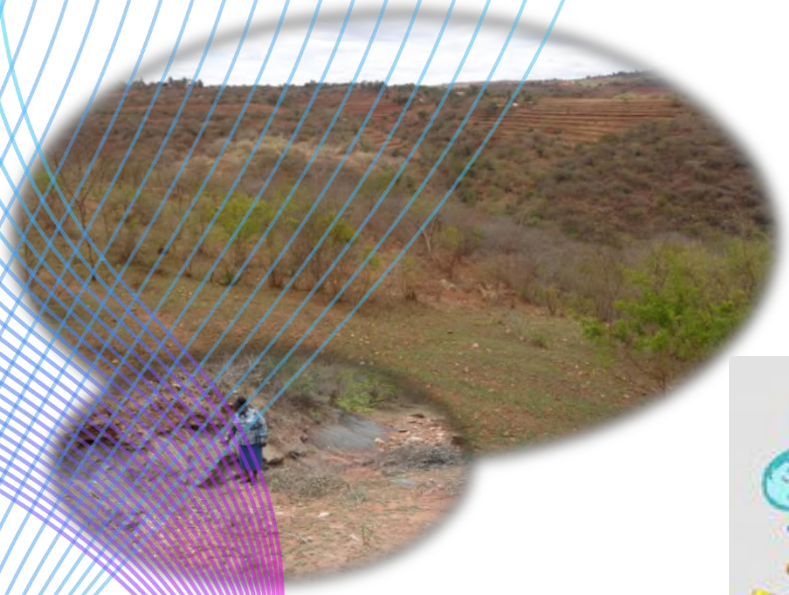

County Government of Machakos - (KCSAP Project)

Ministry of Agriculture, Livestock and Fisheries,

P.O BOX 40-90100

MACHAKOS

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROPOSED KITHAAYONI CONCRETE DAM

ESIA STUDY REPORT

Prepared by:

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AUGUST 2020

CERTIFICATION

For and on Behalf of:

The Kithaayoni Community Committee

Ward: Kiima-Kimwe

Sub County: Machakos Town (Kyanzasu)

In Liaison with the County Project Coordination Unit (CPCU)

MACHAKOS COUNTY

County Project Coordinator Kenya Climate Smart Project

Machakos County.

This Environmental Impact Assessment (ESIA) report was prepared in accordance with the Environmental Management and Coordination Act (EMCA) 1999, World Bank Environmental and Social Safeguard Policies and the Environmental Impact Assessment and Audit Regulations 2003 in order to meet the statutory requirements for implementation of projects under schedule ii.

I, the undersigned, confirm that the contents of this report are a true representation of the ESIA Study process for the proposed construction of Kithaayoni Concrete Dam (Height 5m) in Makaveti village, Kyanzasu sub-location of Kimutwa location in Machakos County.

LEAD ESIA/ EA EXPERT

JOSPHAT OMARI

NEMA REG. No. 7645

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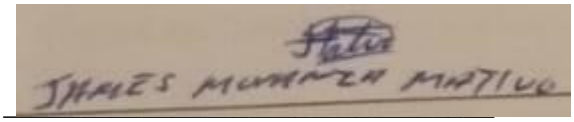
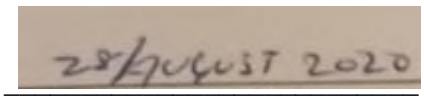
NAIROBI

Lead Expert .....Date..27 August, 2020.....

Name:  **Date:** 

Community Chairman

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LIST OF ACRONYMS AND ABBREVIATIONS

CIDP	County Integrated Development Plan
CMS	Convention on Migratory Species
COVID 19	Corona Virus disease 19
CPCU	County Project Coordination Unit
CSA	Climate Smart Agriculture
CSR	Corporate Social Responsibility
EAs	Environmental Assessments
EMCA	Environmental Management and Coordination Act, 1999 Revised, 2015
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FGD	Focused Group Discussion
GBV	Gender Based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gases
IFC	International Finance Corporation
KCSAP	Kenya Climate Smart Agriculture Project
Km	Kilometers
Km^2	Square Kilometers
m	Meters
M	Million
m^3	Cubic Meter
MEA	Multilateral Environmental Agreements
mm	Millimeter
MOALF	Ministry of Agriculture, Livestock and Fisheries
NEAP	National Environmental Action Plan
NEMA	National Environment Management Authority
PEPB	Pest Control Products Board
PPE	Personal Protective Equipment
RCC	Reinforced Cement Concrete
SEA	Sexual Exploitation and Abuse
SEA	Sexual Exploitation and Abuse
SESA	Strategic Environmental and Social Assessment
SH	Sexual Harassment
SOP	Standard Operating procedure
TOR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization
WRA	Water Resources Authority

EXECUTIVE SUMMARY

Introduction

The County Government of Machakos, through the Kenya National Climate Smart Agricultural Project (KCSAP), a World Bank-funded project, intends to increase agricultural productivity and build resilience to climate change risks among smallholder farmers and pastoral communities.

The KCSAP aims to achieve three main objectives including sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change; and reducing and removing greenhouse gas emissions, where possible.

As part of the programme's main objectives, the County Government of Machakos through the Kenya Climate Smart Agriculture Project intends to construct a Concrete Dam in Makaveti Village, Kyanzasu Sub-Location of Kimutwa Location in Machakos County. The proposed project falls within the second schedule of the EMCA Act under "Dams, rivers and water resources including storage dams" therefore, there is need to conduct an ESIA and develop an Environmental and Social Management Plan (ESMP) to guide management of environmental and social risks during construction, operation and decommissioning of the project.

Project Justification

The County Government of Machakos had realized the climatic and drought related issues affecting the County. Through the Ministry of Agriculture, Livestock, Fisheries and Irrigation under the Kenya Climate Smart Agriculture Project (World Bank Financed), the County Government intends to mitigate poverty and to harmonize the spread of development throughout Machakos. A portion of the KCSAP Programme's budget is earmarked to finance development projects qualified on a priority basis. In its present state, the dry valleys that normally carry water during the rains and drains into Mavoloni River are not reliable to sufficiently sustain the residents of Kimutwa Location. As such, the Kithaayoni community has prioritized construction of the proposed dam to enhance water supply and build resilience to climate change.

ESIA Methodology

Desk study and field investigations through interviews, admission of questionnaires and focus group discussions was conducted. The process included: collection of baseline data to describe the status of the project site before project implementation commences; data

analysis and evaluation; public consultations with the neighbouring communities and persons likely to be affected by the proposed project; and preparation of an ESIA study report encompassing the details specified in the Environmental Impact Assessment/Audit Regulations (2003) revised in 2015.

Health Impacts on Covid 19

The review of this ESIA is undertaken during the Coronavirus disease 2019 (COVID-19) pandemic outbreak. However, the preparation of the ESIA including the relevant consultations were undertaken before the first case of COVID-19 was reported in Kenya. As such, specific mitigation measures have been introduced to prevent the spread of the pandemic during the construction period. Moreover, consultations required as part of the mitigation measures, such as during RAP implementation and training on E&S issues, also pose a risk of infection to communities. For this reason, the risk of contracting the virus during consultations will be avoided, minimized and mitigated with specific measures to ensure national requirements on social distancing and recommendations on how to minimize contact are adhered to.

Policy, Legal and Regulatory Framework

The Environmental Management and Co-ordination Act 1999 revised in 2015, is the legislation that governs ESIA studies in Kenya. This project falls under the Second Schedule of EMCA 1999, which lists the type of projects that are required to undergo ESIA studies. Other key national laws that govern the management of environmental resources in the country have been discussed in this report, as well as World Bank group operational policies on environmental and social risk management.

Mitigation Measures

Although there are a number of justifications of why the project should be constructed, there are various negative impacts both to the environment and social wellbeing and therefore proposed mitigation measures have been documented. This will assist the contractor and proponent to follow in the various levels/phases of the proposed project. The following Table summarises these potential adverse environmental and social impacts and the proposed mitigation measures.

Environmental and Social Management Plan (ESMP)

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
Construction Phase			
Interference with the physical setting	• Adequate survey should be done on the dam location and its extent • Anyone, whose property is affected to be compensated for disturbance • Engagement shall be to assess whether there are grievances. • Landscaping	• No. of person affected • No. of properties destroyed	150,000
Noise pollution and vibration	• Noise maintained in accordance to EMCA specification standards. • Equipment Operators to wear PPEs to prevent direct noise from the machinery • Machines with minimal vibrations to be used • Time restrictions for high vibrating machines (avoid working during the night for such machines)	• State of machines used • Type of machines used for compaction	10,000
Air Quality Degradation/ Dust Emissions	• Supply and construction vehicles will only use the designated transport routes. The drivers will also be advised to stick to prescribed speed limits • The contractor will ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases • The contractor shall ensure the appropriate speed limits are observed at along all road sections that will be used by construction vehicles on a needs basis to eliminate the creation of dusts • Construction workers will be provided with dust masks to mitigate	• Records of speed limits signs erected • Records of machine and vehicle service • Evidence of use of dust masks by workers on site	10,000
Workers Accidents and Hazards	• Contractors to adhere to Occupational Health and Safety rules and regulations as stipulated in the Occupational Safety Act of Kenya of 2007 and revised in 2010 by	• No of persons injured • Type of injury experienced	20,000

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
during Construction	adopting preventive and protective measures to ensure that under all conditions of their intended use, the employees are safe and without risk to health. The employer is also required to take immediate steps to stop any operation or activity where there is an imminent and serious danger to safety and health and to evacuate all persons employed as appropriate • The Project Contractor will be required to provide appropriate personal protective equipment and a safe and healthy environment for construction workers; • There should be a crisis management team to administer First Aid to injured persons; • The Project Contractor should test and approve equipment before use; • The Project Contractor should train workers on how to use various PPE and safe use of machinery.		
Extraction and use of Construction Materials	• The construction extraction site should be backfilled to help retain the value of the land resource • Fencing to be done before backfilling to prevent accidents of humans and livestock. Putting a sign to warn people	• No. of open sites • Type of fencing required	30,000
Generation of Liquid and Solid Waste	• The Project Contractor to comply with NEMA's Waste Management Regulations of 2006 by contracting a licensed waste collector to regularly collect and dispose accumulated wastes • Sensitization of construction workers on proper disposal of solid wastes • Temporary latrines will be provided on site to be used by construction workers • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels	• Presence/ absence of scattered solid wastes at sites • Availability of waste receptors • No. of sensitization meetings held with workers	30,000 part of the Contractors cost

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
	• Water from cleaning of equipment will be utilised within the project site and will not be discharged into watercourses.		
Loss of Flora and Fauna	• Cutting of trees should be done only where necessary. • The proponent shall ensure that clearing of vegetation clearing is limited to the pipeline trench area (i.e. 0.5 meters width) within the road reserve • Transportation of construction materials to be done through the existing local roads • Avoidance of vegetation clearing along riparian land • Sensitization of construction work-force on environmental conservation and ecological protection	• No. and type of vegetation cleared • No. and type of indigenous species re-planted • Size of area cleared • Size of area re-vegetated	50,000
Increased Vehicular and Human Traffic	• Transportation of construction material to specific sites will be done through the existing local roads • The contractor will rehabilitate the local roads that will be damaged during construction activities • Consultation with the local communities on planned road diversions if any • Restriction of Vehicular and Human Traffic to the road reserve where possible • Sensitization of drivers to comply with prescribed speed limits	• No. of accidents involving project vehicles • Transportation control logs • No. of road spots rehabilitated • Community complaints • Complain feedback mechanism	5,000
Influx of workers from other areas	• Preference is given to local residents for unskilled jobs where necessary.	• Staff registry reports	Routine project activity
Occupation Health and Safety	• Continuous supervision of occupational, health and safety management to ensure compliance	• HSE inspection reports	100,000 for awareness
	• Occupational Safety and Health Training for contractor's staff	• Training reports • Training attendance sheets	50,000 part of contractors cost
	• Conduct orientation talks and visits	• Orientation report	5,000

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
	• Conduct toolbox talks (safety meetings)	• No. of toolbox talks conducted	5,000
Spread of COVID-19 amongst workers	• The Contractors will develop a SOPs for managing the spread of Covid-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilization. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions; • Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including • Avoid concentrating of more than 15 workers at one location. Where there are two or more people gathered, maintain social distancing at least 2 meters. All workers and visitors accessing worksites every day or attending meetings shall be subjected to rapid Covid-19 screening which may include temperature check and other vital signs; • The project shall put in place means to support rapid testing of suspected workers for covid-19; • Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc	• Availability of SOP(s), Training material, PPE, sanitising facilities etc.	50,000
Spread of COVID-19 amongst community	• Electronic means of consulting stakeholders and, holding meetings, whenever possible, shall be encouraged whenever feasible. One-on-one engagements for the	• Availability of SOP(s), Training material, PPE, sanitising facilities etc	10,000

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
members during consultations processes	PAPs while observing social distance and adhering to PPE wearing shall be enforced; • Avoid concentrating of more than 15 community members at one location. Where there are two or more people gathered, maintain social distancing at least 2 meters • The team carrying out engagements within the communities on one-on-one basis will be provided with appropriate PPE for the number of people they intend to meet; • Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements and mail) when stakeholders do not have access to online channels or do not use them frequently. Ensure to provide and allow participants to provide feedback and suggestions • Hold meetings in small groups, mainly in form of FGDs if permitted depending on restrictions in place and subject to strict observance of physical distancing and limited duration. • In situations where online interaction is challenging, disseminate information through digital platform (where available) like Facebook and WhatsApp & Chat groups. • Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants		
Gender-based violence at the community level	• The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: • Effective and on-going community engagement and consultation, particularly with women and girls;	• Mitigation plan for GBV occurring at the community level as a result of project implementation	-

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
	• Review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes for women, employments schemes for women, etc.; • Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment • The contractor will ensure adequate referrals mechanisms are in place if a case of GBV at the community level is reported related to project implementation	• Number of GBV cases happening at the community level that receive survivor-centered referral and care	
Sexual Exploitation and Abuse by project workers against community members	• Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). • The SEA action plan will include how the project will ensure necessary steps are in place for: ○ **Prevention of SEA:** including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level IEC materials; ○ **Response to SEA:** including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; ○ **Engagement with the community:** including	• SEA Action Plan • Code of Conduct • Number of staff trainings • SEA FP • Community Liaison trained in PSEA • IEC materials for workers' sites and community • Discrete SEA reporting pathway • Relevant policies, e.g. investigations and discipline and whistle-blower protection • Monthly minutes from SEA coordination meetings	5,000

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
	development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; ○ **Management and Coordination:** including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.		
Sub-Total of Cost Estimates for Construction Phase			***Kshs530,000***
Operation Phase			
Increase in Waterborne Diseases	• Training on efficient home-based irrigation system that is efficient in water use • Removal of any stagnant water • Sensitisation on the use of nets at homes close to site • Use of gumboots in the irrigation field	• Amount of stagnant water	10,000
Water use conflicts	• Water abstraction laws followed • Farmers training on water use • Enforcement of water Act, 2016	• Amount of water abstracted • Number of farmers plots • Irrigation frequency per plots	5,000

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
Pollution of Water	• Machines such as tractors for ploughing used during operation maintained in good condition • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels • All polluted water treated before discharging to water bodies	• Number of machines e.g. tractors used • Number of farmers sensitized on the proper use of pesticides and fertilizers	Proponent's cost
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Sprinkling of backfilled trenches with water • Compaction of backfilled trenches • Re-vegetation of excavated areas • Channelling of surface water runoff away from irrigation channels and pipelines	• No. of wash points installed • No. of silt traps installed • No. of surface drains constructed • Number of people sensitized on soil and water conservation	Part of landscaping cost
Health and Safety Hazards	• Fence the dam to avoid drowning of livestock and even human beings especially children • Train all workers on Health, Safety and Environment (HSE) with an aim of improving awareness • The proponent will erect appropriate safety signage during repair and maintenance activities • The proponent shall provide first-aid facilities for staff • Proponent's staff and visitors will be required to use PPEs all the time	• Training on HSE conducted • Prominently erected safety signage during R&M work • Availability of first-aid kit during R&M work	Proponent's costs as per the quotation
Sub-Total of Cost Estimates for Operation Phase			***Kshs15,000***
Decommissioning Phase			
Reduced availability of livestock water irrigation water to users	• The community to prepare project beneficiaries for a transition strategy when de-commissioning • Develop alternative livelihood strategies.	• Customer complaints • Alternative sources of water provided	500,000 (Future estimates)

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Sprinkling of backfilled trenches with water • Compaction of backfilled trenches • Re-vegetation of excavated areas • Channelling of surface water runoff away from the pipeline route	• Presence/ absence of stockpiled excavated earth material • No. of silt traps installed • No. of surface drains constructed	500,000 (integrated in the works costs)
Air Quality Degradation/ Dust Emissions	• Evacuation vehicles will only use the designated transport routes. The drivers will also be advised to stick to prescribed speed limits • The contractor will ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases • The contractor shall ensure recommended speeds on road sections that will be used by construction vehicles are adhered to on a needs basis to reduce the creation of dusts Construction workers will be provided with dust masks to mitigate	• Records of water sprinkling • Number of speed limit signs erected • Evidence of use of dust masks by workers on site	50,000
Loss of Flora and Fauna	• The proponent shall ensure minimal clearing of vegetation • Transportation of decommissioning wastes to be done through the existing local roads • Sensitization of decommissioning work-force on environmental conservation and ecological protection • Re-vegetation of cleared areas with indigenous vegetation species	• No. and type of vegetation cleared • No. and type of indigenous species re-planted • Size of area cleared • Size of area re-vegetated	30,000
Increased Vehicular and Human Traffic	• Transportation of decommissioning wastes to specific sites will be done through the existing local roads • The contractor will rehabilitate the local roads that will be damaged during decommissioning activities • Consultation with the local communities on planned road diversions	• No. of accidents involving project vehicles • Transportation control logs • No. of road spots rehabilitated	5,000

Potential Impact	Mitigation/ Enhancement Measures	Verifiable Indicators	Estimated Costs (Kshs.)
	• Restriction of Vehicular and Human Traffic to the road reserve where possible • Sensitization of drivers to comply with prescribed speed limits	• Community complaints	
Generation of solid and liquid waste	• Provision of solid waste collection facilities (waste bins) • Contracting licensed solid waste handlers • Sensitization of construction workers on proper disposal of solid wastes • The contractor will maintain all site vehicles and equipment is a serviceable state. • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels • Water from cleaning of equipment will be utilised within the project site and will not be discharged into watercourses.	• Presence/ absence of scattered solid wastes at sites • Availability of waste receptors • No. of sensitization meetings held with workers • Evidence of oil leaks and greases on site • Evidence of waste water flowing through local drainage channels	500,000
Health and Safety	Continuous supervision of occupational, health and safety management to ensure compliance	• HSE inspection reports	30,000.00
	• Occupational Safety and Health Training for contractor's staff	• Training reports • Training attendance sheets	20,000.00
	• Orientation talks and visits	• Orientation report	5,000
	• Toolbox talks (Safety meetings)	• No. of toolbox talks conducted	5,000
Sub-Total of Cost Estimates for Decommissioning Phases			***KSh. 1,645,000.00***

Conclusion and Recommendation

There was upmost acceptability and goodwill from the community living in the project area for the proposed project. Some of the positive impacts identified by the community included; Employment, Enhancement of Tree Species Diversity, Capacity Building and Awareness Campaigns Benefits, Benefits of Engagement by Both Genders, Provision of market for supply of construction materials, Increased local incomes and Economic growth. Their key concerns were; opportunity for employment for local labourers, water borne diseases, accidents, dam safety and associated social immorality. Mitigation measures have been proposed for every negative impact raised in construction, operation and decommissioning under the environmental and social management plan (ESMP) for consideration in this various stage of the proposed project.

The following are some of the recommendation for the proposed project.

a) The mitigation measures proposed should be followed by the proponent as it is highlighted in this ESIA report.
b) The design, construction and operation should be carried out in accordance to the specific report for the proposed project.
c) The proponent to undertake Environmental Impact Assessment Studies for all the proposed borrow pits and areas of construction materials
d) A complete audit be undertaken and submitted to NEMA every year after commissioning of the project to ensure that all the proposed mitigation measures have been complied with.
e) The social impacts raised during community participation should be followed.

In conclusion, the positive impacts outweigh the negative impacts. The listed negative impacts can be corrected with the proposed mitigation measures and it is also economically viable therefore the project should be allowed to proceed.

1.0 INTRODUCTION

1.1 Background

The County Government of Machakos, through the Kenya Climate Smart Agriculture Project, a World Bank-funded project, intends to increase agricultural productivity and build resilience to climate change risks for smallholder farmers and pastoral communities. The Climate Smart Agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate. The KCSAP aims to achieve three main objectives:

1. sustainably increasing agricultural productivity and incomes
2. adapting and building resilience to climate change; and reducing and/or
3. removing greenhouse gas emissions, where possible

These objectives form part of Kenya's obligation as a signatory to the United Nations Framework Convention on Climate Change (UNFCCC). Climate smart agriculture is the pathway that leads to attainment of the national interests of food security, productivity and incomes, while at the same time reducing or sequestering greenhouse gas emissions. KCSAP provides the means to help stakeholders at local, national and international levels to identify agricultural strategies suitable to their conditions.

The Kenya Climate Smart Agriculture Project has developed a Strategy to guide investments and implementation of activities in the context of the current agriculture sector governance structure. As part of the programme's main objectives, the County Government of Machakos through the Kenya Climate Smart Agriculture Project intends to construct a Concrete Dam in Makaveti Village, Kyanzasu Sub-Location of Kimutwa Location in Machakos County. The proposed project falls within the second schedule of the EMCA Act under "*Dams, rivers and water resources including storage dams*" and therefore requires an ESIA study, and is also in line with KCSAP World Bank financing policy for dam projects less than 5m. It is for this reason the County Government of Machakos commissioned a full ESIA study for the project. A Team of Experts has therefore been contracted by County Government of Machakos to conduct the ESIA, as per the TOR that were developed. The objective of this assignment is to ensure that the potentially adverse environmental and social impacts can be minimized and the positive impacts enhanced.

This ESIA study report provides relevant baseline information of the project area, anticipated impacts to the environment and social aspects, appropriate mitigation

measures necessary for incorporation into the project implementation, as well as a comprehensive environmental management and monitoring plan.

Approval will, therefore, be sought on the grounds that environmental performance will be assured throughout the project phases through the implementation of the environmental management actions and monitoring programs recommended in this report and subsequent environmental audits.

1.2 Project Objectives

The main objective of the Proposed Kithaayoni Concrete Dam is to provide a Multi-Purpose Water Reservoir catering for Public water Supply, Irrigation, Fish Production and River Regulation in order to effectively contribute to the regional and national social-economic development in line with the KCSAP objectives.

The reservoir will provide water storage at the middle reach of Kithaayoni/Mavoloni stream which originates from the raised grounds forming slopes of Kiima-kimwe Hill, thus making it possible to augment dry season stream flows from Kithaayoni stream, Ilui stream- Ikiwe seasonal stream sub-ordinate to Thwake river which ultimately joins Athi river downstream and allow increased draw off upstream.

1.3 Project Justification

The County Government of Machakos had realized the climatic and drought related issues affecting the County. Through the Ministry of Agriculture, Livestock, Fisheries and Irrigation under the Kenya Climate Smart Agriculture Project (World Bank Financed), the County Government intends to mitigate poverty and to harmonize the spread of development throughout Machakos. A portion of the KCSAP Programme's budget is earmarked to finance development projects qualified on a priority basis. In its present state, the dry valleys that normally carry water during the rains and drains into Mavoloni River are not reliable to sufficiently sustain the residents of Kimutwa Location.

1.4 Study Methodology

The approach to this exercise was structured such as to cover the requirements under the EMCA, 1999 as well as the ESIA/Audit regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003. The expert reviewed the available project documents; Project Appraisal Document (PAD), Community Proposal, Detailed Design Documents, Machakos **County** Integrated Development Plan (**CIDP**) so as to understand the project background and its context. In addition, baseline information was obtained through physical investigation of the site and the surrounding areas, public consultation (which included discussions with local administration and the community), photography, as well as discussions with the Proponent.

The key activities undertaken during the assessment included:

a) Literature Review: A detailed review of available documentation;

b) Consultations with the Proponent and regarding the proposed project details, the site planning and implementation plan;

c) Interviews and consultations with the local community surrounding the Dam as well as representatives of various organizations;

d) Physical inspections of the proposed site;

e) Evaluation of the activities around the site and the environmental setting of the wider area through physical observations as well as from existing information in literature; and

f) Reporting, review and submissions.

Below is a typical outline of the basic ESIA steps that were followed during this assessment:

Step 1: Environmental Screening

This is the first stage when the proposed project was evaluated guided by EMCA, 1999. In screening we try to confirm whether or not a particular project falls within a category that requires an ESIA prior to commencement. Dams are listed under schedule 2 of EMCA, 1999 among projects requiring an ESIA.

In addition, other considerations during the screening process included physical site location, environmental sensitivity of the areas surrounding the proposed site, nature of community and social activities in the project area.

Step 2: Environmental Scoping

Scoping, a result of a preliminary physical assessment of the site and its surroundings, helps to narrow down to the most critical environmental and social issues requiring attention for detailed evaluation. The ESIA team conducted a reconnaissance survey accompanied by officials from the Kenya Climate Smart Agriculture Project KCSAP - Machakos County whereby the latter provided an overview of the proposed project and took the team on a tour of the site. The scoping exercise concluded with a review of the Terms of Reference (TOR) that had been developed.

Step 3: Desk Study

Documentation review is a continuous exercise that involves a review of available documents on the project, including approved plans/designs, land ownership documentation, project plans and designs, environmental legislation and regulations, etc. The review provided an understanding of the terms of reference, environmental and social status, demographic trends, land use practices, development strategies and plans as well as the policy and legal documents.

Step 4: Field Assessment

With the background obtained from preliminary visits, discussions and documentation, the proposed project site was comprehensively evaluated and the administration and community interviewed. The proposed development was evaluated with a view to establish the physical environment status, social and economic trends. The field assessment was also designed to establish potential positive and negative impacts through interviews, discussions and physical observation

Step 5: Baseline Conditions

Physical inspections and observations constitute the exercise for collecting baseline information. Household Questionnaires were also administered.

Step 6: Consultations

Three approaches were used for the public consultation process: unstructured interviews with the local administration; public meetings with the local community; and a stakeholder workshop (see appendix 4). Meetings with relevant government offices and consultations with the local community were undertaken to establish the general public opinion with respect to the project. Among the major issues addressed included social, economic benefits, values of the project and compatibility with other undertakings in the area as well as any other perceived impacts of the project to the welfare of the people.

1.5 ESIA Scope

This ESIA study has been designed in accordance with the terms of reference to address the following issues:

1. To identify and assess all potential environmental and social impacts of the proposed project;
2. To identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation;
3. To verify compliance with the environmental regulation and industry standards;
4. To identify problems (non-conformity) and recommend measures to improve the existing management system;
5. To assess compliance with programmes's environmental policy requirements;
6. To prepare an Environmental and Social Impact Assessment Report compliant to the Environmental Management and Coordination Act (1999) and the Environmental (Impact Assessment and Audit) Regulations (2003), detailing findings and recommendations.

1.6 Health Impacts Mitigation Measures – COVID 19

The review of this ESIA is undertaken during the Coronavirus disease 2019 (COVID-19) pandemic outbreak. However, the preparation of the ESIA including the relevant consultations were undertaken before the first case of COVID-19 was reported in Kenya. As such, specific mitigation measures have been introduced to prevent the spread of the pandemic during the construction period. Moreover, consultations required as part of the mitigation measures, such as during RAP implementation and training on E&S issues, also pose a risk of infection to communities. For this reason, the risk of contracting the virus during consultations will be avoided, minimized and mitigated with specific measures to ensure national requirements on social distancing and recommendations on how to minimize contact are adhered to.

2.0 PROJECT DESCRIPTION

2.1 Project Location

The Proposed Kithaayoni Concrete Dam is in the southern part of the 3EA sub catchment at coordinates 37M 0312713, 9826238 (E037.316514, S01.571393) at an altitude of 1432 m.a.s.l. The project is located within Makaveti village, Kyanzasu sub-location of Kimutwa location in Machakos County. The area is located approximately 8.5 kilometres to the south-east of Machakos town. Figure 1.1 below shows the project location for the dam.

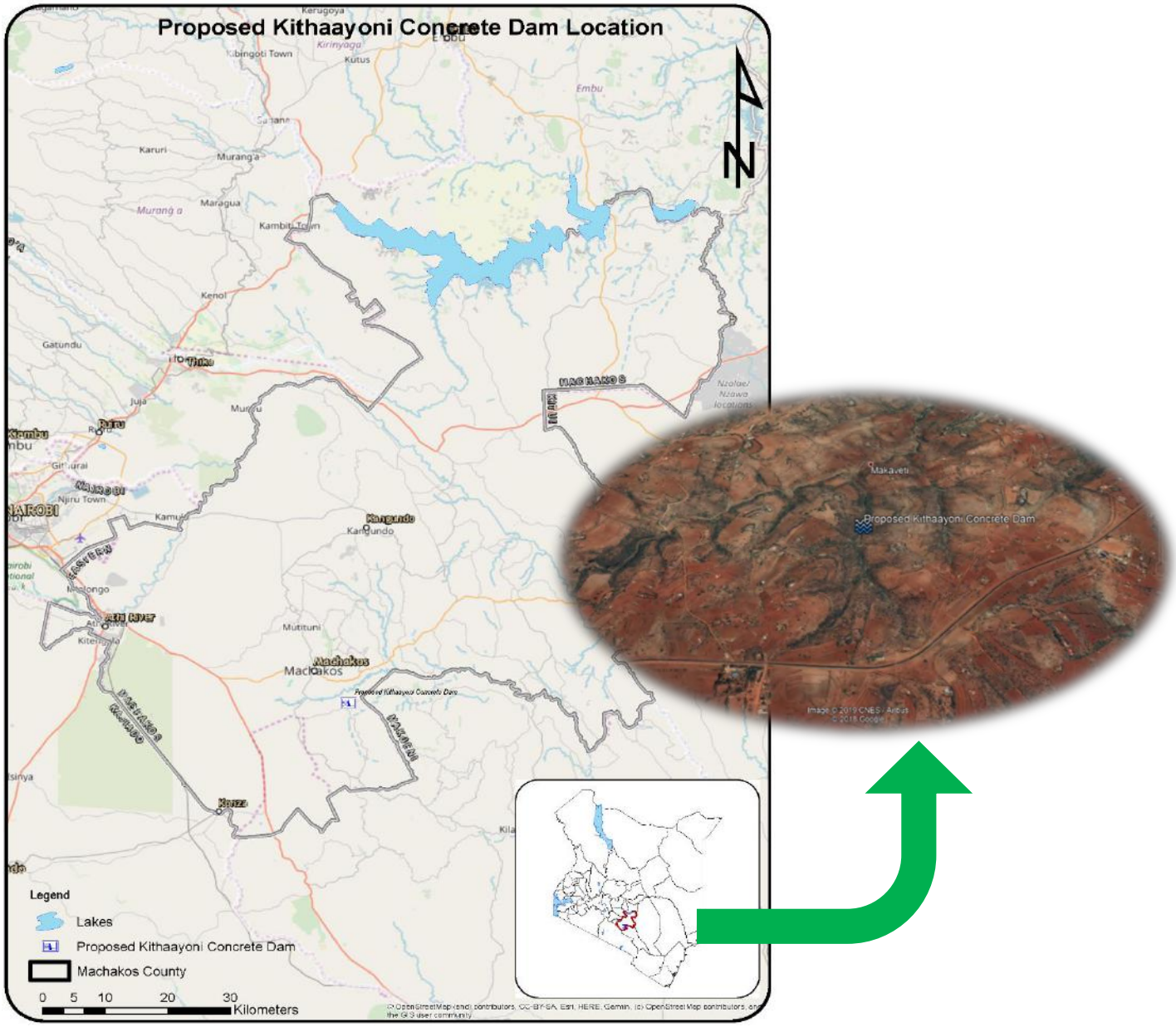

Figure 2-1: Proposed Project Location Area

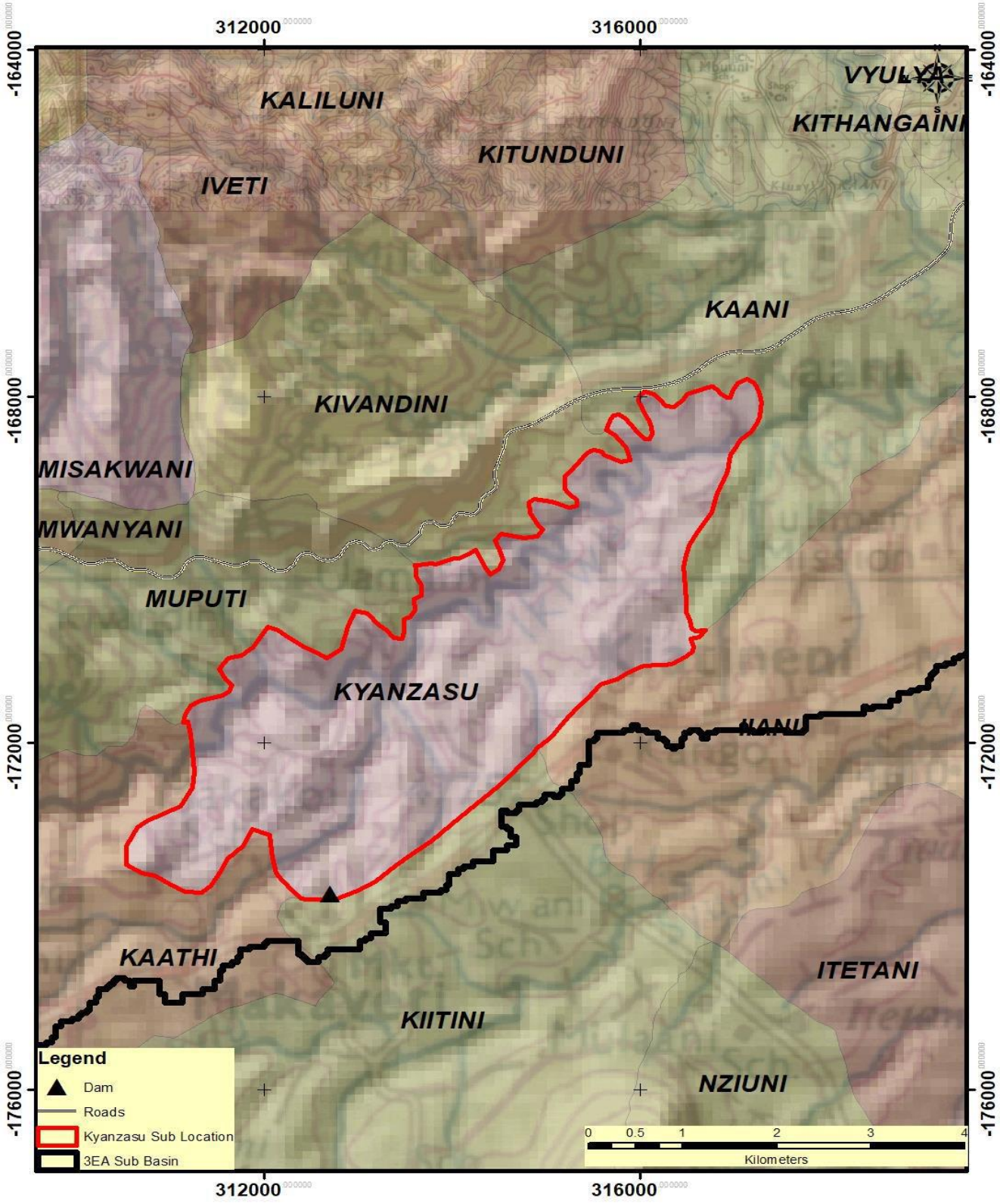

Figure 2-2: Kyanzasu Sub-location

Source: Hydrological Assessment Report of Mavoloni River

2.2 Design Concept

2.2.1 Overview

The proposed Kithaayoni concrete dam is located approximately 8.5 kilometres to the south-east of Machakos town. The sub catchment from which flood flow will be harvested is approximately 0.7 km^2 and wholly within the 3EA Sub Basin (Thwake River sub system). The outlet from this sub catchment and where the storage reservoir will be located is at coordinates 37M 0312713, 9826238 (E037.316514, S01.571393) at an altitude of 1432 m.a.s.l. (Map Sheet No. SK 162-2 Machakos).

- Maximum height above bed 5 m
- Length of concrete dam 113m
- Crest width 1.3m
- Upstream slope Vertical
- Reservoir Capacity 40,000m^3

2.2.2 Proposed site

The proposed site is in a generally rugged and hilly with steep slopes. The flat topography is occasionally broken by hills and deep gulleys forming slopes of Kiima Kimwe Hill and Kalama hills of predominantly Basement formation. The wider topography gently slopes towards the north-east.

The drainage system is the dendritic type and generally flows to the **east.** Seasonal streams draining the area are sub-ordinate to Athi River. The immediate area is drained by Kithaayoni stream, Ilui stream- Ikiwe seasonal stream sub-ordinate to Thwake river which ultimately joins Athi River downstream. The area is located within Athi Drainage Basin. The proposed dam is located on Kithaayoni/Mavoloni stream which originates from the raised grounds forming slopes of Kiima-kimwe Hill.

2.2.3 Other structures

1) The project will have other auxiliary facilities which will include; Construction of cattle trough
2) Construction of communal water points.
3) Fencing of the reservoir as described in bill of quantities
4) Construction of two silt traps with seals

2.2.4 Construction activities

Excavation works will involve mechanized and labour-intensive methods in order to benefit from a mix of involving the beneficiary community and reaping from economies of scale.

2.3 Project Design Layout

2.3.1 Concrete Dam Design

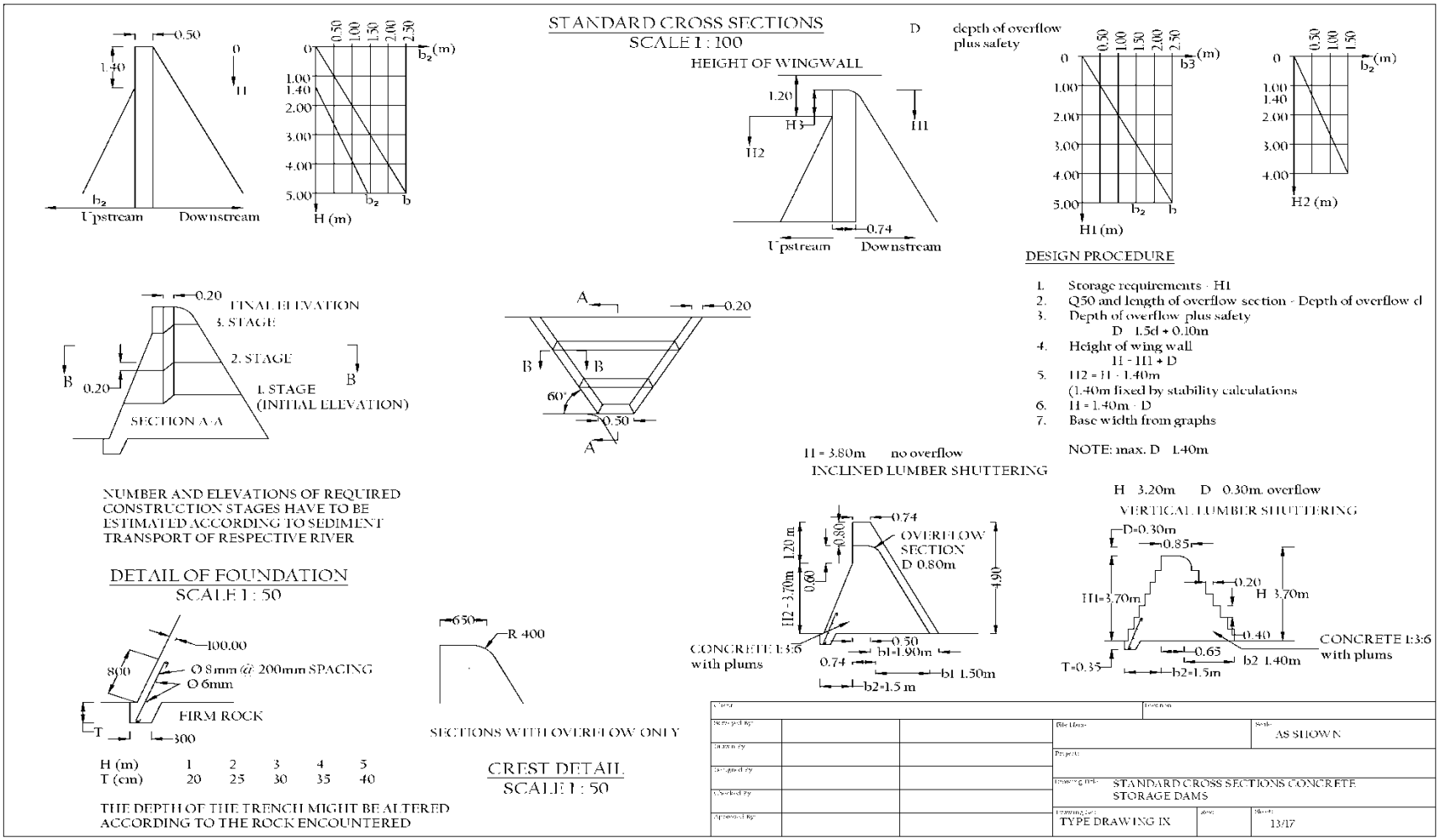

Figure 2-3: Kithaayoni Concrete Dam Design

2.3.2 Kithaayoni Silt Trap

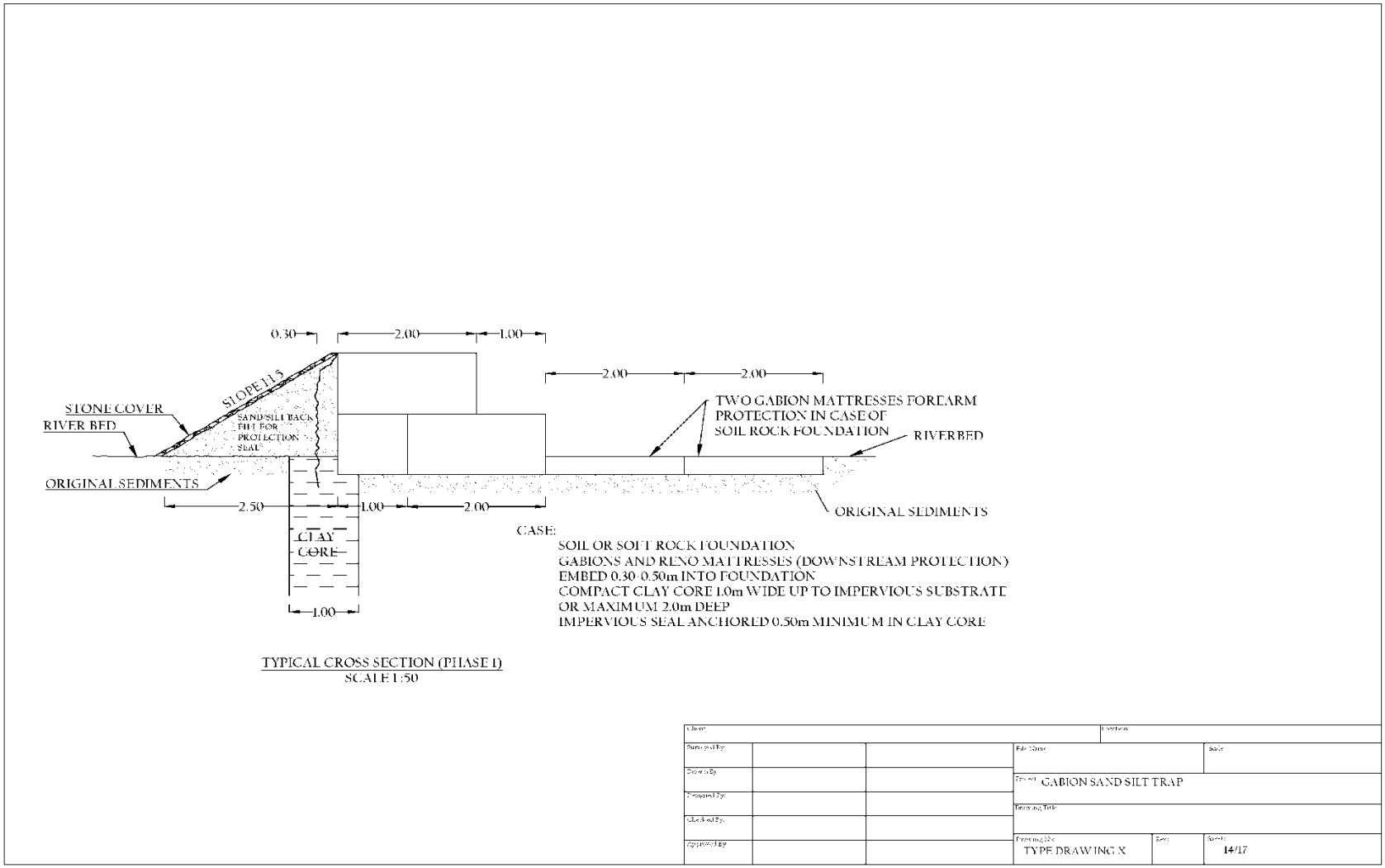

Figure 2-4: Kithaayoni Silt Trap Design

2.3.3 Kithaayoni Intake Works Design

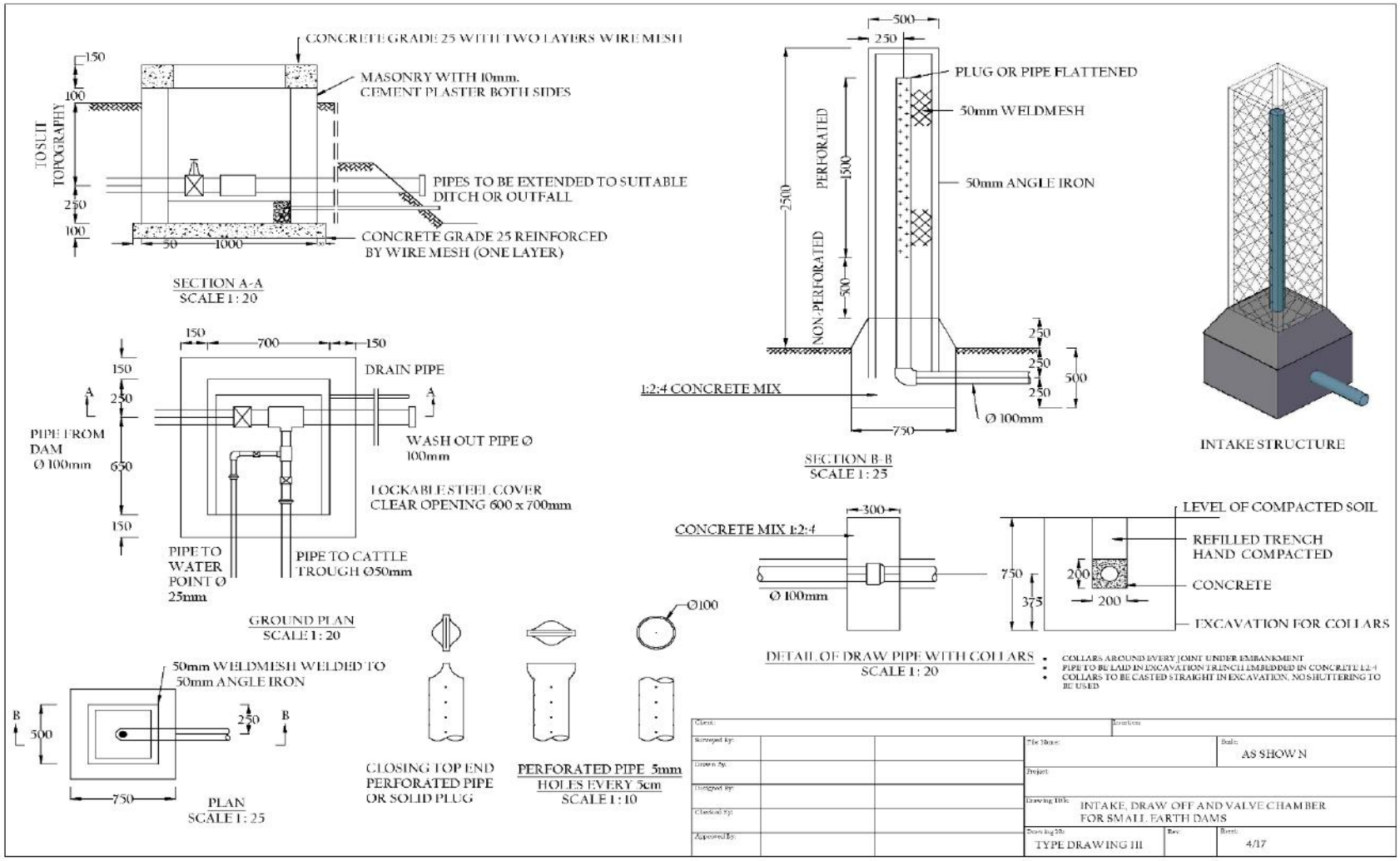

Figure 2-5: Kithaayoni Intake Works Design

2.3.4 Kithaayoni Cattle Trough

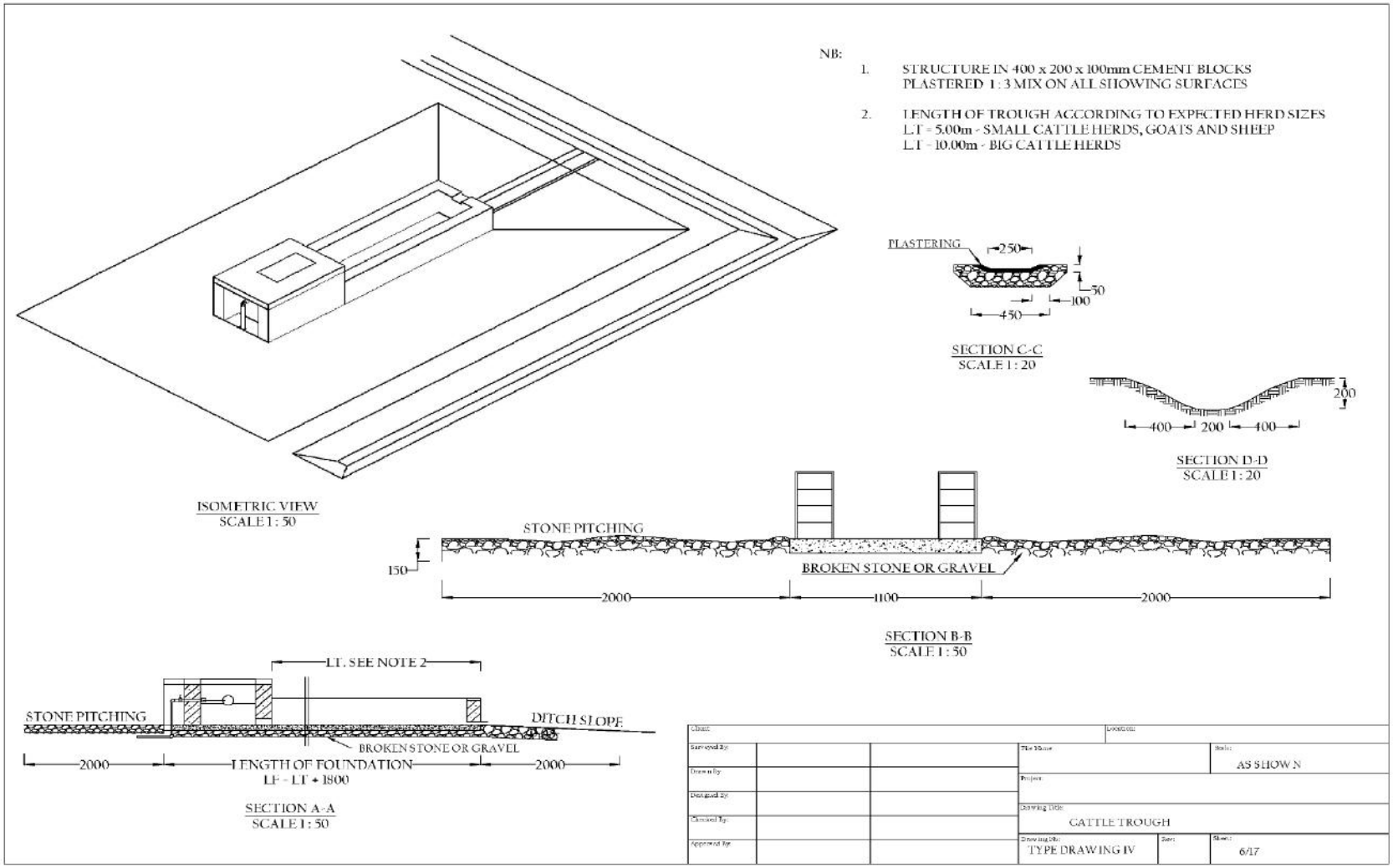

Figure 2-6: Kithaayoni Cattle Trough Design

2.3.5 Kithaayoni Communal Water Point

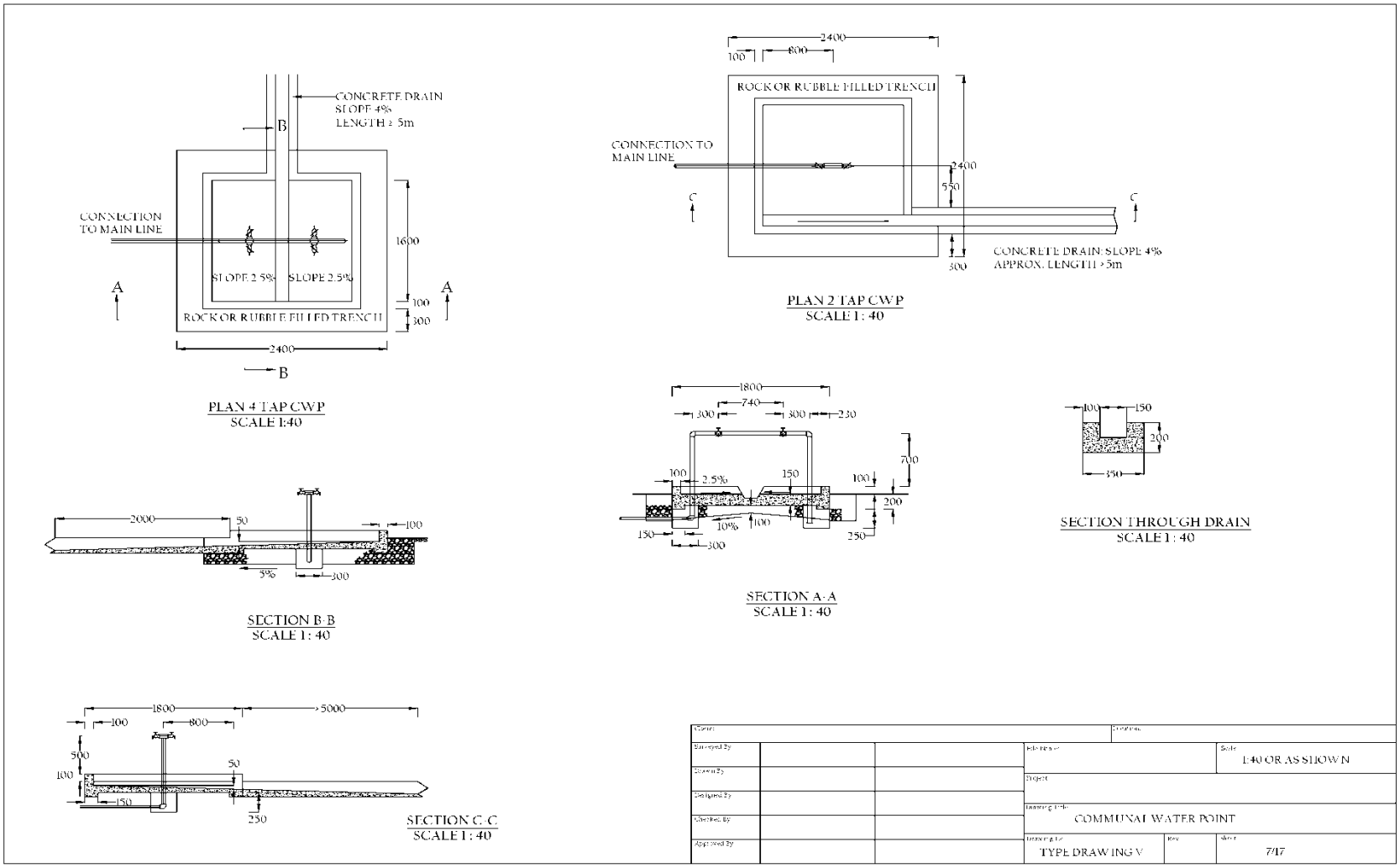

Figure 2-7: Kithaayoni Communal Water Point Design

2.4 Project Cost

Capital costs for the **Proposed Kithaayoni Concrete Dam** are based on the following unit costs; Preliminaries, Civil Works, Steel Work, Engineering Services and Physical & Price Contingencies which were derived from the reports on the Kenya Climate Smart Agriculture Project KCSAP -Machakos County. According to the proponent, the total project cost is a sum of **KSh. 30,000,000.**

2.5 Resettlement Action Plan

The proposed project will be constructed in a community land as authorised by the community (see attached appendix 7). The specific site was set aside for the development of the dam and related structures by the community for the dam construction process. During implementation **no person will be relocated** hence there is no resettlement plan on completion the project will cover less than 2 acres in land area hence the magnitude of the project is very small warranting any form of resettlement. The envisaged losses will be on vegetation including medicinal trees and economic use of land. The latter has however been captured and proper mitigation measures provided in section 8 of this report.

2.6 Project Activities

The following works will generally be followed during the construction of the project:

- *Mobilization*: The contractor will provide access for the Construction Camp if it is not available. He will be required to clear and level the site by: cutting and clearing existing vegetation; removing stumps; leveling the site by grading and filling; and installing site drainage;
- *Setting out:* Once the camp, material storage and parking areas are established, the next task will involve setting out the works, marking and pegging for particular activities;
- *Site clearance and topsoil stripping*: These tasks will be done together with setting out. Areas may or may not be cut and cleared depending on the work area;
- *Earthworks, excavations, filling of structures, concrete works, drainage works:* The above tasks involving excavating, blasting and grading depend on the existing terrain and the foundation base required to build the particular component, although: concrete and steel will be used in various facilities or brought ready mixed; cofferdams may be required to restrict flow, hold back or divert water especially as the dam wall is raised; and erosion measures may be required upstream and downstream of the site; and

- *Handing Over:* At the completion of the works, all structures and equipment not required for the operation and maintenance are removed from the site and the work areas prepared for re-vegetation.

2.7 Project Inputs

2.7.1 Land

The construction activities will take place within the proposed project site that lies within Makaveti Village, Kyanzasu Sub-Location of Kimutwa Location in Machakos County. The areas to be disturbed shall be the Contractor's camp and the area to be cleared for the dam (see attached appendix 7).

2.7.2 Buildings, Sheds, Offices

The Contractor will construct his temporary buildings, warehouses, storage facilities and spoils near the works during the construction period.

2.7.3 Public and Worker Access

The Contractor will maintain all access to the sites and provide temporary screens, fencing, hoardings, fans, planking footways, as may be necessary for protecting the public and others.

2.7.4 Sanitary Provision

The Contractor will provide and maintain sanitary facilities for labour to the requirements of the Government rules and regulations.

2.7.5 Toilets/Latrines

The Contractor will agree with the civil works supervisor on the siting of toilets before construction. They will be constructed of a minimum standard of enclosed walls and roofs of corrugated metal sheeting.

2.7.6 Labour Supply

It is estimated that the total number of skilled labourers will be 10 and will consist of the Contractor's employees both skilled and several unskilled employees most of whom will be sourced from the community within the project location. The proposed sharing proportion is a guided by the labour laws of Kenya for 70 percent of unskilled labourers emanating from the community and assuming at least 30 percent representation from either gender for both skilled and unskilled workers.

2.7.7 Construction Material

Construction input material will include gravel, rock, cement, sand, ballast, structural steel, reinforced steel, paint, timber, fuel and lubricants. Consumable materials will include lubricants, greases, chemicals, reagents, resins and others.

The construction of the dam will utilize rock fill materials that are available from the quarry sites within the vicinity of the project site.

3.0 BASELINE CONDITIONS

3.1 Physical Environment

The sub-sections below provide brief descriptions of each environmental feature observed:

3.1.1 Physiography and Topography

Machakos County is generally characterized by unique physical and topographical features. These include hills rising between 1800 – 2100m above sea level and Yatta plateau, which is elevated to about 1700m above sea level and slopes to the South East. There are isolated hills in the North West. In the plains, the soils are well-drained, shallow, dark and red clay soils. In addition, the vegetation across the entire County varies according to the altitude. The plains receive less rainfall and are characterized by open grassland with scattered trees as compared to high altitude areas, which receive high rainfall and have dense vegetation. The proposed dam location in Kimutwa Location is generally rugged and hilly with steep slopes. The flat topography is occasionally broken by hills and deep gulleys forming slopes of **Kiima Kimwe Hill and Kalama hills of predominantly Basement formation.** The wider topography gently slopes towards the **north-east**.

3.1.2 Drainage

The drainage system is the dendritic type and generally flows to the **east.** Seasonal streams draining the area are sub-ordinate to Athi River. The immediate area is drained by Kithaayoni stream, Ilui stream- Ikiwe seasonal stream sub-ordinate to Thwake river which ultimately joins Athi river downstream. The area is located within Athi Drainage Basin.

The proposed dam is located on Kithaayoni/Mavoloni stream which originates from the raised grounds forming slopes of Kiima-kimwe Hill.

3.1.3 Climate

Generally, the climate is classified as semi-arid with an average annual rainfall of 400-600mm. The rains are bimodal in nature with long rains between March and May, and short rains between October and December.

3.1.4 Vegetation Cover

Vegetation cover in the area comprises of grass patches and indigenous trees and shrubs. Most of the land is being used for subsistence farming.

Figure 3-1: Vegetation Cover at the Proposed Project Site

3.1.5 Soils

Soils comprise deep erosion exposing lateritic formations, unsorted quatzofelspathic pebbles, recent deposits which include soils and alluvial sand deposits. The soils which form the overburden to the underlying geological formations are residual weathering deposits whose composition is controlled more by the physical conditions of formation than by the type of rock from which they were derived. Alluvial sands include river deposits and outwash fans from hills.

In general, the well-drained soils are sandy with gravels and dominate the high grounds while alluvial soils dominate the valleys in the metamorphic terrains, red lateritic soils are the most common and occasionally give way to patches of more sandy soils. Soils cover in the study area comprises of lateritic, quartzitic gravels, weathered mafic gneiss,

sandy alluviums overlying gneiss rock. Near and in the river channel, the soils are thin or absent giving way to the highly fractured country rock.

3.1.6 Geology in the Project Area

The regional geology of the area consists of Basement System rocks forming the entire area. The Basement System rocks resulted from intense regional metamorphism of initial sediments of various compositions and intrusives resulting into schists, gneisses, granitoid gneisses, amphibolites, marbles and quartzites. Metasomatic processes resulted into migmatites and granitic gneisses. Repeated rejuvenation and erosion resulted into two recognizable erosion bevels: - end-Cretaceous and sub-Miocene (after renewed uplift). The formation of the Rift Valley during Tertiary times resulted into outpouring of Kapiti phonolite and a huge mass pyroclastics

The dominant rock in the study area is granitoid gneiss. Other less extensive members include pelitic schists and gneisses. A large portion of the area comprise of undifferentiated Basement System.

The common rock types observed were; -

(1) Granitoid gneisses

(2) Banded gneisses with Migmatized zones

(3) Biotite schists

Figure 3-2: Heavily Fractured banded gneiss at the dam trough

Figure 3-3: Highly weathered fine-grained banded gneiss at the dam axis

3.2 Socio-Economic Survey

3.2.1 Demographics Data

a) Population

Upon compilation and analysis of the data, it was revalidated in the field. Key results of the research are as follows:

Majority (95%) of the respondents were from Kyanzasu sub-location sub counties where as 5% came from the neighbouring sub locations (Maputi and Kaani). The latter therefore signifies that significant impacts of the projects will be felt within Kyanzasu sub-location.

b) Gender

Majority (80%) of the respondents interviewed were male whereas 20% were females. In terms of age, most respondents 38% were aged between 46-60yrs followed by 36-45 years who were 33%. Those aged between 26 -35 were 14% while those above 60 years were 10%. Only 5% of the respondents were aged between 18 -25 years. Figure 3.4 and 3.5 below shows gender and age distribution respectively.

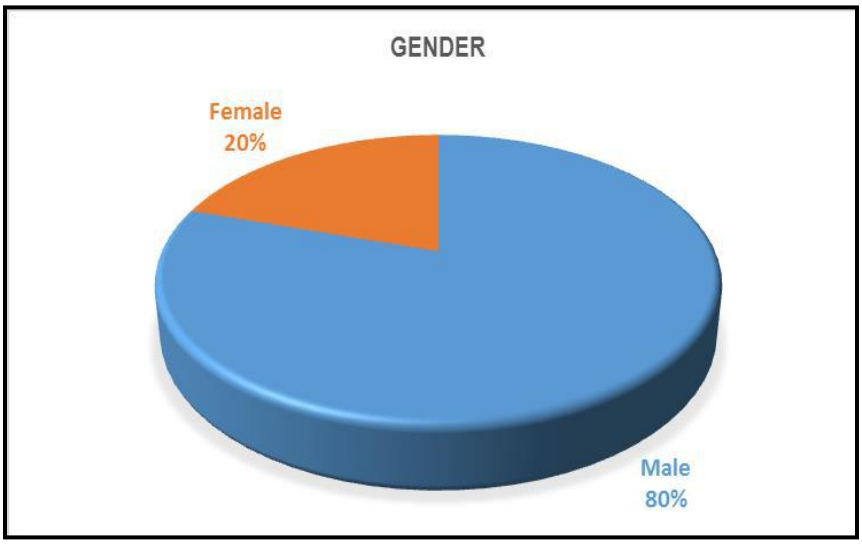

Figure 3-4: Respondents Gender Distribution

c) Age

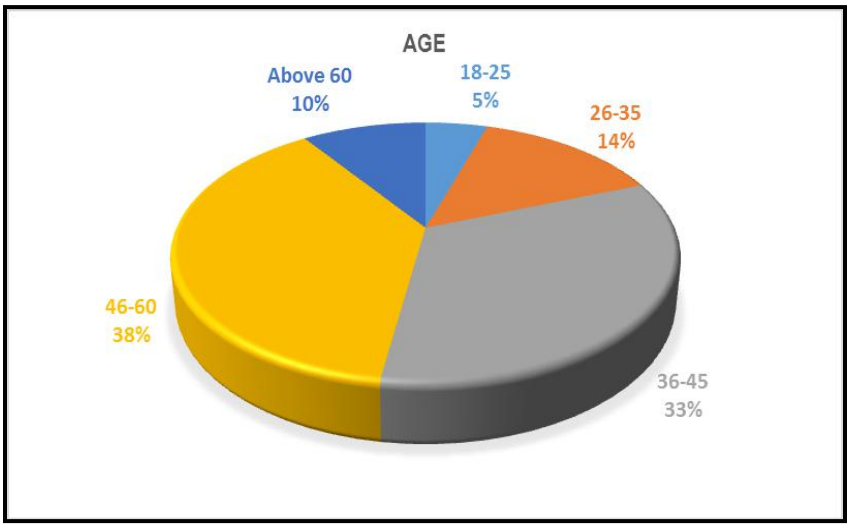

Figure 3-5: Respondents Age Distribution (years)

d) Marital Status

When the respondents were asked to state their marital status, majority of the respondents 85% stated married, 10% of the remaining respondents had never married while the rest 5% had were divorced. None of the respondents indicated having been separated or widowed.

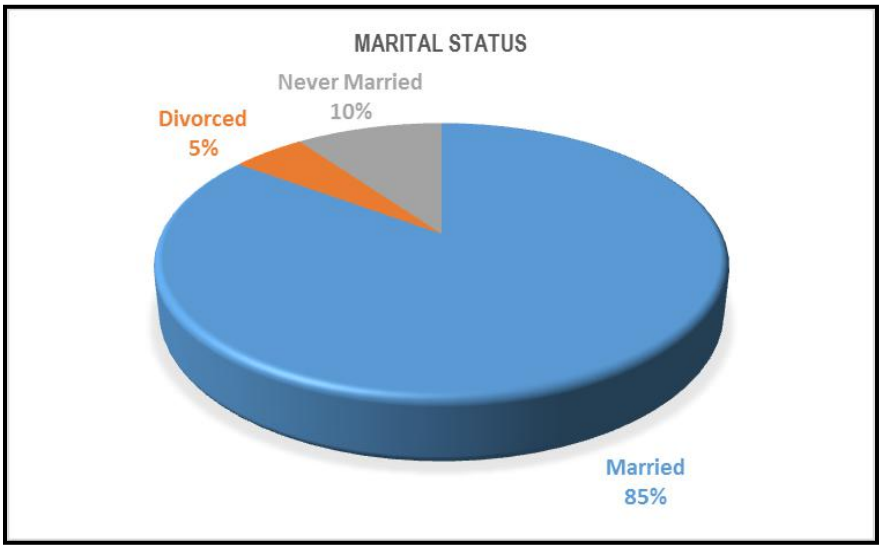

Figure 3-6: Respondents Marital Status

From socio-economic data analysis, majority of the married respondents (75%) had children below 18 years while the rest 25% had no children in the bracket of age. Figure 3.7 below shows the percentage of those with children below 18 years.

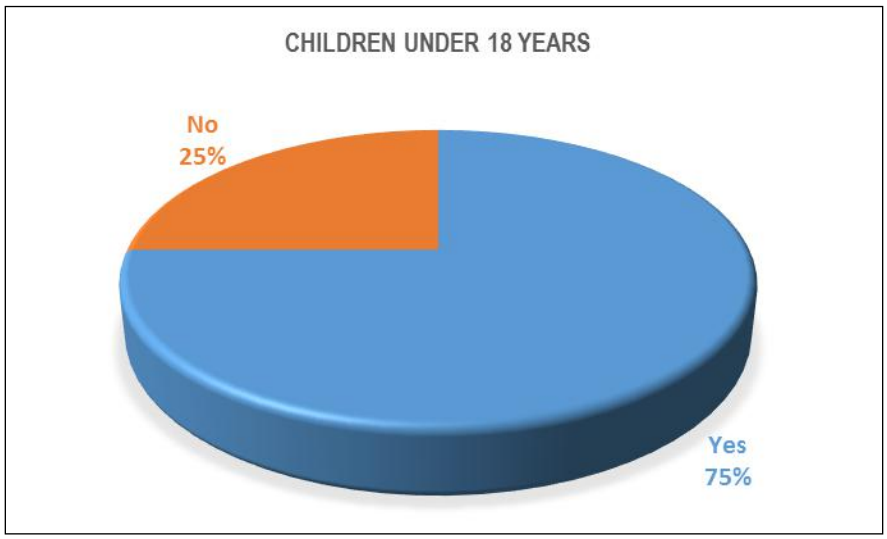

Figure 3-7: Children under 18 years

3.2.2 Education Levels

Education is essential for development and plays a key role in the realization of our national goals. Our findings on education levels of the people are presented in figure 3.8. Majority of respondents 67% had attained high school education, 13% had attained basic primary education followed by 10% attaining college. It was also observed that 5% had attended pre-primary where the 3% had attended adult education and the rest 2% had never received any form of education.

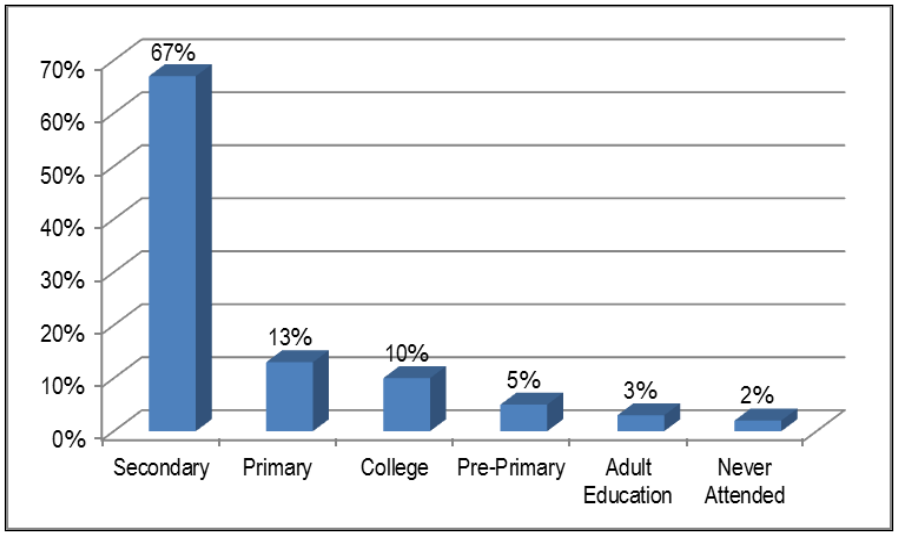

Figure 3-8: Highest level of education attained by respondents

When the respondents were asked to state how much time they take to access the nearest school from their homesteads, a majority 60% indicated less than 20 minutes. This indicates that the schools were less than a kilometre away. It was however observed that 30% of the respondents took between 21 to 40 minutes while the remaining 10 % took between 41-60 minutes to get to the nearest school. This is presented in Figure 3.9.

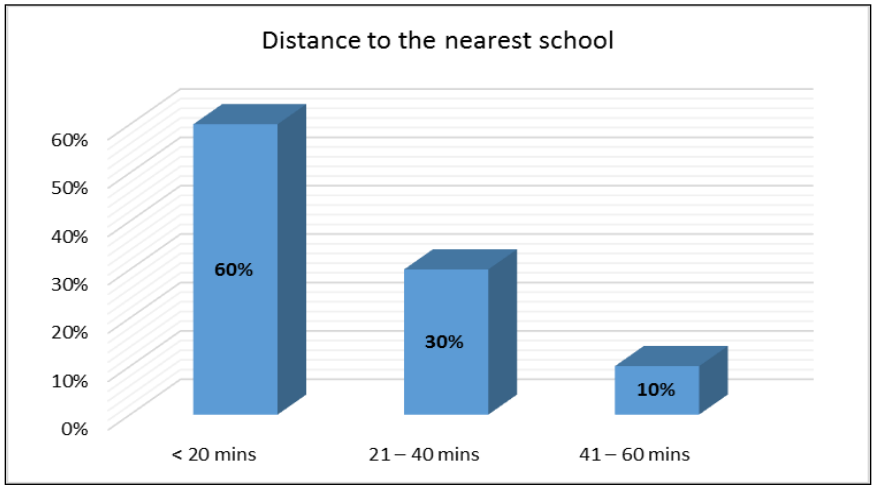

Figure 3-9: Distance to the nearest school

3.2.3 Housing Structure

The standard and quality of dwelling places are manifestations of economic growth and development. The types of houses in the proposed project area comprised of temporary/semi-permanent houses mostly with mud walls and iron roofed. Figure 3.10 illustrates the types of the houses found in the proposed project area.

Figure 3-10: common types of houses around the Area

It was observed that the majority 50% of the respondents lived in semi-permanent houses followed closely with 45% of the residents living in permanent houses. Only 5% of the respondents lived in temporary houses.

In terms of housing materials, majority (51%) of respondents had wood and mud walls, 32% had stones and cement done, while 10% had done their walls on iron sheet. This figure indicates why most houses were semi-permanent. Figure 3.11 below indicated the material on wall used for construction in the Kyanzasu sub county.

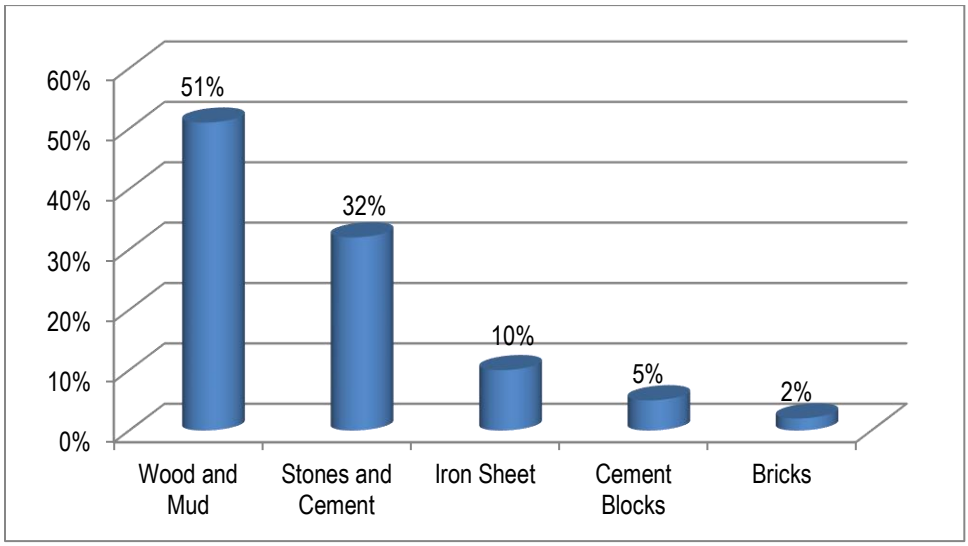

Figure 3-11: Respondent's wall material

Under roofing materials, majority 69% of the respondents used iron sheets, 19% had roofed their houses with mud while the rest 12% had thatch on their roofs (Figure 3.12) in terms of roofing structure.

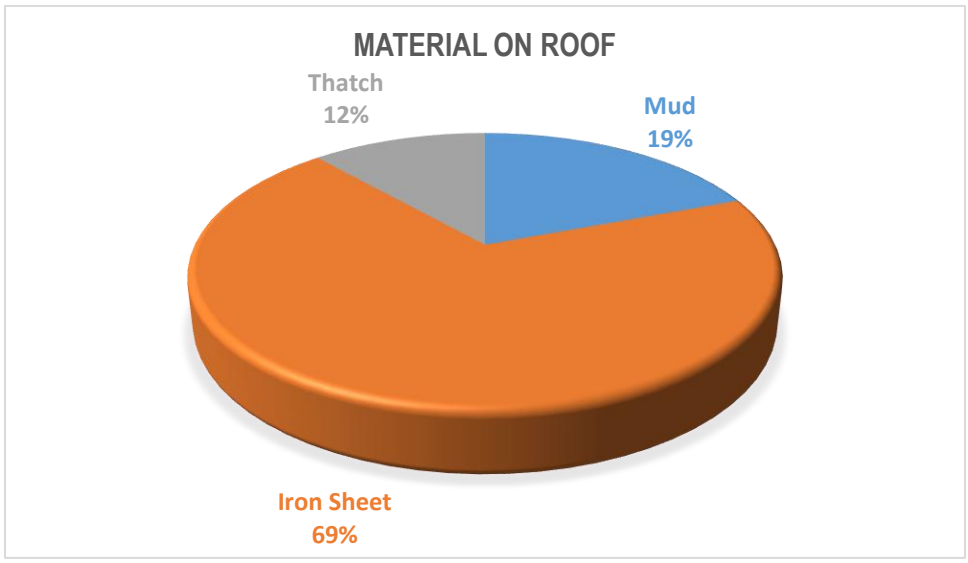

Figure 3-12: Respondent's roofing material in Project Area

3.2.4 Health and Vulnerability

According to the socio-economic survey conducted within the proposed project area, 45% of the respondents take between 41-60 minutes to access the nearest health care facility, followed by 25 % who took 21 – 40 minutes. 20% took less than 20 minutes while the remaining 10% took more than an hour. Figure 3.13 represents the outcome of the survey regarding accessibility to health facilities.

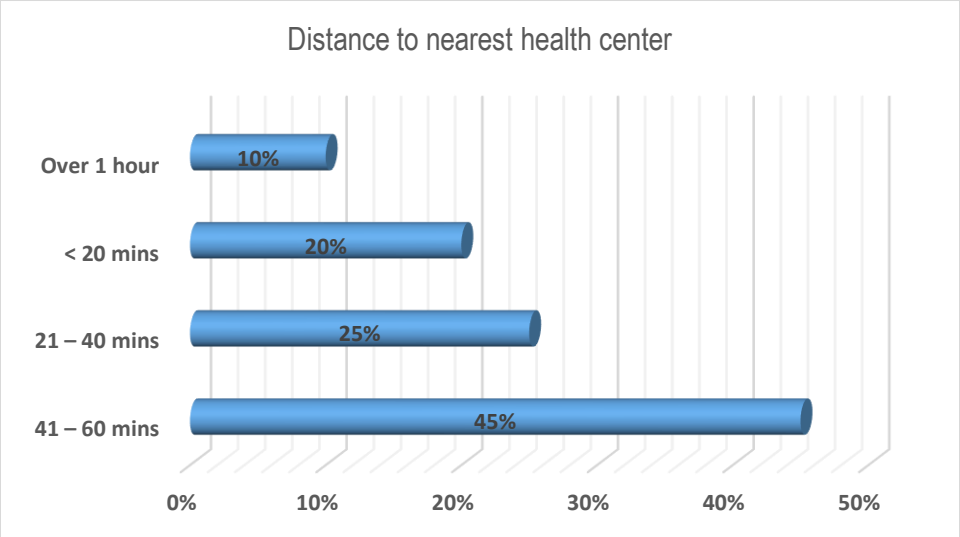

Figure 3-13: Accessibility to health facilities

The analyses from the household socio-economic data indicated 35% of the respondents are disabled indicating a significant number of vulnerable persons within the area. (Fig 3-14)

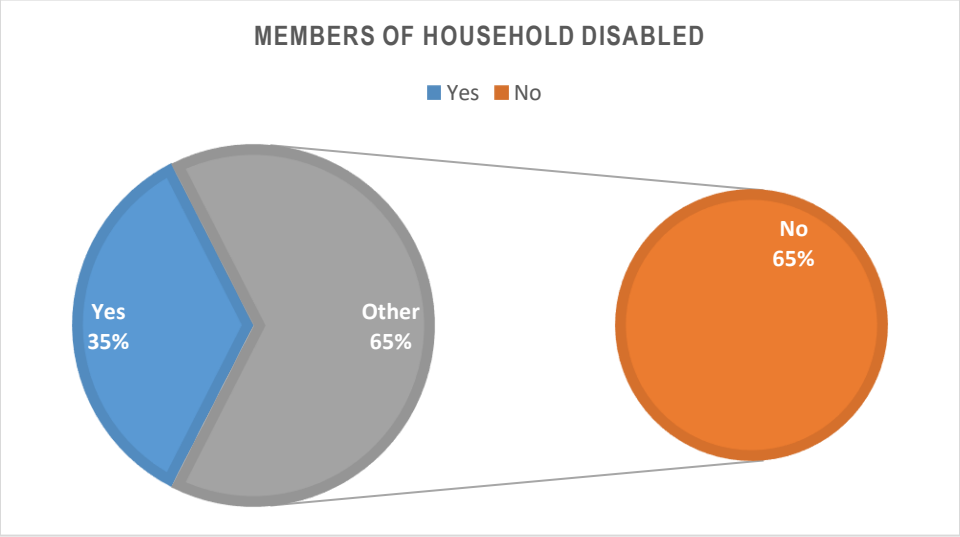

Figure 3-14: Disabled household members

The nature of disability among respondents varied among the interviewed respondents; for those who reported having disabled members, 38% reported having lame members, 29% stated blind followed by 17% who indicated having deaf members and 13% had crippled members. It was however noted that few 4% of the respondents had other forms of disabilities. (Figure 3.15)

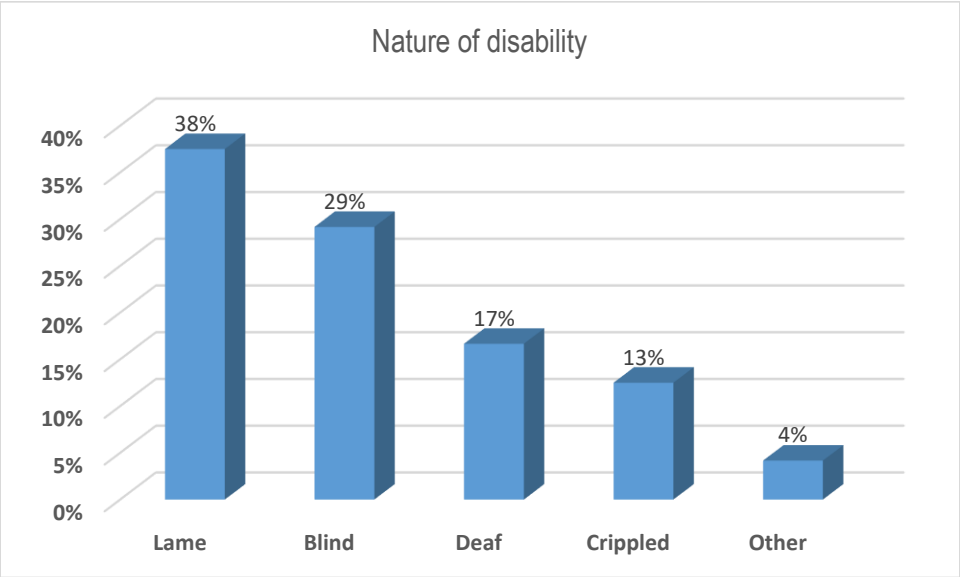

Figure 3-15: Nature of disability

When the respondents were asked if they had ill members within the past four months; 70% of the respondents agreed while the rest 30% had none of their members' sick within the four months. Fig 3.16)

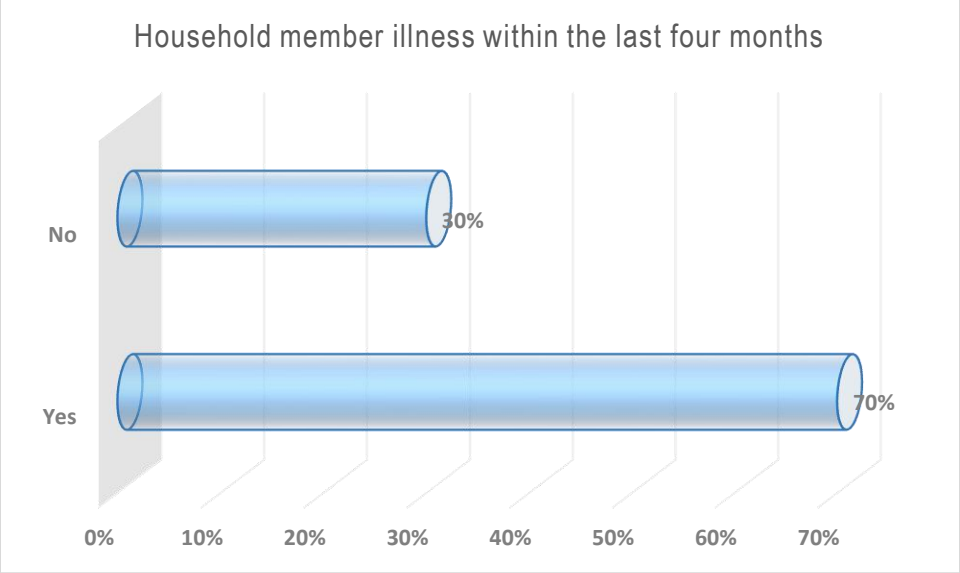

Figure 3-16: Record of illness within the last four months

Common diseases within the proposed project area at the time of survey included malaria accounting for 32 % of the diseases, Flu/Cough with 29%, headaches 18%, stomach disorders at 11%, followed by 7% who reported having diarrhoea. The rest 4% indicated having other forms of illnesses. (Fig 3.17)

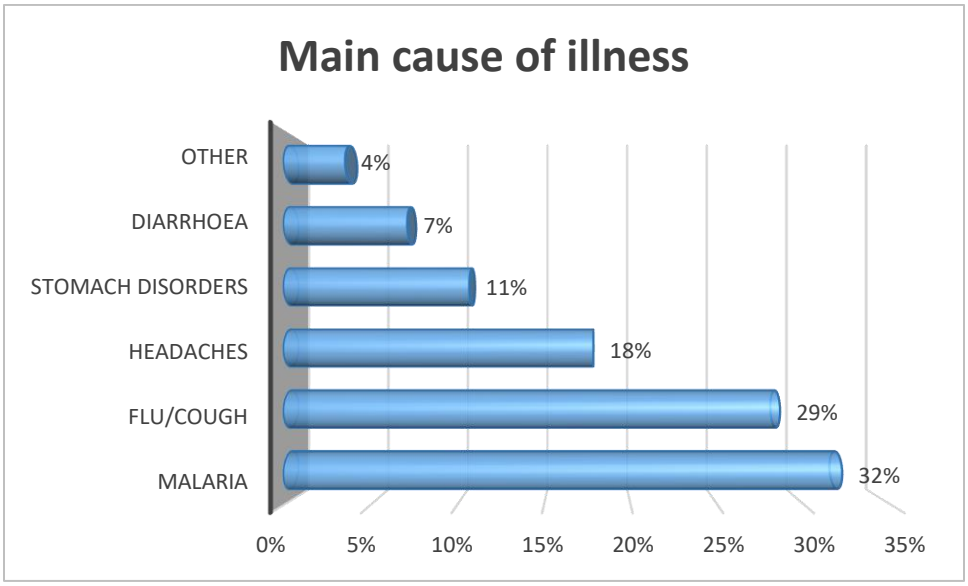

Figure 3-17: Types of diseases common in the proposed project area

It was also observed that majority (65%) of respondents residing within Kyanzasu have rely mostly on rain water. (The assessment was carried out during a rainy season) (Fig 3-18). However, other sources of water seem to be very far from the individual resident's location. Majority (82%) of the respondents take more than an hour while only 18% who said it takes them less than an hour. Further investigation found that it takes an average of 8 hours to get water from surrounding dams/streams and rivers Water is a major problem in this area and the proposed dam project would help change the situation.

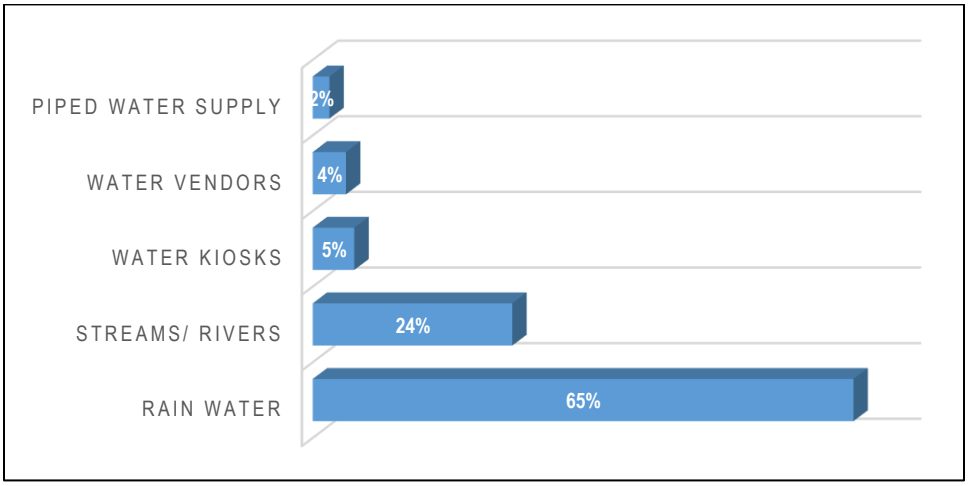

Figure 3-18: Types of diseases common in the proposed project area

Figure 3-19 below indicates the time taken to access the nearest domestic water source.

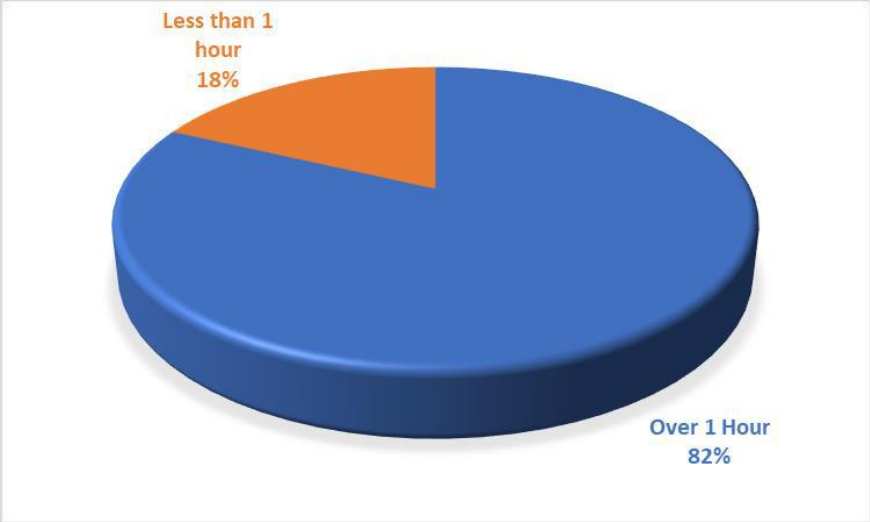

Figure 3-19: Distance to the nearest water source

In terms of safety measures considered before drinking water, majority 82% said they drink directly without boiling, using chemicals, filtering or decanting (Figure 3.20). This factor is mainly attributed to the fact that the residents believe that harvested rain water is clean for drinking.

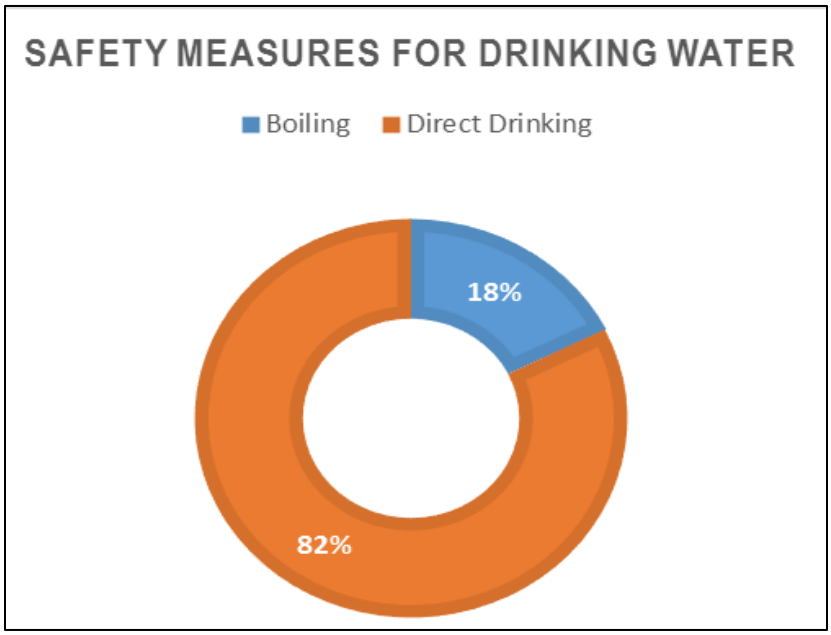

Figure 3-20: Safety measures before drinking water

It was also important to analyse the waste sanitation facilities available in the respondent's vicinity. As evident from the questionnaires answered, majority 95% of the respondents had toilet facilities within their compound (Figure 3.21). Of those with toilets, 90% of the respondents had simple latrines.

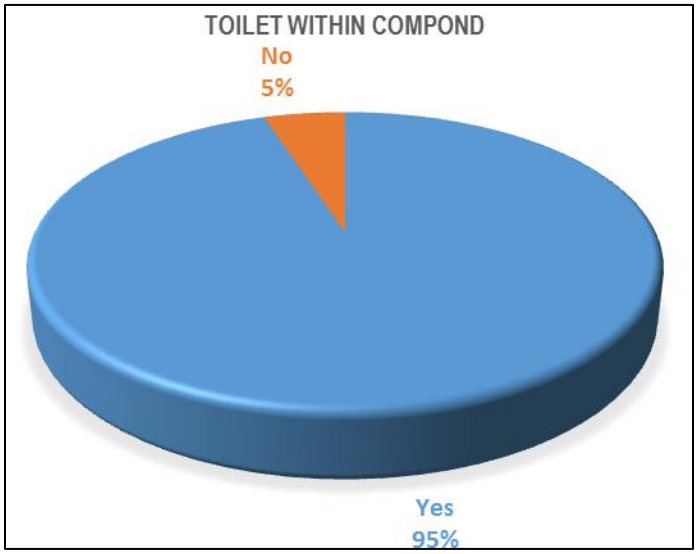

Figure 3-21: Presence of toilet within compound

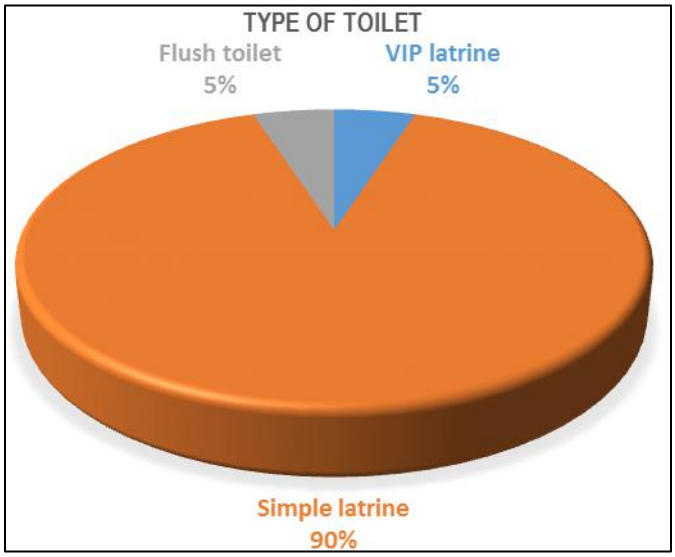

Figure 3-22: Types of toilet common in the area

3.2.5 Land Ownership

Land is a very important factor of production in the economy. It is mostly used for agriculture, livestock keeping, ranching, industrialization, mining, forestry, government reserve, housing and urban development. The absence of a county spatial planning framework in Machakos has led to the proliferation of informal settlements, congestion,

environmental degradation, unplanned urban centres, pressure on agricultural land and land use conflicts.

Land use in Machakos County urban centres is generally mixed development. There are no clear-cut zones for specific land uses in the county. This is because all the existing physical development plans except Machakos New Town Local Physical Development Plan are outdated hence not in force. There is no well-defined zoning policy in the county that guides land use development in all its urban centres sometimes leading to overlaps and mixing of incompatible land uses. There are 2 basic land use structures which are rural and urban. Rural: Agriculture (arable), Urban: residential, commercial, industrial, recreational, wildlife, rangeland.

Land in the proposed dam location is mainly communal. These lands are mainly used for crop growing and livestock farming. Mixed farming is predominant throughout the county. There is a significant change in land use in the urban areas where industrial and commercial use is gaining momentum.

Agriculture is the dominant land use in Machakos County with over 75% of the land in Machakos County is used for agricultural purpose. About 20% of the total land of Machakos County is cultivated. Most people live on their farms and sub-divide them for different uses. All the respondents interviewed were settled on communal land and no one had acquired a private land.

3.2.6 Economic Activities

Our survey revealed that majority 65% of the respondent's practices crop farming as the main source of farming (Figure 3-23). Even though some respondents 35% indicated livestock keeping as main source of income, some crop farmer still kept livestock as secondary source of income.

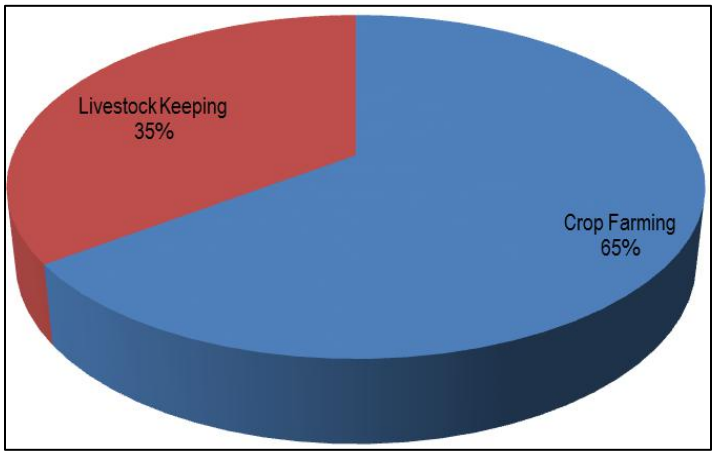

Figure 3-23: Main source of income within the proposed project area

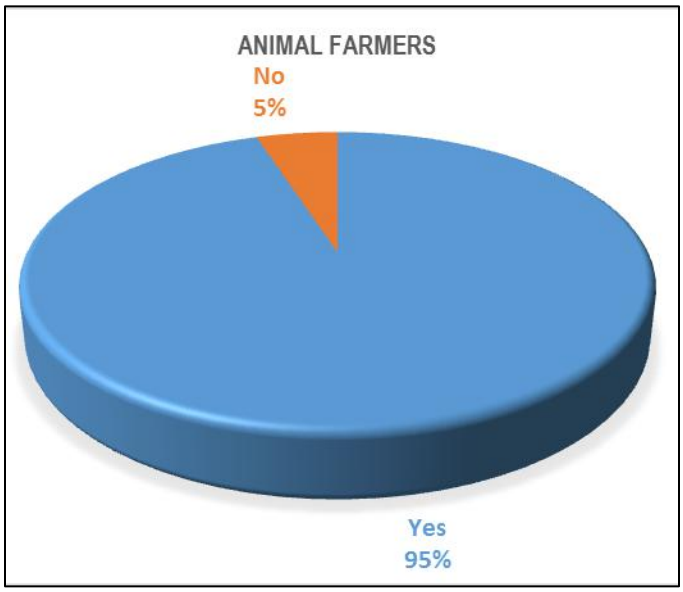

Figure 3-24: Percentage of farmers rearing animals

Even though livestock keeping is not the dominant economic activity in the Kyanzasu sub county, a considerable number of respondents indicated relying on this activity as a source of income. Majority 32% of the respondents interviewed reared cattle, 26% had goats, 22% reared sheep, 10% did poultry farming, 8% had donkeys while the rest kept camels. Figure 3.25 shows the main types of livestock reared in the proposed project area.

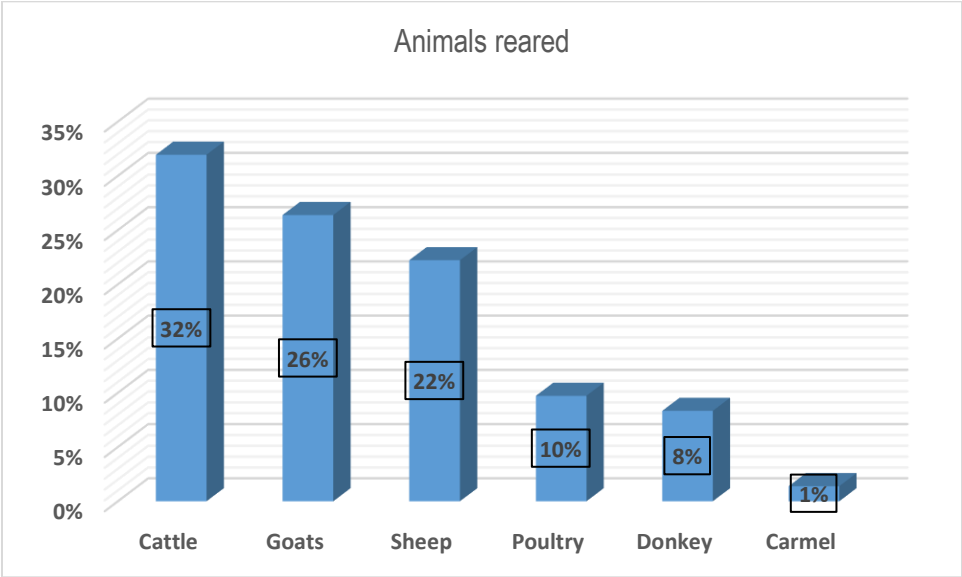

Figure 3-25: Main type of livestock reared in the proposed project area

Figure 3-26: Livestock types in the area

Approximately 60% of total land area in Machakos is arable. Agriculture is the main activity carried out in most of the sub-counties. The main cash crops are coffee, mangoes, citrus, french beans, pineapples, flowers, sorghum and vegetables. The food crops grown include maize, beans, pigeon peas, green grams, cowpeas and cassava which are cultivated in small scale. The County aims to increase the productivity of arable land through use of quality farm inputs, appropriate mechanization, irrigation and good agricultural practices.

Table 3-1: Acreage under major Food and Cash Crops

Type of Crops	Hectares	Cash crops	Hectares
Maize	62,000	Mangoes	6,000
Beans	38,000	Coffee	5,000
Cowpeas	32,000	Citrus	2,000
Pigeon peas	18,000		
Green grams	12,000		

Source: Directorate of crops, Machakos County 2017

From the above table, maize and beans are the main food crops grown across the County with 62,000Ha and 38,000Ha respectively. Mangoes and coffee are the major cash crops with 6,000Ha and 5,000Ha respectively**.** Based on the data from socio-economic analysis, Figure 3.27 indicates the common crops grown in the location.

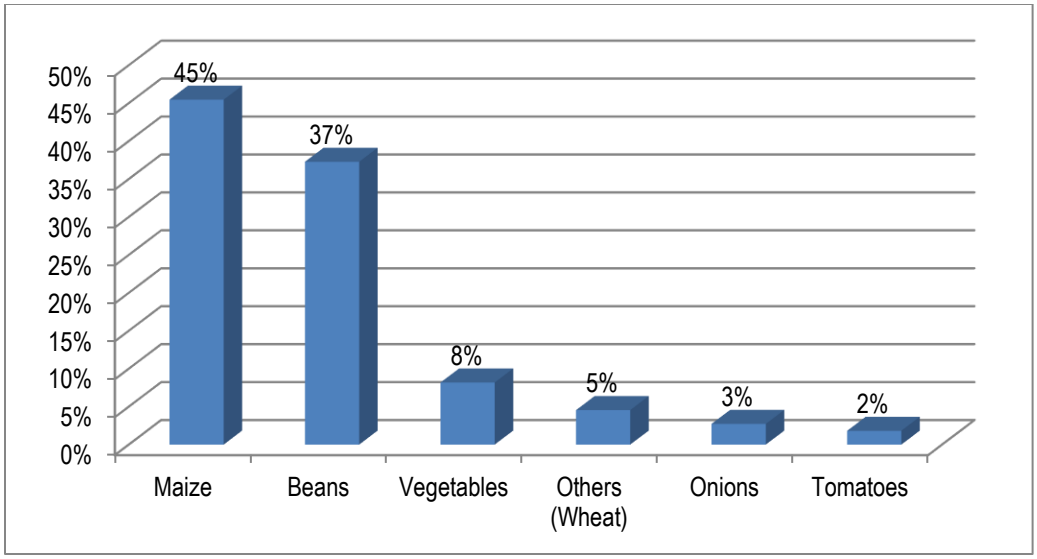

Figure 3-27: Crops cultivated by respondents along the proposed project site

3.2.7 Human and Livestock Water

According to the project documents, the project will provide water to approximately 360 people and 360 Livestock Units (LU). In accordance with the Design Manual of Water Supply in Kenya (Ministry of Water and Irrigation 2005), the per capita water demand for a rural water supply without individual connection is 20 litres per day while for a livestock unit (equivalent to 1 grade cattle, 3 indigenous cattle of 15 sheep/goats) is 50 litres per LU. The current domestic and livestock water stands at 44.4 m3 per day made up of 14.4 m3 per day for human consumption and 30 m^3 per day for livestock use. The project is not existing and it will take approximately 1 year to set it up, bringing the Initial Year to 2020. The ultimate domestic and livestock water demand will stand at 53.596 m^3 per day by the year 2039. The table below presents the domestic and livestock water demand calculation:

Table 3-2: Domestic and Livestock Water Demand Calculation

Class	***Population***				***Water Demand***			
	Current (2019)	*Growth Rate (%)*	*Initial (2020)*	*Ultimate (2039)*	*Per capita*	*Current (2019)*	*Initial (2020)*	*Ultimate (2039)*
Population Human	720	2.5%	738	1,180	20	14,400	14,760	23,596
Population Livestock (LU)	600	0.0%	600	600	50	30,000	30,000	30,000
TOTAL						***44,400***	***44,760***	***53,596***

3.2.8 Irrigation Water Demand

According to the available information, the total area to be placed under irrigation is estimated 15 acres. (6 hectares). To estimate crop water requirements, the results from T. Woodhead studies on crop water requirements in Kenya are utilized. The crop water requirement (ETC) = 4.1 mm per day for the project area based on the data gathered by Woodhead for open evaporation in Kenya and transferred to crop requirement using average scheme crop factor of 0.9.

Net irrigation requirement, NIR = ETC – PE,

Where

PE – Part of the rainfall which is effectively used by the plant.

Considering that the area has low erratic rainfall and irrigation will mainly occur during the dry months, then PE = 0

Therefore NIR = ETC - PE= 4.1 mm

Gross Irrigation Requirement (GIR), GIR = NIR/Efficiency;

From irrigation system efficiencies, assume;

Application efficiency = 75% (assuming use of sprinklers); Distribution efficiency = 90%;

Conveyance efficiency = 95%.

Overall efficiency, = 0.60 x 0.75 x 0.90 = 0.64

GIR = 4.1/0.64 = 6.406 mm /day

However, 1mm/day = 0.116 lt/s/Ha,

Therefore, 6.406 mm/day = 0. 743 lt/s/Ha,

Farm size is 15 acres equivalent to 6 hectares. The total irrigation water demand is estimated at 385.171 m^3 per day.

The Water Resources Management Rules 2007 requires a minimum irrigation storage equivalent to 90-day usage. The domestic and irrigation water demand will also be met from the dam storage as the river is ephemeral. At the rate of 385.171 m^3 per day for irrigation and 53.596 m3 per day for human and livestock water demand, the minimum storage requirement is estimated at 39,489 m^3 before taking into consideration water losses through seepage and evaporation.

The evaporation from open water surface in the area is estimated at 1800 mm per year, resulting in the loss of 1.8 m^3 per square meter of open water surface per year. The design of the dam should consider increasing the water depth in order to reduce the open water surface. The design should consider adding 10% of the demand as evaporative and seepage losses in determining the required storage capacity, thus bringing the minimum required storage to approximately 43,437.933 m^3

3.2.9 Impacts on River Regime and Downstream Users

Mavoloni river, like all the rivers in the 3EA sub basin is ephemeral and only flows during the rains and a shortly thereafter. The construction of the dam will harvest the flood water which would otherwise flow downstream to the Indian Ocean, and use it for economic activity within the area. The development of the storage facility is therefore not expected to have an adverse impact on the river flow and the downstream community.

Average Farm Sizes

According to the Machakos CIDP 2018- 2020, the average farm size for small scale and large-scale farming are 0.756Ha and 10Ha respectively. The County is experiencing a constant decline in arable land due to climatic change risks and change in land use mainly from agriculture to real estate development.

Main Storage Facilities

The main storage facilities of food crops are National Cereals and Produce Board depots located in Machakos town, Konza, Kithimani town and Tala town. Other storage facilities are individual on-farm stores.

Agricultural Extension, Training, Research and Information Services

- The following agricultural institutions are located within the County:
- Machakos Agricultural Training Centre
- National Youth Service Yatta School of Agriculture
- Athi River Meat Training Institute
- Machakos University
- South Eastern Kenya University

Agricultural Research Institutions

- Kenya Agricultural Livestock Research Organization (KALRO)
- Agricultural Mechanization Research Institute within Katumani
- Machakos University
- South Eastern Kenya University

Demonstration Farms

- Machakos Veterinary

3.2.10 Proposed project Awareness

One of the ultimate factors for conducting a full ESIA study was to enhance project awareness. Building up from the previous studies, awareness was created for the proposed project potential impacts and on how mitigation measures will be implemented. Majority of the respondents were now aware of the proposed project ESIA study.

4.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 General Overview

The Kenya Government's environmental policy seeks to achieve sound environmental management through sustainable development that ensures that the needs of the future generations are not compromised with the proposed project. In addition, the world bank policy requires that borrowing governments need to ensure that the beneficiaries and the environment are protected from potential adverse impacts. This is done through policies that identify, avoid, and minimize harm to people and the environment. These policies require the borrowing governments to address certain environmental and social risks in order to receive World Bank support for investment projects.

The ESIA incorporate appropriate measures to mitigate adverse impacts to the environment and peoples' health and safety as well as enhancing sustainable operations with respect to environmental resources and co-existence with other socio-economic activities in their neighbourhood with the guidance of the policy, legal and administrative framework.

4.2 National Policy Framework

This subsection details the various policy provisions pertinent to environmental management:

4.2.1 Constitution of Kenya, 2010

The constitution of Kenya spells out the fundamental rights of every Kenyan citizen. Article 42 of the bill or rights of the Constitution provides that 'every Kenyan has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures' The Constitution goes further ahead and stipulates under article 69 of part II, chapter 5 (environmental and Natural Resources) that the State shall;

i. Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
ii. Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
iii. Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
iv. Encourage public participation in the management, protection and conservation of the environment; Protect genetic resources and biological diversity;

v. Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
vi. Eliminate processes and activities that are likely to endanger the environment; and Moreover, every person has been mandated to cooperate with the State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources

In addition to the environmental and natural resources provision, part 1 of the same chapter emphasizes the following;

1. Land use and management shall by law benefit local communities
2. Community land is protected from encroachment by State.
3. Law shall protect Rivers, forests and water bodies.
4. Equitable access to land.
5. All lawful land rights are secured; only someone who has stolen land needs to worry.
6. County governments will manage land in trust of the people in accordance with the constitution.

In addition to these provisions, article 70 provides that if a person alleges that their right to a clean and healthy environment recognized and protected under article 42, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress.

The Constitution of Kenya stipulates for sustainable and sound management of the environment in relation to development projects. Article 69, the project proponent is mandated to cooperate with State organs and other persons to protect and conserve the environment. *In line with the constitution of Kenya, 2010 through public consultations, the project has proposed mitigation measures to minimise negative impacts and ensure sustainable developments, by this ESIA report and the ESMP the proponent has taken advance measures to make sure that the sub project contributes to a clean and healthy environment for the community in Kithaayoni.*

The proponent will comply with all the obligations relating to the environment under Article 70 through the implementation of the ESMP in the whole sub project cycle. . The Ministry of Agriculture, Livestock and Fisheries, State Department of Agriculture through Kenya Climate Smart Agriculture Project should therefore ensure that the ESMP is followed during all the phases of the project.

4.2.2 Water-related Functions of the County Governments

The Fourth Schedule allocates functions to the two levels of government. The county government has the mandate over soil and water conservation and county public works and services including

water and sanitation services under which would fall the construction of small water pans and small storage facilities for water services purposes.

The proponent has fully engaged the county government in the whole project cycle from counter-funding, planning, screening, ESIA, designing and in the whole processes that will be involved in the implementation and commissioning of the sub project. The county government is the one that chairs the CITAC.

4.2.3 Kenya Vision 2030

The Kenya Vision 2030 provides the national development blueprint for the period 2008 to 2030 emanating from the Economic Recovery Strategy for Wealth and Employment Creation. The Visions objective is to transform the Country into a middle-income economy with a consistent annual growth of 10% through a short term of five-year strategic plan by year 2030. The Vision under the social pillar envisages a just and cohesive society enjoying equitable social development in a clean and secure *environment.*

The proposed project is in line with the vision 2030 as it intends to improve the supply of water of irrigation and livestock use in Makaveti village, Kyanzasu Sub-Location – through the design and construction of the concrete dam. This initiative is part of the process in achieving the goals of Vision 2030 for residents within these locations. The proponent endeavours to protect the environment in supporting the economic pillar of the vision. Implementation of the sub project by the proponent will contribute towards the goal of vision 2030 on water and protection and conservation of the environment.

4.2.4 National Environment Policy, 2013

This Policy sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources. The policy further acknowledges that natural resources are under immense pressure from human activities particularly for critical ecosystems including forest, grasslands and arid and semi-arid lands.

The policy seeks to develop an integrated approach to environmental management, strengthening the legal and institutional framework for effective coordination, promoting environmental management tools. Under the National Environment Policy, the government will;

- Ensure Strategic Environment Assessment (SEA), Environmental Impact Assessment, Social Impact Assessment and Public participation in the planning and approval of infrastructural projects.

- Develop and implement environmentally-friendly national infrastructural development strategy and action plan.
- Ensure that periodic Environmental Audits are carried out for all infrastructural projects

This ESIA study will develop an environmental and social management and monitoring plan to mitigate the impacts that may result during the construction and operation phases of the project. This tool is aimed at promoting coordination of environmental management of the project such that sensitive ecosystems are not destabilized by the subsequent project activities. *The project has complied with the National Environment Policy by preparation of this ESIA report*

4.2.5 National Policy on Water Resources Management and Development (1999)

The Sessional paper No. 1 of 1999 was established with the objective of preserving, conserving and protecting available water resources and to ensure that water is allocated in a sustainable, rational and economic way. The policy further desires to provide water of good quality and in sufficient quantities that meets the various water needs while ensuring safe disposal of waste water and environmental protection. To achieve these goals, water provision through increased household connections and developing other resources and improved sanitation is required.

While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors of socio-economic progress, it recognizes the by-products of this process as waste water. The proposed project is towards providing sufficient water for livestock and irrigation during the drought to the residents of Makaveti village, Kyanzasu Sub-Location, Kimutwa Location, Kalama Ward, Machakos central Sub-County, Machakos County. The proposed project will benefit a total of 800 beneficiaries (250 male 550 female) with 500 cattle, 1,500 shoats (goats/ship), 2,500 chicken with a total of 25acres put under irrigation. As an ongoing process, it is important for the proponent to put in place strategies and plans for waste water management having in mind that the project area lacks a waste disposal site especially during construction and operation.

4.2.6 National Environment Action Plan (NEAP) 1994 (revised 2007)

This plan indicates that the Government recognized the negative impacts on ecosystems that come about as a result of economic and social development programmes that disregard environmental sustainability. In addressing this, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished or are in the process of development.

The ESIA process came about as part of the NEAP process and among the important participants identified were the then District Development Committees. This implies that a multi-sectoral approach is desired in identifying and solving environmental problems. The proponent should therefore strive to engage partners and stakeholders in identifying and solving environmental issues. *Relevant stakeholders were invited and consulted during the preparation of this report and close engagement is encouraged during the project implementation period*

4.2.7 The National Land Policy, 2009

In chapter 4 of the land policy under Environmental Management Principles, the policy provides actions for addressing the environmental problems such as the degradation of natural resources, soil erosion, and pollution. The policy also recommends for appropriate waste management systems and procedures, including waste and waste water treatment, reuse and recycling.

The policy goes further to advocate for environmental assessment and audit as a land management tool to ensure environmental impact assessments and audits are carried out on all land developments that may degrade the environment and take appropriate actions to correct the situation. Public participation has been indicated as key in the monitoring and protection of the environment.

Chapter 4 further advocates for the implementation of the polluter pays principle which ensures that polluters meet the cost of cleaning up the pollution they cause, and encourage industries to use cleaner production technologies.

During the project implementation, project is on land, the proponent is required to ensure environmental protection of the subject land. Moreover, this study is what is advocated for in the policy on top of the public consultations conducted.

4.2.8 Gender Policy, 2011

This Policy Framework aims at mainstreaming gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya. The policy provides direction for setting priorities to ensure that all ministerial strategies and their performance frameworks integrate gender equality objectives and indicators and identify actions for tackling inequality. In addition, each program will develop integrated gender equality strategies at the initiative level in priority areas. Within selected interventions, the policy will also scale-up specific initiatives to advance gender equality.

This policy will be referred to during project implementation especially during hiring of staff to be involved in the implementation of the project. Moreover, the project will be of

benefit to women and girls by providing opportunities to reduce poverty and food insecurity among the rural poor households by improving the performance of irrigation and marketing infrastructure, as well as enhanced methods of post-harvest management

The proponent through this ESIA has carried out adequate social assessment of the sub project and through the ESMP provided adequate measures to comply with the provisions of this legislations on; national legal and policy provisions on gender, HIV/AIDS and Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA and Sexual harassment.).

of the produce.

4.3 National Legal Framework

Applications of national statutes and regulations on environmental conservation suggest that the proposed project management institutions will have a legal duty and social responsibilities to ensure the proposed development is carried out without compromising the status of the natural resources in the area, public health and safety. The key national laws that have a direct relevance to the proposed project are briefly discussed below.

4.3.1 Environmental Management and Coordination Act, 1999 (Amended 2015)

The Environmental Management and Coordination Act, 1999 coupled with the Environmental Management and Coordination (Amendment) Act, 2015 provide legal and institutional framework for environment management in Kenya. EMCA as such supersedes all environmental regulations that might be contrary to the provisions therein owing to its comprehensive coverage of environment management and judicial enforcement Part II of the Act confers to every person the right to clean and healthy environment and to its judicial enforcement. Every citizen is also charged with the duty to safeguard and enhance the environment. In achieving this provision, part VI of the Act directs that any new programme, activity or operation should undergo environmental impact assessment and a report prepared for submission to the National Environment Management Authority (NEMA), who in turn may issue a license as appropriate. As per Environmental Management and Coordination Act, 1999, Legal Notice 150 (2016) - Replacement of the Second Schedule - Water resources infrastructure is listed as one of the activities that must undergo environmental impact assessment Section 42 of the Act deals specifically with the protection of rivers, lakes and wetlands. The Act forbids interference with water bodies without the express permission from the Director General of NEMA. The permission can be granted subject to the findings of an Environmental Impact Assessment. The Act also empowers the Minister of Environment to declare a lakeshore, wetland, coastal zone or riverbank as protected area and impose such

restrictions, as he considers necessary to protect the lakeshore, wetland, coastal zone and riverbank from environmental degradation. The Environmental (Impact Assessment and Audit) regulations, 2003, provide the basis and procedure of carrying out ESIAs and EAs.

EMCA and the other national laws that govern environmental, health and safety issues, in relation to agricultural (livestock) and irrigation activities, are briefly discussed in the below sections. Wherever any of these laws contradict each other, the Act should prevail.

The Second Schedule to the Act specifies the projects for which an ESIA or environmental audit must be carried out. According to the Act, Section 58, all projects listed in the Second Schedule of the Act must submit a study report to NEMA. The proposed Irrigation Project is classified under Item 8 (e) Irrigation, in the Second Schedule of EMCA 1999. *NEMA headquarters approved the terms of reference for carrying out ESIA study for the proposed Kithaayoni concrete dam in Machakos after undergoing a through screening and scooping process.*

4.3.2 Agriculture, Fisheries and Food Authority Act, 2013

Agriculture, Fisheries and Food Authority Act (No.13, 2013) is an Act of Parliament to provide for the consolidation of the laws on the regulation and promotion of agriculture generally, to provide for the establishment of Agriculture, Fisheries and Food Authority. The Act tend to protect Agriculture and fisheries excluding livestock for the purpose of food security in the country.

The Act addresses the following activities:

- Administer the crops Act and the fisheries Act in accordance with provision of these Act.
- Promote best practices and regulate, the production, processing and marketing of agricultural and aquatic products.
- Collect, collate data and maintain a database on agricultural and aquatic products.
- Determines the research priorities in agriculture and aquaculture.

The beneficiaries and supporting stakeholders will expected to follow this act in when carrying out project activities which are agriculture related by discoursing doing agriculture 30 meter away from the river belt

4.3.3 Water Act, 2016

The Water Act of 2016 was assented to on 20th September 2016 and repealed the water Act 2002. The enactment of this law aimed at aligning national water management and water services provision with the requirements of the Constitution of Kenya 2010

particularly on the clauses devolving water and sanitation services to the county governments.

The Act provides for national monitoring and information systems on water resources. The Act regulates abstraction and storage of water from water courses depressions or channels. Section 36 on water rights and works and Section 37 permit not required for certain activities. To formalize the project, the proponent should notify the sub county water officer on the project and its components.

Part IX section 105 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 106 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. The key areas of the Act related to irrigation activities include:

- Obtaining water permits for irrigation (application and issuance procedures and attached conditions);
- Provision of sufficient drainage works for delivery of used or unused water to a water course or body from irrigated lands;
- Revision or variation and cancellation of water permits;
- Penalty for waste;
- Penalty for polluting water used for human consumption.

The Proponent of the Kithaayoni Sub-project has complied and shall continue to adhere to the regulation under this ACT.

- ✓ *The Proponent has undertaken the ESIA and developed this report as required by the provisions of the law.*
- ✓ *The Proponent engaged the services of qualified and approved water experts in the development of the designs for the water pan among other requirements.*
- ✓ *WRA carried out assessment of the of the proposed for the proponent.*
- ✓ *The proponent issued with construction licence and water permit licence by WRA in compliance with Water Act (See appendix 8)*

4.3.4 Counties Government Act, 2012

The Act empowers County Government's authorities to make by-laws in respect of suppression of nuisances, imposing fees for any license or permit issued in respect of trade or charges for any services. County governments are given power to control or prohibit all developments which, by

reason of smoke, fumes, chemicals, gases, dust, smell, noise, vibration or other cause, may be or become a source of danger, discomfort or annoyance to the neighbourhoods, and to prescribe the conditions subject to which such developments shall be carried on.

In compliance, ESIA study report has proposed potential mitigation measures (in the EMP and monitoring plan; and the Environmental Management Framework in the report.

4.3.5 Public Health Act, 1986 (Revised 2012)

The Public Health Act (Cap. 242), in Part IX Section 8 & 9 states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Any noxious matter or wastewater flowing or discharged into a watercourse is deemed as a nuisance. Part Xll Section 136 states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of pests shall be deemed nuisances The Act addresses matters of sanitation, hygiene and general environmental health and safety. Whereas the contractor must comply with the Act during construction, the proposed project will be required to comply with the provisions of this Act during the operation phase.

The proponent through this ESIA and the ESMP has defined the necessary measures to be taken by the Contractor, and other responsible parties to prevent the occurrence of nuisance or condition liable for injurious or dangerous to human health during the construction and the operation phase of the sub project. Also, in keeping with public health requirement to prevent the spread of the new COVID-19 pandemic disease the proponent should ensure that hand washing facilities are installed at the sub project site in addition construction addition construction of Toilets** have been included in the design to comply with this requirement. **Additional mitigation measures have been presented to stop the spread of the pandemic among workers during construction and community members during consultation activities.

4.3.6 Pest Control Products Act, 2012

This Act (Cap. 346, 2012) requires all chemicals used in any agricultural undertaking to be registered by the Pest Control Products Board (PCPB). All pest control products sold in Kenya must bear a label showing a PCPB registration number. Under this Act, there are a number of pesticides whose use is banned in Kenya while training in the use of pesticides must be carried out by PCPB accredited institutions and persons. All pesticide storage and handling arrangements must be inspected and licensed under this Act. The proposed project aims at providing water for domestic use and irrigate about 15 acres of

land. In the operational phase there is likely hood that there would be some increase in the use of pesticides depending on the type of crops the farmers will adopt. In the event the requirement increases the project will need to prepare a stand-alone pest management plan. *Therefore, it will be prudent for the management to familiarize themselves with provisions of this Act at the same time this will trigger the pest Management (4.09 O.P) , project staff t will need to follow ESMF which includes an Integrated Pest Management Plan (IPMP) to guide in (training and capacity-building activities for farmers) their safe handling, storage, and disposal*
.

4.3.7 Occupational Safety and Health Act, 2009

This is an Act of Parliament to provide for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the Directorate of Occupational Safety and Health Services and its purposes. It applies to all workplaces where any person is at work, whether temporarily or permanently. During the construction phase of the dam, the works contractor must adhere to the requirements of this Act. *The proponent will appoint an approved reputable contractor who will be responsible in enforcing the requirements during construction with supervision from the county project office.*

4.3.8 The Forest Act 2005

This Act provides for the establishment, development and sustainable management, including conservation and rational utilization of forest resources for the socio -economic development of the country. The project will ensure that trees will not be cut unless necessary, at the same time the beneficiaries will be trained on establishment of tree nurseries and sensitised on tree planting.

4.3.9 The Occupational Health and Safety Act, 2007

This require that workplaces be kept safe for workers therein. Workers who are exposed to wet or any injurious or offensive substances are required under Section 101 of the Act to be provided with suitable protective clothing. The Act also generally provides for safety and health policies and programmes, workplace safety health and welfare conditions, occupational health and hygiene and welfare conditions.

This Act was found relevant for reference in this ESIA since the construction phase will involve workers who will be exposed to various occupational hazards.

In the ESMP the proponent has put in place measures to be observed by the contractor during the construction phase of the sub project to ensure the health and safety of workers.

A comprehensive occupational health and safety audits will be carried out periodically to ensure compliance with this Act particularly in the construction phase.

4.3.10 National Construction Authority Act

The act regulates the construction industry which requires the registration of the projects under construction, registration of construction companies and professionals in the industry

The proponent shall ensure the conditions requiring registration with NCA are included in the bid document and bidders who qualify with the requirement are evaluated and the same time the project is registered with NCA during implementation.

4.3.11 Engineers Act, 2012 No. 43 of 2011

This is an act of parliament to provide for the training, registration and licensing of engineers, the regulation and development of the practice of engineers and for connected purposes.

Part IV—Provisions relating to licensing and practice

Practising licence.

32. (1) A person shall not engage in the practice of engineering unless that person has been issued with a licence and has complied with the requirements of this Act.

Restriction of right to submit documents.

50. (1) The right of a registered or licensed person under this Act to submit plans, engineering surveys, drawings, schemes, proposals, reports, design or studies to any person or authority in Kenya is restricted to the right to submit such documents only in relation to the discipline of engineering in which that person including a professional engineer in an engineering consulting firm, is qualified as shown in the entries made in the Register. (2) A person who is not registered as a professional engineer or firm shall not be entitled to submit engineering plans, surveys, drawings, schemes, proposals, reports, designs or studies to any person or authority in Kenya. (3) A person who contravenes any provision of this section commits an offence.

(*The approved design drawings have been done by registered engineers under the provisions and further supervision of the works will be done by qualified personnel)*

4.3.12 The Employment Act, 2007

An Act of Parliament to repeal the Employment Act, declare and define the fundamental rights of employees, to provide basic conditions of employment of employees, to regulate employment of children, and to provide for matters connected with the foregoing

The contactor will be expected to comply with the act by providing minimum basic working conditions and enumerating employees in line with set out rules

Risk related to labour-management including influx is not substantial given the small-scale nature of the water pan rehabilitation and expansion works.

However, The Proponent through the Contractor will make sure that fairness and gender equity are followed during the recruitment of the labour force to be used during the construction phase.

This will be included in the Tender Document for contracting for the works.

4.3.13 The Land Planning Act (Cap 303)

Section 9 of the subsidiary legislation (The development and use of land regulations 1961) requires that before the local authorities submit any plans to the Minister for approval, steps should be taken as may be necessary to acquaint the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should also be submitted. This is intended to reduce conflict with other interests such as settlement and other social and economic activities. *A search of the land showed that the land was set aside as public land and title for the land is available (see appendices 6)*

4.3.14 Building Code By-Laws

The By-laws of Building code 3 (1) states 'A person who erects a building or develops land or changes the use of a building or land, or who owes or occupies a building or land shall comply with requirements of these by-laws'. By-law 5 states that a person who intends to erect a building or materially change the use of a building or part of a building shall furnish the council in the manner provided in Part A of the First Schedule to these By-laws. Section 194 requires that where a sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and that all wastewater must be discharged into the sewers.

4.3.15 Waste Management Regulations (2006)

The Waste Management Regulations (2006) are contained in the Kenya Gazette Supplement No 69, Legal Notice No 121. Of immediate relevance to proposed development for the purposes of this project report is Part II, Sections 4(1-2), 5 and 6.

Section 4 (1) states that 'No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle' *The proponent shall adhere to the regulations and proposes to contract a NEMA registered waste transporter.*

4.3.16 Land Acquisition Act (Cap. 295)

This Act provides for the compulsory or otherwise acquisition of land from private ownership for the benefit of the general public. Section 3 states that when the Minister is satisfied on the need for acquisition, notice will be issued through the Kenya Gazette and copies delivered to all the persons affected. Full compensation for any Damage resulting from the entry onto land to things such as survey upon necessary authorization will be undertaken in accordance with section 5 of the Act. Likewise, where land is acquired compulsorily, full compensation shall be paid promptly to all persons affected in accordance to sections 8 and 10 along the following parameters:

i. Area of land acquired,
ii. The value of the property in the opinion of the Commissioner of land (after valuation),
iii. Amount of the compensation payable,
iv. Market value of the property,
v. Damages sustained from the severance of the land parcel from the land,
vi. Damages to other property in the process of acquiring the said land parcel,
vii. Consequences of changing residence or place of business by the land owners,
viii. Damages from diminution of profits of the land acquired.

The land allocated for the sub project is public land. The land was set aside for public utility and therefore, the proposed sub project fits with the stated use of the land. The land was donated by the family of Mutie Kaleli, Wambua Kaleli, Liti Kaleli and Muinde Unyele for the public use by the Kithaayoni community. Demarcations were dome and land documents processed in accordance with the land act. See appendix 7.

The proponent through this ESIA and ESMP has developed appropriate measures to ensure that the proposed development is implemented sustainably through the prevention and reduction of adverse impacts.

The development will not contribute to hindering access to any land rights by the community.

4.3.17 The Community Land Act, 2016

This is an Act of Parliament to give effect to Article 63 (5) of the Constitution; to provide for the recognition, protection and registration of community land rights; management and administration of community land; to provide for the role of county governments in relation to unregistered community land and for connected purposes.

Section 13 sub section (3) of the Act states that a registered community may reserve special purpose areas including areas for- (a) farming; (b) settlement; (c) community conservation; (d) cultural and heritage sites; (e) urban development; or (f) any other purposes as may be determined by the community, respective county government or national government for the promotion or upgrading of public interest.

(4) An area reserved for special purposes under subsection (3) shall be used exclusively for the intended purpose.

The land for the proposed sub project is a public land administered under the National Land Act 2012 as read with the Land Laws (Amendment) Act, 2016 No. 28 of 2016. The proposed water project will enhance the community land rights through availing water for livestock and micro irrigation and supporting their livelihood. See appendix 7

4.3.18 The Sexual Offences Act of 2006 (The Sexual Offences (Amendment) Bill, 2016)

This is an Act of Parliament to make provision about sexual offences, their definition, prevention and the protection of all persons from harm from unlawful sexual acts, and for connected purposes.

Section (6) states that compelled or induced indecent acts by a person is a guilty offence and such a person is liable upon conviction to imprisonment for a term which shall not be less than five years.

Section 24 deals with sexual offences relating to position of authority and persons in position of trust. Section 24, Sub section (5) states any person who being in a position of trust takes advantage of his or her position and induces or seduces a person in their care to have sexual intercourse with him or her or commits any other offence under this Act, such sexual intercourse not amounting to the offence of rape or defilement, shall be guilty of an offence of abuse of position of trust and shall be liable upon conviction to imprisonment for a term of not less than ten years.

Section (30) describes non-disclosure of conviction of sexual offences in the past as an offence and is punishable under the law.

Section 40C. sub section (1) of the amended bill states that the national and county governments shall promote public awareness on sexual offences through a comprehensive nation-wide education and information campaign conducted by the Government through the relevant Ministries, departments, authorities and other agencies.

The proponent has provided measures in the ESMP to avoid sexual exploitation and abuse by project workers, employees of the contractor during the project implementation period.

4.3.19 HIV and AIDS Prevention and Control Act No. 14 of 2006

This legislation provides measures for the prevention, management and control of HIV and AIDS, to provide for the 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, and for connected purposes.

Among the purposes of this Act as outlined in section 3 (a) is to promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS; and (d) to positively address and seek to eradicate conditions that aggravate the spread of HIV infection. Section 7 makes provision for HIV and AIDS education in the workplace in this case even the informal workplace is included.

Section 12 prescribes the penalty for unsafe practices or procedures which might lead to the infection of another person with HIV. Section31. Prohibits discrimination in the workplace based on the HIV/AIDS status of a person.

- ✓ ***The proponent through this ESIA has carried out adequate social assessment of the sub project and through the ESMP provided adequate measures to comply with the provisions of this legislations on; national legal and policy provisions on gender, HIV/AIDS and Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA).***

4.4 World Bank's Safeguard Policies

This ESIA report is in addition, based on internationally respected procedures recommended by the World Bank and IFC, covering various environmental guidelines.

The World Bank has well set safeguard policies aimed at ensuring the organization's funded projects adhere to environmental and social protection. These safeguards include;

4.4.1 World Bank Operational Policy 4.01 – Environmental Assessment

This policy is applied to borrowing countries under the Bank's lending activities in order to ensure that development projects are sustainable and environmentally sound. Although its operational policies and requirements vary in certain respects, the World Bank follows a relatively standard procedure for the preparation and approval of an environmental assessment study.

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

i. **Category B:** the proposed project has potential adverse environmental impacts on human populations or environmentally important areas such as wetlands, forests, grasslands, and other natural habitats - but these are less adverse than those of Category A projects. The impacts are site-specific; few if any of them are irreversible; and in this case, 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.

Screening was done for the proposed project and fell under ***category B*** *and this triggered the ESIA process and this conforms with the requirement of OP. 401 for world bank operational guidelines*.

This report has established all the significant impacts that need to be addressed and proposed appropriate measures to prevent or reduce any risk that may be posed to the environment (physical, biological and social).

The adverse impacts and their mitigation measures are well outlined in the ESMP including responsible parties, duration and cost in the whole project cycle.

4.4.2 OP/BP 4.09 (Pests Management)

The policy is meant to minimize and manage the environmental and health risks associated with pesticides use and promote and support safe, effective, and environmentally sound pest management.

The ESMP has provided prevention and mitigation measures for anticipated impacts that may arise from micro irrigation.

4.4.3 Safety of Dams BP 4.37

The policy is meant to ensure safety of dams by involving expert's geologist hydrologist and engineers in carrying out specialized studies for small dams or small dams, generic dam safety measures designed by qualified engineers are usually adequate. *The proposed project is considered small and has been designed by qualified personnel and safety measures have adequately provided in the report*

4.4.4 Operational Policy 4.04 – Natural Habitats

The natural habitats policy is meant to enhance environmentally sustainable development through protection, conservation, maintenance and rehabilitation of natural habitat and their functions. World Bank supported developments are required to consider and ensures conservation of biodiversity as well as the diverse environmental services and products that the natural habitats present to the communities

The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water area where most of the native plant and animal species are still present). This project has no notable interaction with notable natural habitats apart from limited localized riverine aquatic systems.

The project is not located in a natural sensitive habitat. Further, it will attempt to limit impacts on trees and ecosystems of conservation value. To ensure conservation and project sustainability, the policy requires that:

i. Project alternative be sought when working in fragile environment areas;
ii. Key stakeholders are engaged in project design, implementation, monitoring and evaluation including mitigation planning.

4.4.5 Operational Policy 4.11 – Physical Cultural Resources

This policy assists in preserving physical cultural resources and helps reduce chances of their destruction. The policy considers Physical Cultural Resources (PCR) to be resources of archaeological, paleontological, historical, architectural, and religious (including

graveyards and burial sites), aesthetic or other cultural significance. However, there were no recorded physical cultural resources within the project location but in case during excavations they get into contact with such scenarios, the project should be halted temporarily and the National Museums of Kenya be consulted before further developments.

4.4.6 Operational Policy 4.12 – Involuntary Resettlement

The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative Project designs, to avoid resettlement. This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Project appraisal of proposed projects. The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative Project designs, to avoid resettlement. This policy is triggered when a Project activity causes the involuntary taking of land and other assets resulting in: Relocation or loss of shelter, loss of assets or access to assets, loss of income sources or means of livelihood, whether or not the affected persons must move to another location, and loss of land

This safeguard is not triggered since the land had been earlier set aside for water project by the community and there will be no relocation of any person. However, section 8 of this report provides the necessary mitigation measures for protection of medicinal plants in the area.

4.4.7 World Bank Safeguard Policy BP 17.50 – Public Disclosure

This Policy details the Banks requirements for making operational information available to the public. The Bank reaffirms its recognition and endorsement of the fundamental importance of transparency and accountability to the development process. In addition, timely dissemination of information to local groups affected by the projects and programs supported by the Bank, including nongovernmental organizations, is essential for the effective implementation and sustainability of projects.

4.5 International Laws and Guidelines/ Multilateral Environmental Agreements

In addition, the following guidelines/international laws/multilateral environmental agreements were also reviewed:

4.5.1 Ramsar convention on wetlands

This is an inter-governmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Ramsar Convention is the only global environmental treaty that deals with a particular ecosystem. The treaty was adopted in the Iranian city of Ramsar in 1971 and the Convention's member countries cover all geographic regions of the planet.

Unlike the other global environmental conventions, Ramsar is not affiliated with the United Nations system of Multilateral Environmental Agreements (MEA), but it works very closely with the other MEAs and is a full partner among the "biodiversity-related cluster" of treaties and agreements.

4.5.2 Paris Agreement on Climate Change

The **Paris Agreement** deals with greenhouse-gas-emissions mitigation, adaptation, and finance, signed in 2016. The Paris Agreement's long-term temperature goal is to keep the increase in global average temperature to well below 2 °C above pre-industrial levels; and to pursue efforts to limit the increase to 1.5 °C, recognizing that this would substantially reduce the risks and impacts of climate change. This should be done by reducing emissions as soon as possible, in order to "achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases" in the second half of the 21st century. It also aims to increase the ability of parties to adapt to the adverse impacts of climate change, and make "finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."

Under the Paris Agreement, each country must determine, plan, and regularly report on the contribution that it undertakes to mitigate global warming. The contractor will be required to use efficient machineries at the same time solar water pumping system will be used to avoid carbon-based fuels. Tree planting will also be encouraged in the project area for uptake of carbon.

4.5.3 Convention on biological diversity

In response to the growing threat posed by human activity to biodiversity and inspired by the world community's growing commitment to sustainable development, during the 1992 Earth Summit in Rio de Janeiro world leaders adopted the Convention on Biological Diversity (CBD). It is the most important Convention dealing with biodiversity conservation.

The Convention has three main objectives:

- To conserve biological diversity
- To use biological diversity in a sustainable way

- To share the benefits of biological diversity fairly and equitably.

IUCN has been involved in the CBD since its drafting and through its further development. Its policy work has helped to ensure that decisions taken by the Parties to the Convention are as effective as possible to achieve the CBD objectives.

4.5.4 Sustainable Development Goals

The following goals are relevant to the sub-project;

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture;

Goal 5: It is a stand-alone development goal on gender equality and women's empowerment is characterized by the following targets:

Sustainable Development Goal 5 Targets

Table 3.3: Sustainable Development Goal 5 Targets

GOAL 5: Achieve gender equality and empower all women and girls	
Target 5.1	End all forms of discrimination against women and girls everywhere
Target 5.2	Eliminate all forms of violence against women and girls in the public and private spheres, including trafficking, sexual and other types of exploitation
Target 5.3	Eliminate harmful practices, such as child, early and forced marriage and Female Genital Mutilation
Target 5.4	Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate
Target 5.5	Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making including political, economic and public life
Target 5.6	Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development, the Beijing Platform for Action and the outcome documents of their review conferences

Goal 6: Ensure availability and sustainable management of water and sanitation for all;

Goal 9: Build resilient infrastructure, promote inclusive sustainable industrialization, and foster innovation;

The proponent through the implementation of this project and undertaking of this ESIA and as outlined in the ESMP contributes to the attainment of the stated goals.

4.6 Other Relevant Sectorial legislation

Whereas EMCA supersedes all other environmental legislation, numerous other laws and regulations will influence activities of the proposed Project once construction is complete. These include the following legal statutes, of which the management of the proposed Project will need to familiarize with:

- ⇒ Crops Act - Act No. 16 of 2013,
- ⇒ Seeds and Plant Varieties Act (CAP. 326);
- ⇒ Fertilizers and Animal Foodstuffs Act (CAP. 345);
- ⇒ Use of Poisonous Substances Act (CAP. 247);
- ⇒ Malaria Prevention Act (CAP 246);
- ⇒ Food, Drugs and Chemical Substances Act (CAP. 254);
- ⇒ Plant Protection Act revised 2012;
- ⇒ Fisheries Act revised 2016;

4.7 National Regulatory/Institutional Framework

4.7.1 National Regulatory Framework

1. EIA and Audit Regulations 2003

The Environmental (Impact Assessment and Audit) Regulations, 2003, provide the basis for procedures for carrying out Environmental Impact Assessments (EIAs) and Environmental Audits (EAs).

The Environmental Impact Assessment and Audit Regulations state in Regulation 3 that "the Regulations should apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act".

Regulation 4(1) further states that:

> ''…no proponent should implement a project:
>
> *a) Likely to have a negative environmental impact; or*
> *b) For which an environmental impact assessment is required under the Act or these Regulations; unless an environmental impact assessment has been concluded and approved in accordance with these Regulations…''*

In carrying out the ESIA report the requirements of this regulations and those of the World Bank Social Safeguards were integrated and followed throughout the process. The proponent did the screening and scooping and submitted terms of reference for carrying out a study which were approved.

The proponent shall observe the guidelines as set out in the environmental management plan laid out in the ESIA report as well as the recommendation provided for mitigation, minimization, and avoidance of adverse impacts arising from the sub-project activities.

2. Waste Management Regulations, 2006

These are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006. These Regulations apply to all categories of waste as provided in the Regulations. These include:

- ⇒ Industrial wastes;
- ⇒ Hazardous and toxic wastes;
- ⇒ Pesticides and toxic substances;
- ⇒ Biomedical wastes;
- ⇒ Radioactive substances.

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

Through the ESMP the proponent has provided measures for managing waste generated through this sub project.

The proponent will comply with the provisions of EMCA in managing wastes as stipulated under waste management regulations.

3. Water Quality Regulations 2006

These are described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006. These Regulations apply to drinking water, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes. This includes the following:

- ⇒ Protection of sources of water for domestic use;
- ⇒ Water for industrial use and effluent discharge;

⇒ Water for agricultural use.

These Regulations outline:

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

The Proponent has adhered to the provisions of this regulation to protect the proposed water resource from all possible sources of pollution during the construction and operation phase by carrying out this ESIA. The proponent has outlined the water quality control measures in the ESIA.

4.7.2 EMCA (Noise & Excessive Vibration Pollution Control Regulations, 2009) Legal Notice 61

This regulation prohibits any person from causing unreasonable, unnecessary, or unusual noise which annoys, disturbs, injures, or endangers the comfort, repose, health or safety of others and the environment. Part 11 section 6 (1) provides that no person shall cause noise from any source which exceeds any sound level as set out in the First Schedule of the regulations.

It gives standards for maximum permissible noise levels for construction sites, mines, and quarries. It also gives maximum permissible noise levels for silent zones, places of worship, residential (indoor/outdoor), mixed residential; and commercial.

The proposed sub-project will involve the drilling of the pit to accommodate the proposed septic tank which is expected to comply with the following NEMA standards.

Table 4-1: NEMA Maximum permissible noise levels

Zone		Sound level limits dB(A) (Leq,14h)		Noise rating level (NR) (Leq,14h)	
		Day	Night	Day	Night
A	Silent zone	40	35	30	25
B	Places of worship	40	35	30	25

C	Residential: indoor	45	35	35	25
	Outdoor	50	35	40	25
D	Mixed residential (with some commercial and places of entertainment)	55	35	50	25
E	Commercial	60	35	55	25

4.7.3 Environmental Management and Coordination Act (Air Quality) Regulations, 2008.

These are regulations are still in draft form and have not been gazetted. The objective of these regulations is to provide for prevention, control, and abatement of air pollution to ensure clean and healthy ambient air. The regulations provide for compliance with emission standards for various sources of air pollution including mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, CAP 387. Under these regulations, emissions are supposed to be controlled using specified equipment. Cases of malfunctioning air pollution control systems are supposed to be reported to NEMA within 24 hours and Corrective measures are taken to NEMA's satisfaction within 14 days after the occurrence.

The proponent will ensure compliance with Air quality regulations by enforcing all the proposed preventive and mitigation measures in the ESMP.

4. Conservation of Biological Diversity (CBD) Regulations 2006

These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84 of December 2006. These Regulations apply to conservation of biodiversity which includes Conservation of threatened species, Inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties.

4.7.4 National Institutional Framework

1. Institutions under EMCA, 1999

The Government established the following institutions to implement the EMCA 1999.

a) National Environmental Management Authority (NEMA)

The responsibility of the National Environmental Management Authority (NEMA) 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.

In addition to NEMA, the Act provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee.

b) County Environmental Committees)

The county Environmental Committees also contribute to decentralised environmental management and enable the participation of local communities. These environmental committees consist of the following:

- ⇒ Representatives from all the ministries;
- ⇒ Representatives from local authorities within the province/district;
- ⇒ Two farmers / pastoral representatives;
- ⇒ Two representatives from NGOs involved in environmental management in the province/district;
- ⇒ A representative of each regional development authority in the province/district.

c) National Environment Complaints Committee (NECC)

The Act also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The committee has the mandate to investigate complaints relating to environmental damage and degradation. Its members include representatives from the Law Society of Kenya, NGOs and the business community.

2. Institutions under Water Sector Reforms

The key institutions provided for in the water sector reforms are: The Water Resources Management Authority (WRMA); Seven Water Services Boards (WSBs); The Water Services Trust Fund (WSTF); The Water Services Regulatory Board (WASREB); and The Water Appeals Board WAB).

The Act gave the Ministry of Water and Irrigation the responsibility to set up and oversee various autonomous institutions that provide a harmonized and streamlined management of water resources, supply sewerage services and integrated water

resources management. These duties were previously undertaken by line departments in the Ministry, and one of the institutions established is the Water Resources (WRA).

The MoWI operates mostly through the Water Act 2002 to operationalize water resources management through two departments –Water and Irrigation. The Department of Water is responsible for the provision of water resources and water services strategies through various institutions provided for under the Act. The Department of Irrigation was moved from MoA to MoWI and the governing Act is the Irrigation Act (Cap 347).

The MoWI has also created institutions for water resources management and the provision of water services that would resolve water conflicts and challenges due to growing population, catchment degradation, invasive weeds, groundwater depletion, water pollution and resource use conflicts. The organizations under this structure include Water Resources Authority (WRA) and associated Catchment Area Advisory Committees (CAACs) and Water Resource User Associations (WRUAs); Water Services Regulatory Board and associated Water Services Boards (WSBs) and Water Service Providers (WSPs); Water Services Trust Fund (WSTF); and Water Appeal Board.

Water Resources Authority (WRA)

The Water Resources Authority (WRA) is of particular relevance to the project. Its mandate covers some sectoral issues which are applicable to environmental management, such as use of water resources, human settlement and administration of activities in the scheme.

Part III of the Water Act 2016 defines the powers and functions of WRA which include:

- ⇒ Developing principles, guidelines and procedures for the allocation of water resources;
- ⇒ Monitoring the national water resources management strategy;
- ⇒ Receiving and determining applications for permits for water use;
- ⇒ Monitoring and enforcing conditions attached to permits for water use;
- ⇒ Regulating and protecting water resources quality from adverse impacts;
- ⇒ Managing and protecting water catchments.

WRA may prosecute any offences arising under the Water Act and also provides the basis for the following:

- ⇒ Formulation of a National Water Resources Management Strategy;
- ⇒ Classification of water resources and resource quality objectives;
- ⇒ Determination of water reserves;
- ⇒ Designation of catchment areas;

⇒ Formulation of a catchment management strategy;
⇒ Declaration of protected catchment areas national monitoring of and information on water resource management;
⇒ Definition of state schemes and community projects

⇒ 3. Key Institutional Organs

In summary, the key institutional organs of relevance to the proposed Kithaayoni concrete dam Project are presented in Table 4.2.

Table 4-2: Institutional Organs of relevance to the proposed irrigation project

Institution	Parent Ministry	Responsibility
NEMA	Ministry of Environment and natural Resources	Approval of EIA Project Report
Water Catchment Boards	Ministry of Water and Irrigation	Catchment conservation and issuance of water permits
Public Health Department	Ministry of health	Inspection of the project
Department of Crop Production	Ministry of Agriculture, livestock and fisheries	Implementation of Crops and AFFA acts Act
WRA	Ministry of Water and Irrigation	Approval of water abstraction
Directorate of Occupational Health	Ministry of Labour, social security and services	Approval of construction plans and activities
NCA	Ministry of transport and infrastructure	Construction project registration
Physical planning	Ministry of transport and infrastructure	County development plans approval
Pest Control Products Board	Ministry of Agriculture livestock and fisheries	Approval of any pest control products to be used.
Department of cooperatives	Ministry of agriculture	Registering farmers as a cooperative

5.0 ANALYSIS OF PROJECT ALTERNATIVES

5.1 Introduction

The consideration of alternatives is of prime importance in environmental assessment. The project alternative is arrived at after an in-depth examination of the project in terms of the adverse impacts, the project cost and its sustainability to the social and environmental capacity and acceptability by neighbouring land users. Alternatives identified should be (one with the least adverse impacts) selected based on less negative impacts and cost-benefit analysis. This is a very important analysis because it will help the proponents measure the impacts from the project against those, which will have taken place without the project.

5.2 Alternatives Including the Proposed Action

The options for alternatives are described below.

5.2.1 The 'No Action'/ 'ZERO' Alternative

The 'No Action' alternative, the Proponent would not carry out the intended construction works; therefore, the anticipated impacts resulting from commissioning, operation and decommissioning of the development as proposed, would therefore not occur. Furthermore, any resultant socio-cultural/economic benefits that would be created by the proposed development would not be achieved.

The *No-Project* option will also lead to negative and long-term impacts to Kithaayoni community including:

- Lack of water for domestic use;
- Lack of water for livestock leading to low productivity, low income and increased levels of poverty;
- Conflict due to limited water resources;
- Lack of water for crop irrigation;
- No employment and business opportunities will be created and;
- Development of infrastructural facilities (roads and associated infrastructure) will not be undertaken.

The *No Project* alternative is therefore not a viable alternative as the proposed Kithaayoni concrete dam will provide water for domestic use, livestock watering and used for irrigation purposes. These will improve the livelihoods of the community and reduce poverty at the same time.

5.2.2 Project Alternatives

i. Dam Alternatives

There are various dam alternatives considered in the selection of the project option and they are the composite dam, with rock fill on the banks and reinforced cement concrete (RCC) in the valley. The following criteria was used to arrive at the alternatives, they include the availability of local materials such as rocks and sand, cost estimate, safety/geological hazards, safety/flood hazards and design experience.

The selection criteria for the various options is as shown in Table 5.1.

Table 5-1: Dam Selection Criteria

Criteria	RCC	Hard Fill	Clay core	Concrete face	RCC+ Clay Core	RCC +Asphalt Core
Availability of local materials	+ (lot of cement)	+ (lot of cement)		++ (cement)	++ (cement)	+ Asphalt imported
Cost Estimate	+ (Deep excavation)	++ (cost of RCC)	++ (Cost of Lateral Spillway)	++ (deep excavation at up-stream plant)	+++	++ (cost of Asphalt)
Safety/geo logical hazards	+ (May require very deep excavations)	+++	++	+ (May require very deep excavations)	++	++
safety/flood hazards	++	+++	+ (Spillway sensitive to flood damages)	+ (Spillway sensitive to flood damages)	++	++
Past experience	+++	+ (Very few past experience of this size)	+++	++ (No past experience of in Kenya)	+++	+ (Very few past experience of this size)
TOTAL	**8+**	**10+**	**10+**	**8+**	**12+**	**8+**

Key; + is a comparative score where; each + is a positive core.

From the selection criteria in Table 5.1, the best alternative appeared to be the RCC+ Clay core dam with the second-best solutions both Hardfill and Clay Core with lateral spillway.

Thus, considering the alternatives the best option selected for this project is the reinforced compacted concrete (RCC) dam for construction in the valley with rock filled clay core dams out from both banks. The following are the design features of the proposed option:

5.2.3 Mitigation for the Proposed Action

The proposed mitigation measures and including best environmental management practices, have been recommended in this ESIA report within the ESMP topic, and when diligently implemented will help to protect the physical, ecological and socio-economic environment of the affected project area.

Upon issuance of the licence according to the EMCA Act of 1999, revised 2015, then the proposed mitigation measures should be followed to the latter. The contractor should further issue a quarterly environmental management plan progress report. This report shows how the extent of impact how it is mitigated as described in the ESMP.

The proponent therefore, follows up on the contractor with the help of the progress report.

5.2.4 Project site

The project is more dictated by the government policy on rain water harvesting. During the inception period a sensitization session was held to inform the members about the proposed project and its objectives. The community in consultation the design engineer sited the water pan.

The site was selected based on:

- It has large catchment area
- Community land availability
- It has natural depression very suitable for water pan construction
- The area has soils with suitable properties for water retention and embankment construction
- It is in the path of drainage channel
- The community is already being used for water harvesting activities.

5.2.5 Bore hole drilling

The community has the option of drilling a borehole, the community feels that maintenance costs of boreholes in terms of energy are very high and the quality and quantity is not guaranteed.

6.0 STAKEHOLDER ENGAGEMENT DURING PREPARATION OF THE ESIA

6.1 Overview

Public consultation is not only one of the most effective means of encouraging and obtaining community input and feedback, it also serves to inform the community members and key stakeholders on the proposed projects. Two meetings **(***Barazas***)** were held around proposed project area and its environs to discuss the proposed project (see appendices 3 for consultation minutes). Key stakeholders were also consulted. The aim of the consultation was to ensure that the views of stakeholders and the interests of the communities were identified and taken into account at the earliest during the ESIA study.

Local communities were mobilised with the help of the National, County and local administration. The *Barazas* brought together representatives from the larger community including women, youth and persons with disabilities (see appendices 3 and 4 for minutes and list of stakeholders consulted respectively)

This chapter summarizes the feedback on the consultations undertaken with other governmental and non-governmental organizations including the Ministry of Agriculture, Livestock & Fisheries (MOALF), National Environment Management Authority (NEMA), Water Resources Authority (WRA) and the local Administration.

6.2 Objectives of Public Consultation

The objective of the public consultation was to ensure that stakeholder and community interests were identified during the ESIA study and that stakeholder and community views were taken into account.

The key objectives of such consultations were to.

- Inform the community members and key stakeholders on the proposed project activities.
- Receive community and key stakeholders' comments/ feedbacks/ questions about the proposed project.
- Solicit their views and inputs on the possible adverse environmental and social impacts, and possible mitigation measures. Additionally, it also aims to identify community concerns and provide a forum to discuss and address these.

6.3 Common Issues from Public Participation

6.3.1 Knowledge of the Proposed Kithaayoni Concrete Dam

From focus group discussions (FGD) and public consultations, it was observed that majority of the community members consulted were aware of the proposed Kithaayoni Dam Project and a Community Group to oversee the dam project had already been put in place.

6.3.2 Acceptance of the Project and Anticipated Benefits

During public consultation forums, all the residents were in agreement that they were really eager for the proposed dam project and had been really waiting for such an opportunity to boost water supply in the area. Most residents believed the project would directly impact positively on their lives thought water availability. They pointed out that the availability of water would assure other economic activities like fishing which had previously failed during the *stimulus project*.

The community expressed their anticipated impacts related to the proposed project. Some of the positive impacts that the community expect include the following:

- **Creation of Employment Opportunities:** The communities living along the proposed project site were optimistic that the project will bring about short term and long-term employment opportunities to the local communities during its implementation. They said that the contractor should consider employing the local communities during project implementation in activities like site clearance, excavation, driving and security services.
- **Improved Water Availability:** The dam would ensure both domestic and irrigation water are available to the residents of Kimutwa and the surrounding locality.
- **Improved Road Infrastructure:** Due to the bad state of rural roads in the areas along the proposed well sites the local community members anticipate that the implementation of the project will result to improvement of roads in the project area, since the contractors would also need the road frequently to access the sites.
- **Increased Economic Activity in both the Project Areas and at the National Level:** During project implementation (civil works and construction activities), the workers will demand goods and services that will be supplied by locals. The communities therefore believe that will provide business opportunities to locals.
- **Corporate Social Responsibility (CSR) Benefits:** The locals expect the proponent to extend its social responsibility initiatives for the communities in the project area.

Communities mentioned that they might benefit from provision of a cattle dip and toilet facilities and improved roads.

- **Benefits of Engagement by Both Genders:** The proponent encourages involvement of both women and men in realisation of the proposed project. Local employment opportunities that will be available during the construction phase would provide both direct and indirect income for both women through small scale business activities
- **Enhancement of the Socio-cultural and Local Leadership Structures:** It was suggested that the proponent should empower and utilise the local leaders, extensively consult with them in every undertaking. This will act both ways in ensuring the project runs smoothly and at the same the proponent would be reinforcing the authority of the chiefs as the community observes how they have been involved.

6.3.3 Envisaged Project Negative Impacts and Proposed Mitigation Measures

The consultant and the community also discussed possible negative impacts from the project. The following were the negative impacts anticipated based on the discussions that were held with the local communities:

- Loss of vegetation and animal folder
- Reduction of grazing land
- Livestock accidents
- Dust emission during construction
- Health problems as result of dust and emissions
- Soil erosion.
- HIV/AIDS as a result of population influx
- Noise pollution during construction

During the public meetings, the community members proposed the following mitigation measures to mitigate the above impacts.

- The contractor should fence the area around the dam to prevent human and animals from accidental drowning.
- Construction of necessary structures to control soil erosion
- Avoiding pollution of water resources during construction

- Sprinkling of water to combat dust emission
- Provision of medical services to those who suffer from illnesses as a result of dust and emissions from the construction machines.
- Install sound proofing's, and ensuring proper maintenance of machines to minimize noise pollution during construction
- Community sensitization and provision of condoms to workers to prevent spread of HIV/AIDS
- Compensation for trees that will be cut down

i. Anticipated challenges during project implementation

The members of public mentioned the following as being the challenges that the proposed project may be faced with during implementation:

- Poor road network
- Issues of employement for the locals if not properly guided by a framework
- Inadequate skilled manpower
- Insecurity (vandalism, breakages and theft of construction materials)

6.4 Key Issues from Key Stakeholder Consultation

Key informant interviews were conducted with various stakeholders/ informants. All the key stakeholders consulted were optimistic that the proposed project would boost water supply in the area and spur food production development in Machakos country.

a. Water Resources Authority (WRA)

The WRA officials was very informed of the proposed project and were looking forwards to its implementation. Their key concerns were;

- The proponent and contractor should ensure that the project goes in line with WRA regulations.
- The design of the project does not lead to any related problems and the contractor should review the designs carefully before actualisation. Case examples were pointed out on the Solai Dam that failed recently and the officers thought that this could be mitigated during the design,

This information came after an issuance that WRA had initiated a countrywide assessment of all dams to ascertain their legal status, stability and safety. All dam proprietors and especially those who own or operate class B and C dams were to know that all permits irrespective of whether they have expired or not shall be reviewed afresh. This process would help WRA to check on the compliance level on dam development. Original designs and plans together with sites assessment reports and feasibility studies of the dam prior to authorization and eventual construction.

Currently, WRA is in the final process of issuing license for development and water abstraction for the proposed project.

b. KCSAP – Machakos County

The main aim of the programme was to increase agricultural productivity in the area. The programme had done frequent and vigorous consultations and explained their interventions on the six wards of Machakos. Through the programme, a participatory community development process had been formed and proposals for the dam project reached out. The proposed land would fall in a community land. Thus, the proposed Kithaayoni Dam was as a result of key consultations and project appraisals from various key stakeholders including the community.

c. Environment Officers - National Environment Management Authority (NEMA)

The officers welcomed the project to the county. At the time of study, no significant negative impact was envisaged from the project. The officers just emphasised on the issue of public participation to confirm liaison. They also emphasised and explained their mandate stating an example from the Ekowe Treatment Plant in Machakos which was stopped by the community. The other sited example that was stopped by the public was the Lamu Coal Plant. It was therefore necessary to have the community part and parcel of any ESIA Study project as their input and agreement was very paramount.

The consultant after engaging with various stakeholders ensured that all the stakeholders including the public were properly informed on the project.

d. Ministry of Agriculture, Livestock & Fisheries

Due to the location of the proposed project site, there would be no significant loss of livelihood or relocation of PAPs. However, there would be a significance loss in vegetation cover and trees especially some few medicinal plants. The project benefits

however greatly out weight the negatives and the proponent would mitigate the loss of vegetation and trees through offering tree seedlings and sensitisation. It would also be important to inspect and quarantine sick animals at water points that would be located near the dam to prevent spread of diseases.

The general impact on agriculture would be an increase in food production with improved water quantity / irrigation.

6.5 Summary of the public consultation concerns/ comments

The table a below represents a summary of the comments during pubic consultation the comments from the stakeholders during public meetings on the proposed project are as shown in, Table 6.1 below.

Table 6-1; Summary of Stakeholders' Comments

Comments	Stakeholder
Project Benefits	
• Creation of Employment Opportunities: The communities living along the proposed project site were optimistic that the project will bring about short term and long-term employment opportunities to the local communities during its implementation. They said that the contractor should consider employing the local communities during project implementation in activities like site clearance, excavation, driving and security services. • Improved Water Availability: The dam would ensure both domestic and irrigation water are available to the residents of Kimutwa and the surrounding locality. • Improved Road Infrastructure: Due to the bad state of rural roads in the areas along the proposed well sites the local community members anticipate that the implementation of the project will result to improvement of roads in the project area, since the contractors would also need the road frequently to access the sites. • Increased Economic Activity in both the Project Areas and at the National Level: During project implementation (civil works and construction	Plenary comments

activities), the workers will demand goods and services that will be supplied by locals. The communities therefore believe that will provide business opportunities to locals. • Corporate Social Responsibility (CSR) Benefits: The locals expect the proponent to extend its social responsibility initiatives for the communities in the project area. Communities mentioned that they might benefit from provision of a cattle dip and toilet facilities and improved roads. • Benefits of Engagement by Both Genders: The proponent encourages involvement of both women and men in realisation of the proposed project. Local employment opportunities that will be available during the construction phase would provide both direct and indirect income for both women through small scale business activities • Enhancement of the Socio-cultural and Local Leadership Structures: It was suggested that the proponent should empower and utilise the local leaders, extensively consult with them in every undertaking. This will act both ways in ensuring the project runs smoothly and at the same the proponent would be reinforcing the authority of the chiefs as the community observes how they have been involved.	
Anticipated Negative Impacts	
Negative Impacts; • Loss of vegetation and animal folder • Reduction of grazing land • Livestock accidents • Dust emission during construction • Health problems as result of dust and emissions • Soil erosion. • HIV/AIDS as a result of population	Community -Plenary

Mitigation measures	
• The contractor would fence the area around the dam to prevent human and animals from accidental drowning. • Construction of necessary structures to control soil erosion • Avoiding pollution of water resources during construction • Sprinkling of water to combat dust emission • Provision of medical services to those who suffer from illnesses as a result of dust and emissions from the construction machines. • Install sound proofing's, and ensuring proper maintenance of machines to minimize noise pollution during construction • Community sensitization and provision of condoms to workers to prevent spread of HIV/AIDS • Compensation for trees that will be demolished	Community -Plenary

Most stakeholders felt that the project was good and would generally lead to improvement of livelihoods and provision of water and there was need to consider safety issues during construction. They overwhelmingly supported the enhancement of project design by including water storage structures tanks , solar water pumping in addition to using water efficient technologies such as drip and sprinkler irrigation.

6.5.1 Captured voices

A number of non-beneficiaries living downstream of the project area were interviewed in order to get their views concerning the project. Overall, all the non-beneficiaries were positive on the implementation of the project. A number of them were of the view that they will benefit from the farm produce, water and employment in their neighbours farms. Some of the voices captured from some of the non-beneficiaries are as follows:

Mzee *"Hii shamba ilitegwa na baba yangu kwa ajili ya kutengeza dam ya community, Haki tumeseka kwa miaka mingi , tutafurahi sana tukipata maji"*

6.5.2 Overall outcome of stakeholder consultations

In the overall, the stakeholders consider Kithayooni Concrete Dam Project positive and thus would like to see the implementation take off.

7.0 ANTICIPATED IMPACTS AND MITIGATION MEASURES

7.1 Introduction

The project impact analysis for the Proposed Kithaayoni Concrete Dam Project has been segregated into three main phases:

- Pre-Construction Phase / Construction Phase,
- Operation Phase and
- Decommissioning Phase.

7.2 Impacts during Construction

7.2.1 Positive Impacts

a) Employment

Construction and maintenance of the Kithaayoni Concrete Dam will require both skilled and unskilled labour. The short-term employment opportunities during the construction phase will be of benefit to the local communities living around the project location. The community members will provide labour for bush clearing, loading and offloading of construction materials and deliveries, record keeping and provision of security at active sites and temporary campsites and stores Indirect job opportunities for the locals such as provision of goods and services such as catering and kiosks, barber shops etc. to the construction crew are anticipated

b) Enhancement of Tree Species Diversity

Environmental management good practices demand that the proponent ensures environmental restoration on construction completion. Through afforestation with non-invasive indigenous species and landscaping activities – which would involve the local community – Kenya Climate Smart Agriculture Project KCSAP -Machakos County could improve the biodiversity of the project area. Continuous audit of this activity would ensure sustainability of the initiative

c) Capacity Building and Awareness Campaigns Benefits

Capacity building and continuous awareness creation along the locals are important in ensuring smooth achievement of the project's goals. The proponent will ensure that the both skilled and unskilled construction crew is well trained in health, environment and safety management procedures. Local residents will also benefit from awareness campaigns relating to the proposed project. Continuous awareness will ensure that the

affected persons and residents are well conversant and knowledgeable on the project activities and its anticipated effects – both positive and negative

d) Provision of market for supply of construction materials

The project will require supply of large quantities of construction materials most of which will be sourced locally within the project surrounding areas. This will provide ready market to the suppliers such as companies and individuals with such materials.

e) Increased local incomes

The local community may get extra income from the sale of construction materials from their firms and also renting spaces for camp sites, borrow pits, and quarries.

f) Economic growth

Through the use of locally available materials during the construction phase for example cement, steel metals and others; the project will contribute towards growth of the country's economy by contributing to the gross domestic product. The consumption of these materials, oil, fuel and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

7.2.2 Negative Impacts and Mitigation Measures

a. Potential loss of tree species

The residents of Kithaayoni have special medicinal plant species located in the area and some fall within the proposed project site. This loss will be permanent but necessary due to the need urgent need to increase the per capita water availability for people in Machakos County. This is in line with SDG 6 of ensuring availability and sustainable management of water and sanitation for all. Access to water and sanitation are basic human rights and are critical sustainable development challenges. These challenges will only worsen and the impacts on people will only increase as competing demands for clean fresh water (agriculture, households, industrial use, and ecosystems) are exacerbated by the effects of climate change putting more pressure on water quality and availability. These conditions will create increasing risk for businesses, governments, communities and the environment. To mitigate against loss of trees, the proponent will issue tree seedlings and encourage residents to plant around the location.

b. Temporary land interference

The Kithaayoni Concrete Dam Project is likely to cause temporary interference with the current state of environment in the area due to the establishment of a temporary camp. The camp site will however be temporally hence this effect won't necessarily affect the residents of Kimutwa.

c. Encroachment into the catchment environment

Normally construction of dams is usually preceded with the construction of temporary roads and permanent access roads. These constructed facilities have the potential of opening up river valleys to development 'or other forms of exploitation by farmers and others previously denied access due to the lack of the roads.

For the case of Kithaayoni Concrete Dam the area already has some roads / foot paths that were used by the community for crossing from one valley to the other. During construction, such roads may increase as the residents try opting for alternative paths. The contractor will provide alternative routes for such residents during construction and it was also proposed that fencing would also be done.

d. Influx of workers from other areas

The project area might experience an influx of workers from other areas. This will directly affect the normal social set up of communities living in the project area thereby possible decay of morality, increase in school drop-outs due to available unskilled labour, possible child labour, petty thieves and increased HIV/AIDS incidence and communicable diseases. Proper sensitisation and public awareness should be encouraged to mitigate these effect. *The contractor will give preference to local residents for unskilled jobs where necessary.*

e. Health Impact – Spread of COVID-19 amongst construction workers

The World Health Organization declared COVID-19 a global pandemic after assessing both its alarming levels of spread and severity, and the alarming levels of inaction. Consequentially, WHO issued various guidance and measures to prevent the spread of the virus. The measures have been adopted worldwide. Similarly, the Kenyan government has since then issued several guidance and directives after the first case was registered on March 13th 2020. These included complete cessation of movement to and from areas considered hot spots and night curfew, social distancing guidelines, closure

on non – critical and essential enterprises, closure of places of worship and public gatherings, mandatory use of masks in public places, among others.

During project execution (civil works), large numbers of workers will be required to assemble together in meetings, toolbox talks and even at work sites; varied number of workforce including suppliers of material and services are also expected to come in from various places in the country which may be COVID-19 hot spots; and interaction of workers with the project host community will happen as workers find accommodation close to work sites, and/or return to their homes after works. The potential for the spread of any infectious disease like COVID-19 by projects is high. There is also the risk that the project may experience large numbers of its workforce becoming ill and will need to consider how they will receive treatment, and whether this will impact on local healthcare services including the project host community. The presence of international workers, especially if they come from countries with high infection rates, may also cause social tension between the foreign workers and the local populations.

Recently, the WHO has warned that the virus is here to stay for a long time and might persist and become our new way. The Government of Kenya has also lifted some of the initial movement controls and allowed the resumption of business, with certain industry specific guidelines being enforced. The duty of care has now been transferred to individual citizens and enterprises. Recognizing the potent risk this may present, it is difficult to clearly outline exhaustive mitigation measures under the mitigation impacts. As such, there is need for the client and the contractor to develop and adopt COVID-19 Standard Operating Procedure (SOPs) in line with the World Bank guidance, Ministry of Health Directives and site-specific project conditions. These SOPs need to be communicated to all workers and enforced to the latter without fail. In addition to the requirement of the SOPs, the following mitigation measure shall also be adopted:

COVID-19 – Mitigation Measures against spread of COVID-19 amongst workers:

(i) The Contractors will develop SOPs for managing the spread of Covid-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilizing to site. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions;
(ii) Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including workers and visitors;
(iii) Avoid concentration of more than 15 workers at one location. Where there are two or more people gathered, maintain social distancing of at least 2 meters;
(iv) All workers and visitors accessing worksites every day or attending meetings shall be subjected to rapid Covid-19 screening which may include temperature

check and other vital signs;

(v) The project shall put in place means to support rapid testing of suspected workers for covid-19;

(vi) Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used;

(vii) Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc;

f. Social risk - Spread of COVID-19 amongst community members during consultations

During implementation of the ESIA, various consultative activities will be undertaken. For efficient and meaningful engagement, a wide range of individual participants, groups in the local community and other stakeholders will be involved. The types of consultations to be used to pass information shall be through public Baraza's, electronic means shall be used where possible and one-on-one basis meetings while observing the COVID-19 mitigation measures to ensure safety stakeholders involved, the community at large and the client. The consultations will involve verification of PAPs covering the occupants of the affected area and vulnerable persons and groups; awareness raising, sensitization of PAPs and gauging attitude to the project; training and capacity building for livelihoods restoration, grievance redress, execution of site - specific surveys among others. If carried out conventionally, these activities would lead to close interaction between the proponent and the community members leading to a high risk of spreading COVID-19 amongst community members during the consultation process.

To minimize the risk of spread of COVID-19 amongst community members, alternative means of consultation will be required as mitigation measures to ensure social distancing and appropriate communication measures. The mitigation measures will be supervised by a communications/ stakeholder engagement / social safeguards expert in the project proponent's team.

Mitigation measures against spread of COVID-19 amongst community members

i. Electronic means of consulting stakeholders and holding meetings shall be encouraged whenever feasible. One-on-one engagements for the PAPs while observing social distance and adhering to PPE wearing shall be enforced;

ii. Avoid concentrating of more than 15 community members at one location. Where two or more people are gathered, maintain social distancing of at least 2 meters;

iii. The team carrying out engagements within the communities on one-on-one basis will be provided with appropriate PPE for the number of people they intend to meet;

iv. Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements and mail) when stakeholders do not have access to online channels or do not use them frequently. Allow participants to provide feedback and suggestions.

v. Hold meetings in small groups, mainly in form of FGDs if permitted depending on restrictions in place and subject to strict observance of physical distancing and limited duration.
vi. In situations where online interaction is challenging, disseminate information through digital platform (where available) like Facebook and WhatsApp & Chart groups.
vii. Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants.

g. Gender Based violence and Sexual Harassment

This impact is triggered during Project Construction Phase when the Contractor fails to comply with the following provisions;

(i) Gender Inclusivity requirements in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 gender rule.
(ii) failure to protect Human Risk Areas Associated with, Disadvantaged Groups, Interfering with Participation Rights, and interfering with Labour Rights.

Mitigation Measures of Human Rights and Gender Requirements

- Ensure clear human resources policy against sexual harassment that is aligned with national law
- Integrate provisions related to sexual harassment in the employee COC
- Ensure appointed human resources personnel to manage reports of sexual harassment according to policy
- The Contractor shall require his employees, sub-contractors, sub-consultants, and any personnel thereof engaged in construction works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse
- The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including:
  - ✓ effective and on-going community engagement and consultation, particularly with women and girls;
  - ✓ review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes; employment schemes for women; etc.
- the contractor shall develop specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment; etc
- The contractor will ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.

h. Sexual Exploitation and Abuse (SEA)

This impact refers to sexual exploitation and abuse committed by Project staff against communities and represents a risk at all stages of the Project, especially when employees and community members are not clear about prohibitions against SEA in the Project.

Mitigation Measures to Risk of SEA

- Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018).
- The SEA action plan will include how the project will ensure necessary steps are in place for:
    - Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level IEC materials;
    - Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management;
    - Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights;
    - Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.

i. Gender-based Violence (GBV) at the community level

This impact refers to gender-based violence that women and girls may experience as a result of Project implementation. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of water and sanitation projects that do not adequately consult women and adolescent girls in the community about safety and security issues related to the delivery of water and sanitation services.

Mitigation Measures to Risk of GBV at the community level

- Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including:
  - effective and on-going community engagement and consultation, particularly with women and girls;
  - review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes; employment schemes for women; delivery of water supplies; etc.
  - Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment; water services; etc

Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.

j. Dust emissions

Limited air pollution will occur mainly due to fugitive emissions and dust generation from various construction activities. Particulate matter pollution is likely to occur during the site clearance, excavation, loading and transportation construction materials. However, the site is in a protected forest reserve with no human settlements and will therefore have no key receptors except the construction workers who will have the necessary PPEs such as dust masks.

k. Disturbances to Kithaayoni and Ilui - Ikiwe stream

The dam construction will cut across Kithaayoni and Ilui - Ikiwe which could affect the environmental status of rivers through limited siltation. It is expected that the engineering works will ensure that soils within the site are well stabilized.

l. Solid waste generation

Some solid waste will be generated from construction waste including remnant packaging materials such as cement bags. Domestic waste from the construction base camp could also lead to environmental pollution. It is expected that the contractor should ensure full compliance with the EMCA Waste Management Regulations of 2006 as well as the following measures: -

- ✓ Use of integrated solid waste management system through the following options: i) waste source reduction, ii) material reuse and recycling, and, iii) combustion,
- ✓ Disposing waste more responsibly in appropriate designated dumping sites,
- ✓ Using construction materials that have minimal or no packaging to avoid the generation of excessive packaging waste, and

- ✓ Providing waste collection sites and facilities within the site.
- ✓ Use of licensed waste handlers

m. Noise and Vibrations

Increased noise levels will be experienced from the use of heavy construction equipment. Increased vibrations during construction by equipment movement, excavations and blasting may transform the calm and quiet conditions in the area. Noise during the project construction will mainly be caused by construction machinery, such as bulldozers, excavators, pile drivers, concrete mixer trucks, and transport vehicles among others could exert noise impact. The vibration effect during the construction period will mainly result from the operation of machinery and equipment. However, the site is set aside for the dam construction works and it was observed that very no people live near the site location, the construction process will therefore have no key receptors except for the construction workers who will have the necessary PPEs such ear plugs.

n. Occupational health and safety issues

During the construction of the proposed project, it is expected that construction workers are likely to have accidental injuries as a result of accidental occurrences, neglect of the use of protective gears among others. Accidents may also occur to members of public, livestock and wildlife from open trenches, but they will be reduced by fencing of the construction site and restricting access to the site.

o. Negative cultural impacts

Construction workers will come from communities with different cultural and welfare backgrounds. There is therefore possibility that the local community could be affected negatively by presence of migrant communities. For example, the construction workers may not necessarily be accompanied by their spouses and as such young girls and women from the local community could be lured to engage in promiscuous behaviors by the workers with serious implications on the health of the local community.

7.3 Impacts during Operations Phase

7.3.1 Positive Impacts

a) Employment creation

Kithaayoni Concrete Dam will open up new employment opportunities especially in Kyanzasu sub-location which will recruit both skilled, semi-skilled and unskilled workers to operate and maintain the dam. Fish farming is also envisaged to emanate from the project during operation phase. Other areas of employment will include the Kithaayoni Concrete Dam security team, and water distribution pipeline maintenance team. It is envisaged that employment in the Kithaayoni Concrete Dam Project will have an indirect injection of money into the local economy, with persons working on the project spending some of their wages in the local area. This in turn will encourage business activities for local entrepreneurs supplying goods to such persons. Brick making was also proposed as a spillover effect from Kithaayoni Dam. Food prices such as kales, cabbages among others would also reduce significantly.

b) Improved water supply

The proposed dam will improve the general water supply in the area and encourage both domestic and commercial water uses. This will directly improve the livelihood of the village residents and promote irrigation around the dam location.

c) Reduction in water fetching time

It was noted during focused group discussions that the average water fetching time around the area was 8 hours, this will significantly reduce up to about 45 mins in average for most residents within the area.

d) Reduction in waterborne diseases

The commissioning of the Kithaayoni Concrete Dam Project will significantly reduce the health problems associated with the current reliance on raw, untreated and occasional contaminated water. This include the problem of intestinal worms and other related diseases.

e) Habitat support for migrant birds

Reservoirs are also characterized by frequent thermal instability, which ensures more rapid exchange of nutrients within the water column, and at the water-sediment interface. This can greatly increase their level of productivity (Marshall & Maes 1994). The Kithaayoni reservoir after attaining ecological stability within 20-30 years is likely to create an important staging area for both short and long-distance migratory birds including Palearctic species, which migrate away from the temperate countries in winter. This will support the goals for both the Ramsar Convention and the Convention on Migratory Species (CMS).

f) Waterbird breeding support

The reservoir after attaining ecological stability within 20-30 years is likely to create an important waterbird breeding site for birds such as the Black-headed Heron *(Ardea melanocephala*), Little Egret (*Egretta garzetta*), Egyptian Geese (*Alopochen aegyptius*) as observed in other similar water bodies in Kenya.

g) Fishery support

The reservoir after attaining ecological stability will become a fish breeding habitat for species such as tilapia (*Tilapia Spp.)* and common carp (*Cyprinus carpio*) which will enrich downstream fishing areas along Kimutwa.

h) Increase in Land Value

The dam will encourage people to invest and stay within the area due to availability of water and improved infrastructure, the value of land will also appreciate as many people get encouraged to stay within the project location.

7.3.2 Negative Impacts and Mitigation Measures

a. Downstream flow variations

Down stream flow variations may be either beneficial or harmful. Releasing of water to simulate normal flood conditions can be beneficial in that it can lead to fish migration and create enabling environment for trees to set seed and germinate. On the other hand, low flow variations can affect fish migration and their breeding patterns. Similarly, low

flow variations can affect downstream community who depend on the river for their domestic and livestock water use. For the case of the Kithaayoni Dam Project the downstream flow variation will be beneficial to the local community.

b. High reservoir carbon content

The carbon content in the bottom sediments of in the Kithaayoni Dam could be quite high at the beginning due to the submergence of a section of natural vegetation in the sub merged area. The submergence will generate a lot of debris, which accumulated in the reservoir. The flushing of allochthones organic matter from the forest undergrowth will initially increase biochemical demand and reduce the dissolved oxygen concentration below critical levels. The average level of oxygen for most aerobic life in water is 8 mgO/l. This may affect downstream aquatic life in the river section immediately below the dam. However, water mixing as a result of the river current will improve the DO levels to normal in the lower sections. These conditions are normal for all new dams in the world.

c. Low hypolimnetic oxygen concentration

Kithaayoni Dam is likely to suffer from hypolimnetic oxygen depletion during the rainy season because large amounts of fresh oxidizable matter which are likely to be washed into the reservoir and settle at the bottom. However, this will only happen during the initial period of a few years after dam commissioning due to the expected submergence of natural vegetation. The environmental impact of this to the aquatic fauna will be minimal because the reservoir ecosystem will still be at the formative stage and very few species will have established in the area.

d. Long-term reservoir nutrient build-up

Improper catchment land-use in the agricultural area above Kithaayoni Dam if un-checked could eventually lead reservoir nutrient build-up which will affect the quality of drinking water. According to Meybeck (1982) the global levels of total phosphorus and nitrogen have increased by a factor of between 2 to 50 due to changes in watershed land-use. Nitrogen is likely to be anthropogenically transferred diffusely from the farming areas and pastures especially through the movement of fertilizer residue and animal excrement. According to Meybeck (1982) the recent increase of nitrogen in world waterways by a factor of 2-50 has been found to be directly proportional to the catchment population. High total-P content is likely to occur in Kithaayoni Dam especially at the on-set of the long rains through soil movement into the waterbody. High leakage of fertilizer

from the agricultural land to the reservoir is likely to occur due to land ploughing in the planting season due to the high rainfall erodibility and soil erosivity levels. Reservoir nutrient build-up is likely to create the problem of eutrophication hence needs mitigation

e. Potential risk of other reservoir disease vectors

Standing water bodies such as reservoirs attract people to settle nearby and provide the habitat and circumstances for water related problems. For the case of Kithaayoni dam the commonly expected problems will be that of diseases related to mosquitoes and intestinal worms. These are considered to be major and negative impacts and appropriate mitigation measures have been considered.

f. Risk of dam failure

The proposed Kithaayoni Dam Project belongs to the Class B Category of Medium Hazard dams with Maximum Depth of Water at NWL of 5.00-14.99m according to the Water Resource Management Rules (2007) and the MWI Practice Manual for Small dams in Kenya (GoK, 2015). However, any impoundment of water by a dam forms a hazard so due consideration is required to the nature of the hazard, the risk of harm and/or damage, and mitigation measures that can be undertaken to minimize the risks. The typology of failure could include hydraulic, seepage, structural or operational failure which could lead to downstream flood hazards.

g. Potential water use conflicts

Currently the local community taps water for domestic and livestock use from the seasonal rivers. This means that communities living downstream of the proposed dam could lose their rights of using the river, if measures are not taken during the design stage to guarantee minimum regulated flow downstream to local community since this is usually taken for granted. However, the national water resources authority WRA management strategy shall determine the requirements of the reserve for each water resource.

h. Risk of increased water pollution from additional wastewater occasioned by increased water supply

Kimutwa and surrounding location/ do not have formal wastewater disposal system. Provision of additional water to the surrounding location is expected to spur economic

growth of the area leading to additional wastewater which will unlikely be managed by use of septic tanks. This can cause pollution of surrounding rivers besides increasing cases of water related diseases which are already significantly affecting the local community. Suitable mitigation measures have been proposed.

i. Increased agricultural activity

The establishment of the dam will not only increase water availability within the project area but also accelerate other economic activities, there are all possibilities that the outcome of the increased economic activities within the supply area will ultimately exert pressure on the limited forested catchment areas and agricultural activities both upstream as well as downstream of the water reservoir. This may then lead to the following negative impacts: -

- Increased siltation rates due to increased farming activities upstream of the reservoir with potential of shortening the working life of the reservoir
- Changes in the hydrological regime of the upper river due to changes in vegetation cover and consequently impairment of the base flows of the river with adverse effects on water supplies.

j. Effect of the dam on climate change

The initial filling of a reservoir floods the existing plant material, leading to the death and decomposition of the carbon-rich plants and trees. The rotting organic matter releases large amounts of carbon into the atmosphere. The decaying plant matter itself settles to the non- oxygenated bottom of the reservoir, and the decomposition–unmitigated by a flow pattern that would oxygenate the water –produces and eventually releases dissolved methane. All these are greenhouse gases that can contribute to global warming and climate change.

7.4 Impacts During Decommissioning

The decommissioning phase is hereby considered in two phases as follows:- a) short-term decommissioning works after the construction stage where certain installations such as borrow pits and construction base camps including associated equipment will have to be withdrawn and the locations restored as much as possible to their original status, and b) long-term decommissioning of the entire dam due to policy changes associated for example with the identification of more suitable alternative sources of water supply.

The short-term decommissioning is normal practice undertaken in any construction project. However, decommissioning of a small dam, pan or water conservation structure can arise for a number of reasons which may include:

a) The structure has filled with sediment or for whatever reason cannot provide the stream of benefits for which it was constructed;

b) The structure has become an uncontrolled public safety hazard. This could arise if proper maintenance of the spillway was neglected by the owner and WRA decides to withdraw the water permit; or

c) The owner of the structure decides to decommission the structure due to identification of more suitable alternative sources of water supply.

In the event that the removal of the structure is inevitable, then breaching, in the case of a dam, may be considered. Gradual emptying the dam or lowering the water level (by cutting down the spillway or opening the scour pipes) to reduce pressure on the embankment should be undertaken before any breaching of the embankment is undertaken.

7.4.1 Positive Impacts

The following are the positive impacts during decommissioning phase of the proposed project:

a) Environmental rehabilitation

It is envisaged that the road transport services will be provided throughout but upon decommissioning of the road construction camp sites and borrow pits appropriate rehabilitation will be carried out to restore the site to its original status or to a better state than it was originally. This will include replacement of topsoil and re-vegetation, which will lead to improved visual quality of the area.

b) Employment opportunities

Temporary employment opportunities will be created for the demolition staff during the decommissioning works.

7.4.2 Negative Impacts and Mitigation Measures

The impacts during dam decommissioning phase relates to flooding of downstream areas, erosion and loss of scenery due to excavation and damping of excavated materials as detailed in **Table 7.1**. These are considered to be major and negative and suitable mitigation measures have been considered.

Table 7-1: Projected negative impacts at decommissioning stage

Phase	Activity	Anticipated impact
ESIA	Dam decommissioning ESIA	None
Design	Dam decommissioning design	None
Dam Removal	Notch excavation, armoring and channel restoration	-Flooding downstream -Erosion
Excavation	Excavation of the dam	Loss of scenery due to dumping of excavated material
Spillway Removal	Demolish and bury the spillway	Restoration of original scenery
Disposal	Disposal of materials	Loss of scenery
Clean Up	Clean up and rehabilitation of site	Restoration of original scenery
Landscaping	All the areas inundated re afforestation shall be done	Restoration of original scenery
	Indigenous trees should be preferred in the afforestation of all landscaped areas	Restoration of original scenery

8.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1 Introduction

The purpose of the ESMP is to ensure that environmental and social impacts and risks identified during the ESIA are effectively managed during the construction, operation and decommissioning of the proposed project. The ESMP specifies the mitigation and management measures for each impact/ risk, party allocated responsibility, means of monitoring and frequency, objective verifiable indicators and an indicative budget. The ESMP also establishes a monitoring plan, capacity building plan and institutional arrangements to support its implementation.

The ESMP highlighted for appropriate action shall be availed to the contractor awarded the tender for construction work for this project. The contractor should adhere to the proposed mitigation measures and a quarterly report on ESMP progress submitted to the proponent. The contractor will factor the costs of implementing the ESMP into their budget. The project proponent will take the necessary steps to ensure that the ESMP is fully implemented.

8.2 Environmental and Social Management Plan (ESMP)

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
Construction Phase					
Interference with the physical setting	• Adequate survey should be done on the dam location and its extent • Anyone, whose property is affected to be compensated for disturbance • Engagement shall be to assess whether there are grievances. • Landscaping	KCSAP	Prior to project implementation	• No. of person affected • No. of properties destroyed	150,000
Noise pollution and vibration	• Noise maintained in accordance to EMCA specification standards. • Equipment Operators to wear PPEs to prevent direct noise from the machinery • Machines with minimal vibrations to be used • Time restrictions for high vibrating machines (avoid working during the night for such machines)	Contractor	During construction	• State of machines used • Type of machines used for compaction	10,000
Air Quality Degradation/ Dust Emissions	• Supply and construction vehicles will only use the designated transport routes. The drivers will also be advised to stick to prescribed speed limits • The contractor will ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases	Contractor	Daily Monitoring	• Records of speed limits signs erected • Records of machine and vehicle service • Evidence of use of dust masks by workers on site	10,000

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	• The contractor shall ensure the appropriate speed limits are observed at along all road sections that will be used by construction vehicles on a needs basis to eliminate the creation of dusts • Construction workers will be provided with dust masks to mitigate				
Workers Accidents and Hazards during Construction	• Contractors to adhere to Occupational Health and Safety rules and regulations as stipulated in the Occupational Safety Act of Kenya of 2007 and revised in 2010 by adopting preventive and protective measures to ensure that under all conditions of their intended use, the employees are safe and without risk to health. The employer is also required to take immediate steps to stop any operation or activity where there is an imminent and serious danger to safety and health and to evacuate all persons employed as appropriate • The Project Contractor will be required to provide appropriate personal protective equipment	Contractor	Daily Monitoring	• No of persons injured • Type of injury experienced	20,000

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	and a safe and healthy environment for construction workers; • There should be a crisis management team to administer First Aid to injured persons; • The Project Contractor should test and approve equipment before use; • The Project Contractor should train workers on how to use various PPE and safe use of machinery.				
Extraction and use of Construction Materials	• The construction extraction site should be backfilled to help retain the value of the land resource • Fencing to be done before backfilling to prevent accidents of humans and livestock. Putting a sign to warn people	Contractor	After extraction of construction materials	• No. of open sites • Type of fencing required	30,000
Generation of Liquid and Solid Waste	• The Project Contractor to comply with NEMA's Waste Management Regulations of 2006 by contracting a licensed waste collector to regularly collect and dispose accumulated wastes • Sensitization of construction workers on proper disposal of solid wastes	Contractor	Daily Inspection	• Presence/ absence of scattered solid wastes at sites • Availability of waste receptors • No. of sensitization meetings held with workers	30,000 part of the Contractors cost

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	• Temporary latrines will be provided on site to be used by construction workers • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels • Water from cleaning of equipment will be utilised within the project site and will not be discharged into watercourses.				
Loss of Flora and Fauna	• Cutting of trees should be done only where necessary. • The proponent shall ensure that clearing of vegetation clearing is limited to the pipeline trench area (i.e. 0.5 meters width) within the road reserve • Transportation of construction materials to be done through the existing local roads • Avoidance of vegetation clearing along riparian land • Sensitization of construction work-force on environmental conservation and ecological protection	KCSAP and Contractor	Routine inspections	• No. and type of vegetation cleared • No. and type of indigenous species re-planted • Size of area cleared • Size of area re-vegetated	50,000

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
Increased Vehicular and Human Traffic	• Transportation of construction material to specific sites will be done through the existing local roads • The contractor will rehabilitate the local roads that will be damaged during construction activities • Consultation with the local communities on planned road diversions if any • Restriction of Vehicular and Human Traffic to the road reserve where possible • Sensitization of drivers to comply with prescribed speed limits	Contractor	Routine inspections	• No. of accidents involving project vehicles • Transportation control logs • No. of road spots rehabilitated • Community complaints • Complain feedback mechanism	5,000
Influx of workers from other areas	• Preference is given to local residents for unskilled jobs where necessary.	Contractor	At least 70% of the unskilled labourers are locals	• Staff registry reports	Routine project activity
Occupation Health and Safety	• Continuous supervision of occupational, health and safety management to ensure compliance	KCSAP	Routine Inspection	• HSE inspection reports	100,000 for awareness
	• Occupational Safety and Health Training for contractor's staff	Contractor	Throughout construction phase	• Training reports • Training attendance sheets	50,000 part of contractors cost

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	• Conduct orientation talks and visits	Contractor	At employment of new staff	• Orientation report	5,000
	• Conduct toolbox talks (safety meetings)	Contractor	On a daily basis	• No. of toolbox talks conducted	5,000
Spread of COVID-19 amongst workers	• The Contractors will develop a SOPs for managing the spread of Covid-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilization. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions; • Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including • Avoid concentrating of more than 15 workers at one location. Where there are two or more people gathered, maintain social distancing at least 2 meters. All workers and visitors accessing worksites every day or attending meetings shall be subjected to rapid Covid-19 screening which may include temperature check	Contractor	Throughout construction phase	• Availability of SOP(s), Training material, PPE, sanitising facilities etc.	50,000

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	and other vital signs; • The project shall put in place means to support rapid testing of suspected workers for covid-19; • Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc				
Spread of COVID-19 amongst community members during consultations processes	• Electronic means of consulting stakeholders and, holding meetings, whenever possible, shall be encouraged whenever feasible. One-on-one engagements for the PAPs while observing social distance and adhering to PPE wearing shall be enforced; • Avoid concentrating of more than 15 community members at one location. Where there are	Contractor	Throughout construction phase	• Availability of SOP(s), Training material, PPE, sanitising facilities etc	10,000

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	two or more people gathered, maintain social distancing at least 2 meters • The team carrying out engagements within the communities on one-on-one basis will be provided with appropriate PPE for the number of people they intend to meet; • Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements and mail) when stakeholders do not have access to online channels or do not use them frequently. Ensure to provide and allow participants to provide feedback and suggestions • Hold meetings in small groups, mainly in form of FGDs if permitted depending on restrictions in place and subject to strict observance of physical distancing and limited duration. • In situations where online interaction is challenging,				

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	disseminate information through digital platform (where available) like Facebook and WhatsApp & Chat groups. Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants				

Gender-based violence at the community level	• The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including:
	  • Effective and on-going community engagement and consultation, particularly with women and girls;
	  • Review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes for women, employments schemes for women, etc.;
	  • Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to
		Contractor	Continuous	• Mitigation plan for GBV occurring at the community level as a result of project implementation
				
				• Number of GBV cases happening at the community level that receive survivor-centered referral and care
					-

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	compensation and employment • The contractor will ensure adequate referrals mechanisms are in place if a case of GBV at the community level is reported related to project implementation				
Sexual Exploitation and Abuse by project workers against community members	• Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). • The SEA action plan will include how the project will ensure necessary steps are in place for: o Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level IEC materials; o Response to SEA: including survivor-centered coordinated multi-sectoral	Contractor	Continuous	• SEA Action Plan • Code of Conduct • Number of staff trainings • SEA FP • Community Liaison trained in PSEA • IEC materials for workers' sites and community • Discrete SEA reporting pathway • Relevant policies, e.g. investigations and discipline and whistleblower protection • Monthly minutes from SEA coordination meetings	5,000

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; o Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; o Management and Coordination: including integration of SEA in job				

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.				
Sub-Total of Cost Estimates for Construction Phase					**Kshs530,000**
Operation Phase					
Increase in Waterborne Diseases	• Training on efficient home-based irrigation system that is efficient in water use • Removal of any stagnant water • Sensitisation on the use of nets at homes close to site • Use of gumboots in the irrigation field	• KCSAP • Farmers	On need basis	• Amount of stagnant water	10,000
Water use conflicts	• Water abstraction laws followed • Farmers training on water use • Enforcement of water Act, 2016	• WRA • IWUA • Farmers	During water abstraction and use	• Amount of water abstracted	5,000

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
				• Number of farmers plots • Irrigation frequency per plots	
Pollution of Water	• Machines such as tractors for ploughing used during operation maintained in good condition • Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels • All polluted water treated before discharging to water bodies	• KCSAP • Farmers	All farming operations	• Number of machines e.g. tractors used • Number of farmers sensitized on the proper use of pesticides and fertilizers	Proponent's cost
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Sprinkling of backfilled trenches with water • Compaction of backfilled trenches • Re-vegetation of excavated areas • Channelling of surface water runoff away from irrigation channels and pipelines	• KCSAP • Farmers	On a needs-basis	• No. of wash points installed • No. of silt traps installed • No. of surface drains constructed • Number of people sensitized on soil and water conservation	Part of landscaping cost
Health and Safety Hazards	• Fence the dam to avoid drowning of livestock and even human beings especially children • Train all workers on Health, Safety and Environment (HSE)	• KCSAP	On a needs-basis	• Training on HSE conducted • Prominently erected safety	Proponent's costs as per the quotation

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	with an aim of improving awareness • The proponent will erect appropriate safety signage during repair and maintenance activities • The proponent shall provide first-aid facilities for staff • Proponent's staff and visitors will be required to use PPEs all the time			signage during R&M work • Availability of first-aid kit during R&M work	
Sub-Total of Cost Estimates for Operation Phase					**Kshs15,000**
Decommissioning Phase					
Reduced availability of livestock water irrigation water to users	• The community to prepare project beneficiaries for a transition strategy when de-commissioning • Develop alternative livelihood strategies.	• KCSAP	During and after the decommissioning phase	• Customer complaints • Alternative sources of water provided	500,000 (Future estimates)
Soil erosion and Siltation of Surface water resources	• Use excavated earth materials for backfilling • Sprinkling of backfilled trenches with water • Compaction of backfilled trenches • Re-vegetation of excavated areas • Channelling of surface water runoff away from the pipeline route	Contractor	Daily Inspection	• Presence/ absence of stockpiled excavated earth material • No. of silt traps installed • No. of surface drains constructed	500,000 (integrated in the works costs)

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
Air Quality Degradation/ Dust Emissions	• Evacuation vehicles will only use the designated transport routes. The drivers will also be advised to stick to prescribed speed limits • The contractor will ensure proper repair and maintenance of vehicles and equipment to minimize exhaust gases • The contractor shall ensure recommended speeds on road sections that will be used by construction vehicles are adhered to on a needs basis to reduce the creation of dusts Construction workers will be provided with dust masks to mitigate	Contractor	Daily Monitoring	• Records of water sprinkling • Number of speed limit signs erected • Evidence of use of dust masks by workers on site	50,000
Loss of Flora and Fauna	• The proponent shall ensure minimal clearing of vegetation • Transportation of decommissioning wastes to be done through the existing local roads • Sensitization of decommissioning work-force on environmental conservation and ecological protection • Re-vegetation of cleared areas with indigenous vegetation species	• KCSAP • Contractor	Routine inspections	• No. and type of vegetation cleared • No. and type of indigenous species re-planted • Size of area cleared • Size of area re-vegetated	30,000

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
Increased Vehicular and Human Traffic	• Transportation of decommissioning wastes to specific sites will be done through the existing local roads • The contractor will rehabilitate the local roads that will be damaged during decommissioning activities • Consultation with the local communities on planned road diversions • Restriction of Vehicular and Human Traffic to the road reserve where possible • Sensitization of drivers to comply with prescribed speed limits	Contractor	Routine inspections	• No. of accidents involving project vehicles • Transportation control logs • No. of road spots rehabilitated • Community complaints	5,000
Generation of solid and liquid waste	• Provision of solid waste collection facilities (waste bins) • Contracting licensed solid waste handlers • Sensitization of construction workers on proper disposal of solid wastes • The contractor will maintain all site vehicles and equipment is a serviceable state. • Oils and greases emanating from repair and maintenance activities will be collected in containers to	Contractor	Throughout decommissioning phase	• Presence/ absence of scattered solid wastes at sites • Availability of waste receptors • No. of sensitization meetings held with workers • Evidence of oil leaks and greases on site • Evidence of waste water flowing	500,000

Potential Impact	Mitigation/ Enhancement Measures	Responsibility	Monitoring means / Frequency	Verifiable Indicators	Estimated Costs (Kshs.)
	avoid entry into local drainage channels • Water from cleaning of equipment will be utilised within the project site and will not be discharged into watercourses.			through local drainage channels	
Health and Safety	Continuous supervision of occupational, health and safety management to ensure compliance	MOAI	Routine Inspection	• HSE inspection reports	30,000.00
	• Occupational Safety and Health Training for contractor's staff	Contractor	Throughout decommissioning phase	• Training reports • Training attendance sheets	20,000.00
	• Orientation talks and visits	Contractor	At employment of new staff	• Orientation report	5,000
	• Toolbox talks (Safety meetings)	Contractor	On a daily basis	• No. of toolbox talks conducted	5,000
Sub-Total of Cost Estimates for Decommissioning Phases					**1,645,000.00**

8.3 Self-Audit Monitoring Plan

Auditing of the proposed sub-Project will help strengthen the mobilization of the beneficiary communities with regard to environment and health aspects and render the project socially and environmentally sustainable. KCSAP will need to conduct periodic self-audits to ensure that the implementation of the ESMP is maintained.

The self-audit shall ensure that:

- ⇒ The ESMP being used is an up to date version;
- ⇒ Variations to the ESMP and non-conformities and corrective actions are documented;
- ⇒ Appropriate environmental training of personnel is undertaken;
- ⇒ Emergency occupational health and safety procedures are in place and effectively communicated to personnel;
- ⇒ A register of major incidents (spills, injuries, complaints, legal transgressions, spot fines and penalties etc) is in place and other documentation related to the ESMP; and
- ⇒ Ensure that appropriate corrective and preventive actions are taken once instructions have been issued.

The implementation and operation of the ESMP should evolve from deep understanding and appreciation of the nature of project, environmental and social requirements, and should demonstrate the integration of environmental and social management as part of the overall project management.

Effective self-audit monitoring will be achieved through:

- ⇒ Capacity building;
- ⇒ Communication;
- ⇒ Emergency preparedness and response;
- ⇒ Checking non-conformities and effecting corrective actions; and
- ⇒ Review of the ESMP.

8.3.1 Capacity building

Efficient self-audit monitoring requires competent capacities, wise management, environmentally and socially sound employees. The project employees should be environmentally aware of the project nature and impacts, so that they would develop their appreciation and thorough commitment to the ESMP requirements, complexity and integrity.

Each responsible employee should be trained and motivated to appreciate and act according to the issued mitigation and monitoring measures. Such requirement should be tackled in the pre-construction phase in order to have the employees acting as per the stated course of procedures and actions. During the construction phase, the employees' acts and awareness level should be monitored and developed. Adequate training of senior staff and orientation of project staff is also considered as a cost-effective means to reduce impacts.

KCSAP should ensure the following in order to fulfil the awareness and training requirements:

1. Training needs are identified;
2. Training requirements for each operational unit within the project are established;
3. Personnel are trained in their specific environmental responsibilities that are directly related to significant aspects, targets, and objectives of the ESMP;
4. Personnel that do not have a significant role, receive awareness training;
5. New-hires and re-assigned personnel are given appropriate training on the specific aspects of their new positions; and
6. Personnel are kept abreast of regulatory changes that impact their job performance;

Training includes communication on the following:

a) Requirements of the ESMP and the importance of regulatory compliance with policy;
b) Potential effects of the employee's work, both negative and positive;
c) Responsibility in achieving compliance with policies, regulations and ESMP requirements.

8.3.2 Communication

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

The Environmentalist specialist should effectively communicate and cooperate on continuous basis with the related authorities, WRUA and IWUA in order to avoid or minimize possible disruptions.

Communicating internally and externally if effective will ensure:

- ⇒ Better understanding and appreciation of target groups to the proposed project conditions and benefits;
- ⇒ No or minimum disruption by the project to other developed/under-development projects and vice versa;
- ⇒ Minimum impacts and risks; and
- ⇒ Community participation in helping and making choices to develop suitable and acceptable avoidance/mitigation measures.

8.3.3 Emergency Preparedness and Response

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

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

The emergency management plan should be reviewed and verified by the KCSA, Environmentalist. Also, the implementation of this plan should be monitored and evaluated.

Whenever environmental and/or social emergency situation is triggered during the construction phase, the Environmentalist should directly inform the Contractor requesting him to respond according to the stated plan. After a drill or incidents occurrence, these processes should be reported on, reviewed and modified by the Environmentalist. In this regard, the Environmentalist specialist should hold the responsibility of reviewing and verifying the Contractor reports and plan adaptations.

The ESMP implementation and performance should be monitored continually; performance, conformance and non-conformance audit should be applied on in order to adapt the plan by adopting effective corrections whenever needed. Environmental audit (Eco-Audit) should be conducted on an annual basis. All records should be stored in orderly and easily accessible manner, enabling individual items to be located easily and ensuring that the records are protected. The audit reports should be reported in accordance to the stated reporting structure.

The selected auditors should hold acceptable experience with relevant tasks and capable of undertaking such responsibilities, and should be accepted by the Ministry of Agriculture.

For the purpose of this project, the audit would cover but not be limited to the following categories of issues influencing the planning and implementation of the project:

1. Environmental and technical issues;
2. Socio-economic issues; and
3. Gender and socio-cultural issues.

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

As an exit strategy for community will have to be trained on how to monitor and inspect the dam for failure and at the same time have an Emergency response plan and clear channels for communications with relevant authorities.

8.3.4 Review of the ESMP

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

8.4 ESMP Reporting Structure

Monitoring efforts would be in vain in the absence of an organized record keeping practice. It is the responsibility of the M&E specialist to ensure the development of a database that includes a systematic tabulation of process and performance indicators, maintenance schedules, compliance and process performance monitoring outcomes. The ESMP reporting structure is as shown in Table 8.1 as follows:

Table 8-1: The Proposed ESMP Reporting Structure

Report	Report Type	Frequency
Progress Report	Document the ESMP implementation progress, limitations & difficulties based on regular monitoring. This includes checking & corrective actions. Also, the progress report should address the conducted public consultation sessions.	Monthly, Quarterly & Annually.
Emergency Management Plan	The plan should document for emergency preparation, including the health & safety programs (for farmers and & project employee) for all key procedures reviewed, in addition to all necessary adequate & correct emergency equipment.	Prior to construction phase
Self -Audit Reports	ESMP Performance, Conformance & Non-conformance Audit, this should also include checking & corrective actions	Quarterly & Annually.
Environmental & Social Management Evaluation Report	Evaluation Report of the Project Environmental & Social Impacts. The evaluation should also document to all conducted management practices & to evaluate the effect of these practices	Once upon completion of construction

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

Concrete dams are usually sufficiently large to satisfy the conditions and, in this case, reservoir for livestock and irrigation water during the dry season.

There was upmost acceptability and goodwill from the community living in the project area for the proposed project. There are major environmental and social issues both positive and negative associated with the construction, operation and decommissioning of the proposed project. Mitigation measures have been proposed in every negative impact raised in construction, operation and decommissioning under the environmental and social management plan (ESMP) for consideration in these various stages of the proposed project.

The ESIA and preparation of this Study Report was carried out to fulfil legal requirements, as outlined in the Environmental Management and Co-ordination Act (1999), and the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015. Mitigation measures for the potentially significant and/or adverse environmental and social impacts and safety risks have been provided as an integral part of this ESIA report.

There is need for rigorous implementation of the Environmental Management and Monitoring Plan will facilitate the mitigation and/or prevention of potentially adverse environmental impacts.

The proposed ESMP should be followed fully by the contractor with the supervision from the proponent and environmental and social monitoring progress report be submitted quarterly. This will help to ensure success of EMP and that the recommended mitigation is implemented throughout construction, operational and decommissioning phases in order to avert any negative impacts.

9.2 Recommendations

The following are some of the recommendations for the avoidance and mitigation measure for the adverse environmental and social impacts from the proposed concrete dam.

(i) The mitigation measures proposed should be followed by the proponent as it is highlighted in this ESIA report.

(ii) The design, construction and operation should be carried out in accordance to the specific report for the proposed project.

(iii) The proponent to undertake Environmental Impact Assessment Studies for all the proposed borrow pits and areas of construction materials

(iv) A complete audit be undertaken and submitted to NEMA every year after commissioning of the project to ensure that all the proposed mitigation measures have been complied with.

(v) The social impacts raised during community participation should be followed.

In conclusion, the positive impacts outweigh the negative impacts. The listed negative impacts can be corrected with the proposed mitigation measures and it is also economically viable therefore the project should be allowed to proceed.

10.0 REFERENCES

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Ministry of Agriculture, Drought Resilience sustainable livelihood project (2017). Design report for design of Lmisiyoi concrete dam Machakos County.

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APPENDICES

Appendix 1: Sampled Comment List

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kithaayoni Concrete Dam in Machakos County

ESIA Comment Sheet / Karatasi ya maoni ya ESIA

Return this comment sheet to the **County Government of Machakos – (KCSAP Project) ESIA Team**; Office Location; Ministry of Agriculture and Livestock Development, P.O. Box 40-90100, **Machakos, Kenya.** *(Rudisha karatasi hii ya maoni kwa – Serikali ya Machakos Kaunti – Timu ya ESIA)*

Tel/ *Namba ya simu*: +254 725 980 512
Email/ *Barua pepe)*: kcsapmachakos@gmail.com

Kindly write your comments and suggestions regarding the proposed Project below.
(Tafadhali andika maoni na mapendekezo yako kuhusu mradi iliyopendekezwa hapa chini)

Name and Title: *(Jina na Uteuzi)*	PASCHAL NZOKA MAKEGHA (Secretary)		
Location: *(Eneo)*	KIMUTWA		
ID No.: *(Nambari ya kitambulisho)*	20618966		
Mobile Number: *(Namba ya simu ya mkononi)*	0727 241648	**Date:** *(Tarehe)*	01/10/2019
Signature: *(Sahihi)*		**Email:** *(Barua pepe)*	N/A

What Positive impacts do you expect to emanate from the proposed Kithaayoni Concrete Dam Project?
(Ni athari gani zenye matokeo mwafaka unazotarajia kutoka kwenye Mradi uliopendekezwa wa Bwawa la maji?)

- Provision of water for domestic use.
- Provision of water for agricultural purposes
- Creation of employment through brick-making hence sell.

What negative socio-economic impacts do you expect to emanate from the proposed Kithaayoni Concrete Dam Project? *(Je, ni madhara gani za kijamii na kiuchumi ambazo unatarajia kutoka kwenye Mradi uliopendekezwa wa Bwawa la maji Kithaayoni?)*

- Destruction of medicinal trees
-

Kindly propose any mitigation measures the proponent needs to put in place during and after the development of the proposed Kithaayoni Concrete Dam Project. *(Tafadhali, elezea hatua za zozote zakupunguza unazopendekeza ambazo mshiriki anahitaji kuweka wakati na baada ya maendeleo ya Mradi uliopendekezwa wa Bwawa la maji Kithaayoni)*

Replanting of destroyed plants and ground covers
Fencing the dam.

Do you support the development of the proposed Kithaayoni Concrete Dam Project?
(Je! Unakubaliana na maendeleo ya Mradi uliopendekezwa wa Bwawa la maji Kithaayoni?)

Yes I do.

THANK YOU FOR YOUR CONTRIBUTION
ASANTE KWA KUCHANGIA

Page **1** of **1**

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kithaayoni Concrete Dam in Machakos County

ESIA Comment Sheet / Karatasi ya maoni ya ESIA

Return this comment sheet to the **County Government of Machakos – (KCSAP Project) ESIA Team**; Office Location; Ministry of Agriculture and Livestock Development, P.O. Box 40-90100, **Machakos, Kenya.** *(Rudisha karatasi hii ya maoni kwa – Serikali ya Machakos Kaunti – Timu ya ESIA)*

Tel/ *Namba ya simu*: +254 725 980 512
Email/ *Barua pepe)*: kcsapmachakos@gmail.com

Kindly write your comments and suggestions regarding the proposed Project below.
(Tafadhali andika maoni na mapendekezo yako kuhusu mradi iliyopendekezwa hapa chini)

Name and Title: *(Jina na Uteuzi)*	Villager		
Location: *(Eneo)*	Kinutuku		
ID No.: *(Nambari ya kitambulisho)*	25069183		
Mobile Number: *(Namba ya simu ya mkononi)*	0712096023	**Date:** *(Tarehe)*	1 - 10 - 2019
Signature: *(Sahihi)*		**Email:** *(Barua pepe)*	

What Positive impacts do you expect to emanate from the proposed Kithaayoni Concrete Dam Project?
(Ni athari gani zenye matokeo mwafaka unazotarajia kutoka kwenye Mradi uliopendekezwa wa Bwawa la maji?)

- We will Practice rearing Cattles
- provision of water
- We will plant more trees to Beter our environment

What negative socio-economic impacts do you expect to emanate from the proposed Kithaayoni Concrete Dam Project? *(Je, ni madhara gani za kijamii na kiuchumi ambazo unatarajia kutoka kwenye Mradi uliopendekezwa wa Bwawa la maji Kithaayoni?)*

- Thair will be destruction of Medicinal trees

Kindly propose any mitigation measures the proponent needs to put in place during and after the development of the proposed Kithaayoni Concrete Dam Project. *(Tafadhali, elezea hatua za zozote zakupunguza unazopendekeza ambazo mshiriki anahitaji kuweka wakati na baada ya maendeleo ya Mradi uliopendekezwa wa Bwawa la maji Kithaayoni)*

- Terrace the dam
- Planting More trees araind the dam and grass
- Construction of terraces

Do you support the development of the proposed Kithaayoni Concrete Dam Project?
(Je! Unakubaliana na maendeleo ya Mradi uliopendekezwa wa Bwawa la maji Kithaayoni?)

Yes I do Support

THANK YOU FOR YOUR CONTRIBUTION
ASANTE KWA KUCHANGIA

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Appendix 2: Sampled Household Questionnaire

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kithaayoni Concrete Dam in Machakos County

Household Socio-Economic Questionnaire

Questionnaire No. | | | |

SECTION A INTRODUCTION

Hello. My name is [ ]. I am working with the County Government of Machakos. We have been subcontracted by the **Kenya Climate Smart Agriculture Programme (KCSAP) to conduct an Environmental & Social Impact Assessment Study for the Proposed Kithaayoni Concrete Dam in Machakos County.** This study will help us obtain information that will be used to identify potential socioeconomic impacts of the proposed project.

Name of Respondent	BENEDICTER MUTHOKI MUKINGE	County	Machakos County
Respondent Contact	0727453186	Sub-county	MACHAKOS
Respondent ID No.	13830186	Division	KALAMA
Date of Interview	1/10/2019	Location	KIMUTWA
Name of Interviewer		Sub Location	KYANZASU
Supervisor		Village	MAKAVETI

*(**NOTE:** This questionnaire shall be administered only to the household head or any other responsible adult person in the household at the time of the survey)*

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Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kithaayoni Concrete Dam in Machakos County

SECTION B DEMOGRAPHIC DATA

B1	B2	B3	B4	B5	B6
Sex of respondent 1. Male 2. Female	How old are you (yrs)? 1. < 18 yrs 2. 18 – 25 yrs 3. 26 – 35 yrs 4. 36 – 45 yrs 5. 46 – 60yrs 6. Above 60 yrs	What is your marital status? 1. Married (No. of Spouses) 2. Widowed 3. Divorced 4. Separated 5. Never Married (99) Others(Specify)	Do you have any children under the age of 18 yrs? 1. Yes 2. No >>B6	If yes, how many?	What is the highest level of education you attained? 1. Pre-primary 2. Primary 3. Secondary 4. College 5. University 6. Never Attended (99) Others (Specify)
2	4	1	2		3

B7	B8	B9	
How long does it take to get to the nearest school? 1. < 20 mins 2. 21 – 40 mins 3. 41 – 60 mins 4. Over 1 hour	What type of house you dwell in? 1. Permanent 2. Semi-Permanent 3. Temporary	What materials have you used to build the house?	
		Walls 1. Wood & mud 2. Stones & mud 3. Stones & cement 4. Cement blocks 5. Wood poles 6. Bricks (99) Others (Specify)	**Roof** 1. Mud 2. Thatch 3. Iron Sheet 4. Tin 5. Poles 6. Polythene 7. No roof (99) Others (Specify)
1	1	6	9

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SECTION C HEALTH AND VULNERABILITY

C1	C2	C3	C4	C5
How long does it take to get to the nearest health centre? 1. < 20 mins 2. 21 – 40 mins 3. 41 – 60 mins 4. Over 1 hour	Do you have any member of your household who is disabled? 1. Yes 2. No	What is the nature of disability? 1. Lame 2. Blind 3. Deaf 4. Dumb 5. Crippled 6. Crossed eyes 99. Others	Has any member of your household been ill within the last four months? 1. Yes 2. No	If yes, what is/was the member suffering from? 1. Malaria 2. Flu/Cough 3. Stomach disorders 4. Diarrhoea 5. Cholera 6. Headaches 7. Chronic Illness 8. Other (Specify)
4	2	—	1	3

NB:-Chronic illnesses include Ulcers, Sickle Cells, Cancer, Diabetes, Asthma, High Blood Pressure, Tuberculosis, and HIV/AIDS.

SECTION D WATER & SANITATION

D1	*D2*	*D3*	*D4*
What is your ***main*** source of water for domestic use? 1. Dam 2. Water pans 3. Roof Catchments / Tanks 4. Piped water supply 5. Boreholes 6. River/Stream 7. Shallow Well 8. Water Kiosks (99) Other(Specify)	How long does it take to get to the nearest water source from your homestead? 1. < 20 mins 2. 21 – 40 mins 3. 41 – 60 mins 4. Over 1 hour	How do you ensure water for household use is safe? 1. Boiling 2. Filtering 3. Decanting 4. Use of Chemicals 99. Others	Do you have a toilet within your compound? 1. Yes 2. No>>>D6
6	4	3	1

Page **3** of **11**

D5	D6
If Yes in D4 above, what type is it? 1. VIP latrine 2. Simple latrine 3. Flush toilet 99. Others	If No how do you dispose of human waste? 1. Neighbours Toilet 2. Bush 3. Burying within compound 99 Others
2	—

SECTION E INCOME & LIVELIHOOD

E1	E2	E3	E4
Do you own any land? 1. Yes 2. No>>>>E3	If Yes, what is the size? 1. < 1 acres 2. 1 - 2.5 acres 3. 2.6 – 4 acres 4. 4.1 – 5 acres 5. Above 5 acres	What is your main source of income? 1. Crop Farming 2. Livestock keeping 3. Bee Keeping 4. Poultry Farming 5. Formal Employment 6. Charcoal production 7. Trading/Businessman (Specify)	Name any other income generating activities practiced.
1	2	1	—

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kithaayoni Concrete Dam in Machakos County

E4	E5		E6		E7
Do you practice crop farming? 1. Yes 2. No>>>E7	If Yes, which crops do you cultivate?		How much do you get per acre/annum?		Do you practice animal farming? 1. Yes 2. No
	Cassava		Cassava		
	Millet		Millet		
	Sorghum		Sorghum		
	Maize	✓	Maize	15 BAGS	
	Onions		Onions		
	Beans	✓	Beans	8 BAGS	
	Vegetables	✓	Vegetables		
	Tomatoes		Tomatoes		
	Others		Others		
1					1

E8		E9
If Yes, which animals do you keep?		What is the nature of your business?
Goats	✓	
Sheep	✓	
Cattle	✓	
Carmel	~~✓~~	
Poultry	✓	
Others		
		Selling animal/ Poultry

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F: ASSETS- LAND OWNERSHIP

F1	F2	F3	F4	F5	F6
Which of your assets are affected 1. None 2. Land >> **F2** 3. Structure(s) >>**G1** 4. Crops/Trees>>**H1** 5. Grave/Cultural site 6. Others (Specify)	For the affected land do you have proof of Ownership? 1. Yes>>**F3** 2. No	If yes in E2, which one? 1. Title deed 2. Allotment letter 3. Other, Specify	Which type of ownership is your land under? 1. Leasehold 2. Freehold 3. Trust land 4. Squatter	What is the size of your Land and when did you acquire?	How did you acquire this property? 1. Buying 2. Inherited 3. Gift 4. Rented 5. Other (Specify)
1	—	—	—	—	—

F7	F8	F9	F10	F11	F12
How do you use your land? 1. Crop Farming 2. Livestock Keeping 3. Sanctuary 4. Other Uses (specify)	What non-farm activities do you conduct on your land? 1. Quarry 2. Mining 3. Other (Specify)	If affected, can you relocate within your plot (if settlement land) or outside the way leave trace (If trust land)? 1. Yes 2. No	To the best of your knowledge, does this land have any caveats or under any form of dispute? 1. Yes>>**F11** 2. No >>**F12**	Explain the existing caveats or dispute	Do you or any of the affected families on this plot have other land holding nearby or elsewhere? 1. Yes>>**F14** 2. No>>**G1**
—	—	—	—	—	—

F13	F14	F15	F16
If yes, where?	Estimated total size (*Acres*)	Land Type 1. Settlement 2. Trust	Nature occupancy 1. Land owner 2. Tenant 3. Co-owner 4. Co-tenant 5. Licensee 6. Renter 3. Squatter
—	—	—	—

SECTION G: ASSETS- STRUCTURES

G1	G2	G3
Which of your structures is affected? 1. None 2. Main House 3. Kitchen 4. Latrine 5. Dish Rack 6. Fence 7. Granary/Store 8. Business premise 9. Tank 10. Well 11. Others (Specify)	How did you acquire this property? 1. Buying 2. Constructed 3. Inherited 4. Gift 5. Rented 6. Other (Specify)	Nature of the affected structure 1. Permanent 2. Semi-permanent 3. Temporary
Structure Affected	**How It Was Acquired**	**Nature**

SECTION H: ASSETS- TREES AND CROPS

H1	H2	H3			H4
Which of your plants are affected? 1. Trees>>**H2** 2. Crops>>**H5** 3. Others (Specify)	Which of your trees are affected? 1. Exotic 2. Indigenous 3. Both Exotic and Indigenous 4. Fruit 5. Others (Specify)	What is the Number, Type and Size of your affected trees?			Why do you own these trees? 1. Source of Income 2. Prestige 3. Environmental Conservation 4. All the above 5. Others (Specify)
		Number	**Type**	**Size (S, M, L)**	
—	—	—			—

N/B: Size of Trees is either Small (S), Medium (M) or Large (L)

H5	H6			H7
What kinds of your Crops are affected? 1. Food crops 2. Pasture 3. Cash crop 4. Others (Specify)	What is the Number, Type and Size of your affected Crops?			Why do you own these Crops? 1. Source of Income 2. Source of food 3. Animal feeds 4. All the above 5. Others (Specify)
	Number	**Type**	**Size (Area)**	
—	—			—

H9		
Which are the common types of tree species within the area? Kindly tick those affected within the project within your area.		
Local Name	**Scientific Name**	**Affected (Tick theaffected)**
Kithi		
Kilaa		
Kisemei		
Muuku		
Mukenea		
Chuashi		
Kitheu		

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SECTION I: SOCIAL STRUCTURES

I1	I2
Which of these Public facilities are you closest to? 1. Primary School 2. Secondary School 3. Health Centre 4. Road 5. Water Source/Point 6. Historical Sites 7. Others (Specify)	Distance to public facility? 1. < 500m 2. 501m to 1 km 3. 1-2 km 4. 2-3 km 5. 3-5 km 6. More than 5 km
Public Facility	**Distance**
4	2
1	3
3	3

SECTION J:

Comments: I want water because where we go to search water is very foer. from home.

THE END

THANK YOU FOR YOUR TIME

Appendix 3: Minutes of Consultative Meetings

Appendix 3a: Meeting Venue and Scheduled Time for Public Consultation Meetings

Activity Day	Meeting Venue and Time Schedule of Public Consultation Meetings	Date of Meeting
1.	10:30 am – 2: 00 pm County Government of Machakos Offices / Kenya Climate Smart Agriculture Project KCSAP	Monday 30 September, 2019
2.	11:30 am – 2:00 pm Makaveti Village, Kimutwa Location	Tuesday 1 October, 2019
3.	11:00 am – 3:00 pm Makaveti Catholic Church	Friday 11 ctober, 2019

Appendix 3b: Minutes of Meeting Held at Kithaayoni Dam Site in Makaveti Village

Minutes of meeting held at Kithaayoni Dam Site in Makaveti Village; Kalama Ward on Tuesday 1 October, 2019 from 11:00 am – 1:00 pm

Agenda

1. Opening remarks
2. Team & Project Introduction
3. Concerns, comments and questions from community members
4. AOB

Min 01/2/2019: Opening Remarks

The meeting was called to order by Diana N. Komo - Ministry of Agriculture, Livestock & Fisheries – KCSAP Project Officer at 11:00 am and was opened by a word of prayer by a Bendeter Muthoki Mulinge. Mrs. Diana later introduced the project team to the village residents before calling on the consultant to address the members. The figure below shows a section of members of public who were in attendance.

Figure 0-1: Kithaayoni Dam Site Public Consultation Meeting

Min 01/2/2019: Team & Project Introduction

The consultant introduced the project and the ESIA study of the proposed Proposed Kithaayoni Concrete Dam Project to the members elaborating its objectives and the role of communities and leaders in the project.

The legal requirement that development projects are subject to Environmental and Social Impact Assessment was outlined. The consultant explained that the proposed project would have both positive and negative impacts on the surroundings and on the community and welcomed them to voice their concerns, comments and questions.

Min 01/2/2019: Concerns, comments and questions from the community members

Knowledge of the Project

It was clear from the focused group discussions that all residents were aware of the project and further added that they had even donated part of their community land to foresee the implementation of the project. The villagers were eagerly awaiting for the project to kickoff but the consultant advised them of the significance of carrying out the ESIA Study. After briefing the community about the ESIA process and the need for the project, the consultant and the residents made the following discussions on the possible benefits and negative issues that may arise during project implementation.

Envisaged project benefits

The community appreciated that the project would improve the resident's livelihood though provision of water which would enhance agriculture.

Among other impacts, the following were the key benefits as discussed during the project meeting;

1. **Creation of Employment Opportunities:** The communities living along the proposed project site were optimistic that the project will bring about short term and long-term employment opportunities to the local communities during its implementation. They said that the contractor should consider employing the local communities during project implementation in activities like site clearance, excavation, driving and security services.
2. **Improved Water Availability:** The dam would ensure both domestic and irrigation water are available to the residents of Kimutwa and the surrounding locality.
3. **Improved Road Infrastructure:** Due to the bad state of rural roads in the areas along the proposed well sites the local community members anticipate that the implementation of the project will result to improvement of roads in the project area, since the contractors would also need the road frequently to access the sites.
4. **Increased Economic Activity in both the Project Areas and at the National Level:** During project implementation (civil works and construction activities), the workers will demand goods and services that will be supplied by locals. The communities therefore believe that will provide business opportunities to locals.
5. **Corporate Social Responsibility (CSR) Benefits:** The locals expect the proponent to extend its social responsibility initiatives for the communities in the project area. Communities mentioned that they might benefit from provision of a cattle dip and toilet facilities and improved roads.
6. **Benefits of Engagement by Both Genders:** The proponent encourages involvement of both women and men in realisation of the proposed project. Local employment opportunities that will be available during the construction phase would provide both direct and indirect income for both women through small scale business activities
7. **Enhancement of the Socio-cultural and Local Leadership Structures:** It was suggested that the proponent should empower and utilise the local leaders, extensively consult with them in every undertaking. This will act both ways in ensuring the project runs smoothly and at the same the proponent would be reinforcing the authority of the chiefs as the community observes how they have been involved.

Envisaged negative impacts

Some of the key negative issues and their mitigations discussed included;

Negative Impacts;

- Loss of vegetation and animal folder
- Reduction of grazing land
- Livestock accidents
- Dust emission during construction
- Health problems as result of dust and emissions
- Soil erosion.
- HIV/AIDS as a result of population influx
- Noise pollution during construction

The consultant proposed the following mitigation measure among the key issues discussed;

- The contractor woould fence the area around the dam to prevent human and animals from accidental drowning.
- Construction of necessary structures to control soil erosion
- Avoiding pollution of water resources during construction
- Sprinkling of water to combat dust emission
- Provision of medical services to those who suffer from illnesses as a result of dust and emissions from the construction machines.
- Install sound proofing's, and ensuring proper maintenance of machines to minimize noise pollution during construction
- Community sensitization and provision of condoms to workers to prevent spread of HIV/AIDS
- Compensation for trees that will be demolished

Min 01/2/2019: A.O.B

There being no other business the meeting ended at 1:00 pm.

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kithaayoni Concrete Dam in Machakos County

Public Participation Attendance List

Date: 1ST OCT 2019 Time: 1.00 PM Venue: KITHAAYONI DAM SITE MAKAVETI VILLAGE, KYANZASU SUB-LOCATION KIMUTWA LOCATION KALAMA WARD

No.	Name	Location/ Designation	ID No.	Contacts	Signature
1.	BENDETER MUTHOKI MUHINGE	KIMUTWA	13830186	0727453186	Muthoki
2.	JOSEPHINE MAITHA KYALO	KIMUTWA	2191456	0769472008	Myalo
3.	MACDONARD MAKEWA MUTIE	KIMUTWA	6051914	07015780 44	
4.	DANIEL MUSYOKA KIMATA	KIMUTWA	25069183	0714096023	
5.	CATHERINE MWENDE JOHN	KIMUTWA	29144617	0717569609	Mwendo
6.	DANIEL MUTUNGA MUTIE	KIMUTWA	26296 10	0723655455	
7.	PASCHAL NZOKA MAITHEKA	KIMUTWA	20618966	0727 241648	
8.	MUENDO KIMEU	KIMUTWA	24310567	0795 963781	
9.	SAMMY SULIE MUIA	KIMUTWA	09636 44	0721 404923	
10.	ERICK ORUG	ENG II	24077629	0721 78524	
11.	DIANA N. KOMO	KCSAP-ESSO	28389173	0721533125	
12.					

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kithaayoni Concrete Dam in Machakos County

Public Participation Attendance List

Date: 1st October, 2019 Time: 1.00 pm Venue: KITHAAYONI DAM SITE MAKAVETI VILLAGE, KYANZASU SUB-LOCATION KIMUTWA LOCATION, KALAMA WARD

No.	Name	Location/ Designation	ID No.	Contacts	Signature
1.	JAMES MWANZA MATIVO	KIMUTWA-CHAIRMAN	0917246	0724888394	[illegible]
2.	MUENI MUTISYA	KIMUTWA-TREASURER	7540416	0742594744	[illegible]
3.	MBITHI NGIE	" —	0919395	—	Mbithi
4.	PATRICK MWANZIA MWEU	KIMUTWA —	26828152 ~~0727091726~~	0727091726	[illegible]
5.	CHRISTINE M. MUTUNGA	KIMUTWA —	07	0711946775	Christine
6.	GRACE M. MUTUA	"	0919011	0714952575	[illegible]
7.	SERA MUTUA	"	0914262	0723850464	Sarah
8.	ZIBORA LOKO KALELI	"	600166	0720624028	[illegible]
9.	ELIZABETH MUENI KAVOO	"	24653765	0725291430	[illegible]
10.	JANEFER WAVINYA MUTINDA	"	37143379	0734900091	[illegible]
11.	NDUA KYAMBAI MUTIE	"	5044091	0718475458	[illegible]
12.					

Kenya Climate Smart Agriculture Project

Public Participation Attendance List
Page 1 of 2

Appendix 3c: Minutes of Meeting Held at Makaveti Cathotholic Church

Minutes of meeting held at Makaveti Cathotholic Church on Friday 11 October, 2019 from 11:30 am – 2:00 pm

Agenda

5. Opening remarks
6. Team & Project Introduction
7. Concerns, comments and questions from community members
8. AOB

Min 01/2/2019: Opening Remarks

The meeting was called to order by the Assistant Chief - Kimutwa location at 11:30 am and was opened by a word of prayer by a Josephine Kyalo. The Chief later introduced the project team lead by Nicodemus Nzombe and his colleagues before calling on the consultant to address the members. The figure below shows a section of members of public who were in attendance.





Figure 0-2: Makaveti Cathotholic Church Public Consultation Meeting

Min 02/2/2019: Team & Project Introduction

Mr. Omari; the consultant introduced the project and the ESIA study of the proposed Proposed Kithaayoni Concrete Dam Project to the members elaborating its objectives and the role of communities and leaders in the project.

The legal requirement that development projects are subject to Environmental and Social Impact Assessment was outlined. The consultant explained that the proposed project would have both positive and negative impacts on the surroundings and on the community and welcomed them to voice their concerns, comments and questions.

Min 03/2/2019: Concerns, comments and questions from the community members

Knowledge of the Project

The consultant explained to the community where the proposed project area stood but it was evident that almost all the residents were familiar with where the proposed dam would be put up. After elaboration from the consultant, was certain that all the members understood what the project was all about.

Envisaged project benefits

The community appreciated that the project would boost the level of development in the area (improved roads) and provides employment opportunities.

The main impact that the community was also aware of is that water will now be available within their vicinity and it was certain that all the residents were happy about this. The key benefits as discussed during the project meeting included;

1. Water whose accessibility ranges to about 8 hours would not be available at within 45 mins for most residents.

2. The local residents would benefit from cheap labour from unskilled jobs during the project construction phase.
3. The availability of water would boost food production through irrigation and other farming practices.
4. Plenty of water would improve health and sanitation
5. The project would also boost fish production which had initially failed during the stimulus project due to availability of the water reservoir.
6. Spill over projects such as brick making would arise from the project. Brick making is a lucrative business in the Eastern but heavily relies on water. The Chief officer encouraged residents to do proper proposals for such businesses and forward to respective departments for funding.
7. The cost of land would generally go up as peoples' lifestyle would improve through availability of water. More people will therefore invest and buy more land in the area.
8. Production of cash crops would also emanate from the project as a result of the dam water. Fruits such as Pawpaw and Mangos would do well.
9. The proponent will also engage the residents in tree planting activity as a way of compensation for lost trees during the dam construction process.
10. The availability of more food / produce as a result of irrigation will make the prices reduce hence making food more affordable.

Envisaged negative impacts

Environmental pollution in the form of noise resulting from construction activities would occur. Moreover, diseases and injuries would be caused by dusts and flying rock fragments emanating from the project sites during construction. Excavation activities would cause open pits that pose a safety hazard especially at night.

Some of the key negative issues and their mitigations discussed included;

1) Possibility of children and animals drowning in the dam would arise. Proper vigilance was therefore encouraged after completion of the project. The residents also proposed a proper fence (Chain-Link) be put up to prevent such menace. Cattle should drink from specified water points. All water points would be put up at a raised location to reduce drowning. Solar system was proposed for power.
2) Spread of disease in likely to occur at drinking locations if animals are not properly managed. Proper spacing should therefore be allowed at drinking locations to mitigate against spread of diseases.
3) Stagnating water are courses of mosquitos breeding and arises other water borne diseases. The residents were encouraged to buy mosquito nets after the

project has been put up. Fish breeding would also reduce the spread of malaria (fish feed on mosquito lava).

4) During the project implementation and construction phase, theft would arise as is a common phenomenon in many similar projects in Kenya. A proper fence (Chain -Link) was proposed to curb the issue. The residents should report to the resident engineer in case of any short comings.
5) Increased human activities along the dam banks would result in siltation. Human activities and rain increase siltation in water reservoirs. The Proponent should/ would;
    - Plants trees around the dam
    - Sensitize farmers and reducing farming activities around the dam
    - Use appropriate methods of ploughing around the dam
    - Train residents on soil erosion control and agroforestry
6) Dams pose risks over certain period if not properly managed. Design proper spillway and offer strict supervision on site to ensure compliance. The contactor should also ensure gabions and silt dams are properly designed.
7) Influx workers from various locations including foreign workers to the project area may encourage spread of sexually transmitted diseases. The proponent should ensure proper sensitization to prevent diseases such as HIV/AIDs.
8) In case rock blasting is deemed necessary,

    - A current and valid authorization from the Department of Mines prior to any blasting activity shall be obtained;

    - A qualified and registered blaster by the Department of Mines and Geology shall supervise all blasting and rock-splitting operations at all times.

    - The Contractor/KCSAP shall ensure that appropriate pre blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area);

    - The Proponent and the Contractors shall ensure that emergency services are notified, in writing, a minimum of 24 hours prior to any blasting activities commencing on Site;

    - The Proponent and the Contractor shall take necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock

9) Possibility of accidents at site during construction. Safety gear should be provided to the community members who will be employed on site to

minimize the occurrence of injury incidences. A mobile clinic should be set-up at the project sites to treat medical emergencies and injuries immediately.

10) Loss of vegetation: Civil works conducted under the proposed project will lead to loss of vegetation. This will lead to loss of nesting grounds for avifauna, bees and dry season fodder for pastoralists and dairy farmers. The community requested the proponent and contractor to consider replanting de-graded areas with indigenous trees when the project is completed.

Min 04/2/2019: A.O.B

There being no other business the meeting ended at 2:00 pm.

REPUBLIC OF KENYA

MACHAKOS COUNTY

KENYA CLIMATE SMART AGRICULTURE PROJECT

(KCSAP)

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION ON ESIA

Venue: PUBLIC PARTICIPATION ON ESIA MAKAVETI CATHOLIC CHURCH **Date:** 16/10/19

S/No	Name	P/No. / ID No.	Age		Gender (M/F)	Organization/ Ward/Zone	Contact.	Signature
			Less than 35yrs	Above 35yrs				
1.	LUCIA M. MUNGUTI	11863190		✓	F	Village Admin	0710 650075	
2.	Bernard -M. Mutuku	28891433	✓		M	Village Admin	0704546469	
3.	JOSEPH MUTUKU MUTISO	8790717		✓	M	LIVESTOCK Officer Kalama/Muumandu wards	0725913619	
4.	MONICA M NZIOKA	0919227		✓	F	Malindi	0714969553	monika
5.	Beatrice Musyoki	26285 55		✓	F	Watamu	0726910833	
6.	ANNA M Peter Mwadi	35422584		✓	F	Malindi	0757149105	Anna
7.	Sarah Mutua	0914262		✓	F	Makaveti	0723815464	Sarah
8.	MUTYAWAA KILAKA	22353427		✓	M	Makaveti	0707407463	
9.	Paul Ndeti	2629851		✓	M	Makaveti	0724049513	
10.	Daniel mutuku munya	25203286		✓	M	Malindi	0728990618	

(3)

REPUBLIC OF KENYA

MACHAKOS COUNTY

KENYA CLIMATE SMART AGRICULTURE PROJECT

(KCSAP)

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION ON ESIA

Venue: MAKAVETI CATHOLIC CHURCH **Date:** 11/10/2019

S/No	Name	P/No. / ID No.	Age		Gender	Organization/	Contact.	Signature
			Less than 35yrs	Above 35yrs	(M/F)	Ward/Zone		
1.	Daniel Mutie	2629610		✓	M	MAKAVETI	0723053455	[signature]
2.	GRACE MUTUA	0919011		✓	F	MAKAVETI	0714152573	[signature]
3.	BEATRICE -K- IKINGU	0		✓	F	MAKAVETI		
4.	ROSE . M . MUTUA	2328269		✓	F	MAKAVETI	07[illegible]	Roso
5.	TIMOTHY KIMEU	0321277		✓	M	MAKAVETI	0720814922	[signature]
6.	Charles Kyambati	22777419		✓	M	MAKAVETI	0728428949	[signature]
7.	JENNIFER S. MUINDE	13640669		✓	F	MAKAVETI	070525596	[signature]
8.	Hellen Musembi	1988054960		✓	F	MOALF	0729555476	[signature]
9.	Amos Kitoo	PW/40		✓	M	MCA - PA	0713138423	[signature]
10.	JACINTA MUTHIKE	14523703		✓	F	VILLAGE ADMIN	0727562712	Jossy

REPUBLIC OF KENYA

MACHAKOS COUNTY

KENYA CLIMATE SMART AGRICULTURE PROJECT

(KCSAP)

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION ON ESIA

Venue: MAKAVETI CATHOLIC CHURCH **Date:** 11/10/19

S/No	Name	P/No. / ID No.	Age		Gender (M/F)	Organization/ Ward/Zone	Contact.	Signature
			Less than 35yrs	Above 35yrs				
1.	PASCHAL · N· MATHEKA	20618966		✓	M	MALINDI	0727-241648	
2.	BENSON M KIMEU	1477221		✓	M	MUUSINI	0728242377	
3.	JOSEPH N. NGUMU	2626648		✓	M	MUUSINI	0727167337	
4.	JAMES M. MATIVO	0917246		✓	M	MAKAVETI	0724888394	
5.	ROBERT M. KIMONDIU	4827267		✓	M	MUUSINI	0714215596	
6.	Simon Nzioka	7001638		U	M	Muusini	0703474436	
7.	DAVID -K· MUIG	5044091		✓	M	MAKAVETI	0718475458	
8.	JOHN -K· IKASOMBA	0914411		✓	M	MALINDI	0724816606	
9.	MULWA - K· MAINGI	0916641		✓	M	MALINDI		
10.	MBITHI NGIG	0919395		✓	M	MAKAVETI		

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REPUBLIC OF KENYA

MACHAKOS COUNTY
KENYA CLIMATE SMART AGRICULTURE PROJECT
(KCSAP)
ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION ON ESIA

Venue: MAKAVETI CATHOLIC CHURCH **Date:** 11/10/2019

S/No	Name	P/No. / ID No.	Age		Gender (M/F)	Organization/ Ward/Zone	Contact.	Signature
			Less than 35yrs	Above 35yrs				
1.	ELVIS ONGORO	00625		✓	M	WATER RESOURCES AUTHORITY	0728312122	
2.	Gosphine Mutunga Kingoo	24511044	✓		M	Kalandini	0710641136	
3.	Nicholas Mwia	0919275		✓	M	Malindi	0725612911	
4.	MACKDONALD M. MUTUE	6051914		✓	M	MAKAVETI	0701578044	
5.	DANIEL MBAMBUKU	7947148		✓	M	Malindi	0714104833	
6.	CATHERINE MWENDE JOHN	29144617		✓	F	MAKAVETI	0717569609	
7.	JOSEPHINE M. KYALO	21914456		✓	F	MAKAVETI	0769472008	
8.	MUENI MUTISYA	7540416		✓	F	MAKAVETI	0742594744	
9.	Josephine Peter	20007899		✓	F	Malindi	0729789925	Josephine
10.	Patrick Iweny	35016899	✓		M	Water Resource Authority	0799455879	

Appendix 4: List of Key Stakeholders Consulted

REPUBLIC OF KENYA

MACHAKOS COUNTY

KENYA CLIMATE SMART AGRICULTURE PROJECT

(KCSAP)

ATTENDANCE LIST

Activity: PUBLIC PARTICIPATION ON ESIA

Venue: MAKAVETI CATHOLIC CHURCH **Date:** 11/10/19

S/No	Name	P/No. / ID No.	Age		Gender (M/F)	Organization/ Ward/Zone	Contact.	Signature
			Less than 35yrs	Above 35yrs				
1.	JOSEPH KYALO	28641513	✓		M	MALINDI	0701112923	
2.	DANIEL K KYALO	20140119508	✓		M	COUNTY GOVT	0713571305	
3.	Grace Mama	22262373		✓	F	NEMA-MKS	0721619684	
4.	NYAGA C. NIGORO	20090645?4		✓	M	MOAFS&CO	0720335732	
5.	DR DAVID MANGERA	19940?364		✓	M	MOAFSCD	0723665925	
6.	SIMON M. MWANGANGI	19860??		✓	M	MoAFSCD	0722795656	
7.	Nicodemus Kioumbe	9849280		✓	M	MoAFSCD	0725980572	
8.	Josphat Omen	20050834?2		✓	M	MOALF-HQ	0720349322	
9.	Mutinda Kipalo	20140117442		✓	M	MOAF-	0710827817	
10.	ELVIS ONGORO	22535544		✓	M	WRA-MKS	0728312122	

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REPUBLIC OF KENYA

MACHAKOS COUNTY
KENYA CLIMATE SMART AGRICULTURE PROJECT
(KCSAP)
ATTENDANCE LIST

Kenya Climate Smart Agriculture Project

Activity: PUBLIC PARTICIPATION ON ESIA

Venue: MAKAVETI CATHOLIC CHURCH Date: 11/10/19

S/No	Name	P/No. / ID No.	Age		Gender	Organization/	Contact.	Signature
			Less than 35yrs	Above 35yrs	(M/F)	Ward/Zone		
1.	DIANA N. KOMO	1986077954		✓	F	MoALF	0721583125	[signature]
2.	JACKSON KAMAU	2009051121		✓	M	MOALF	0703963545	[signature]
3.	JOHN THIGA	2007070907		✓	M	MOALF	0722617093	[signature]
4.	JOB MUTETHIA	2009063597		✓	M	MOALF	0725546582	[signature]
5.	ALEK NDAMBU	2014013776		✓	M	WATER	0729425200	[signature]
6.	Nicholas W. Kioko	20140059703	✓		M	KCSAP	0720069245	[signature]
7.	SILVESTER MUSAU	2012028281	✓		M	MOALF	0720313443	[signature]
8.	David Simiyu	14640761		✓	M	WRA	0720982096	[signature]
9.	Nancy Mbai	2006007767		✓	F	MOALF	0722757326	[signature]
10.	Eric O. Owoga	24077629	✓		M	Ministry of water & Sanitation	072117854	[signature]

REPUBLIC OF KENYA

MACHAKOS COUNTY
KENYA CLIMATE SMART AGRICULTURE PROJECT
(KCSAP)
ATTENDANCE LIST

Activity:.....

Venue:.....**Date:**.....

S/No	Name	P/No. / ID No.	Age		Gender (M/F)	Organization/ Ward/Zone	Contact.	Signature
			Less than 35yrs	Above 35yrs				
1.	[illegible] [illegible]	25779407	✓		M	MKS County Gvt	0727291003	[illegible]
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

Table 0-1: Key Informants Consulted

SNo.	Name	Designation
1.	Nicodemus Nzombe	Ministry of Agriculture, Livestock & Fisheries & CO
2.	Hellen Musembi	Ministry of Agriculture, Livestock & Fisheries
3.	Grace Maina	National Environment Management Authority (NEMA)
4.	Daniel K. Kyalo	County Government of Machakos Officer
5.	Nyaga C. Nkori	Ministry of Agriculture, Livestock & Fisheries
6.	Dr. David Waweru	Ministry of Agriculture, Livestock & Fisheries
7.	Elvis Ongoro	Water Resources Authority – Machakos
8.	William Makau	Machakos County Government
9.	Diana N. Komo	Ministry of Agriculture, Livestock & Fisheries
10.	Jackson Kamau	Ministry of Agriculture, Livestock & Fisheries
11.	Job Matheu	Ministry of Agriculture, Livestock & Fisheries
12.	Nicholas W. Kioko	KCSAP
13.	David Simiyu	Water Resources Authority – Machakos
14.	Nancy Mbai	Ministry of Agriculture, Livestock & Fisheries
15.	Lucia M. Munguti	Village Admin
16.	Bernard M Mutuku	Village Admin
17.	Bernard M. Mutuku	Livestock Officer
18.	Amos Kitoo	MCA – PA
19.	Patrick Iwenya	Water Resources Authority – Machakos

Appendix 5: Picture gallery of public barazas meetings held with the local communities

Figure 0-3: MOALF Offial (Nzombe) addressing a public baraza in Makaveti Catholic Church

Figure 0-4: Public consultation in Makaveti Catholic Church with Madam Hellen

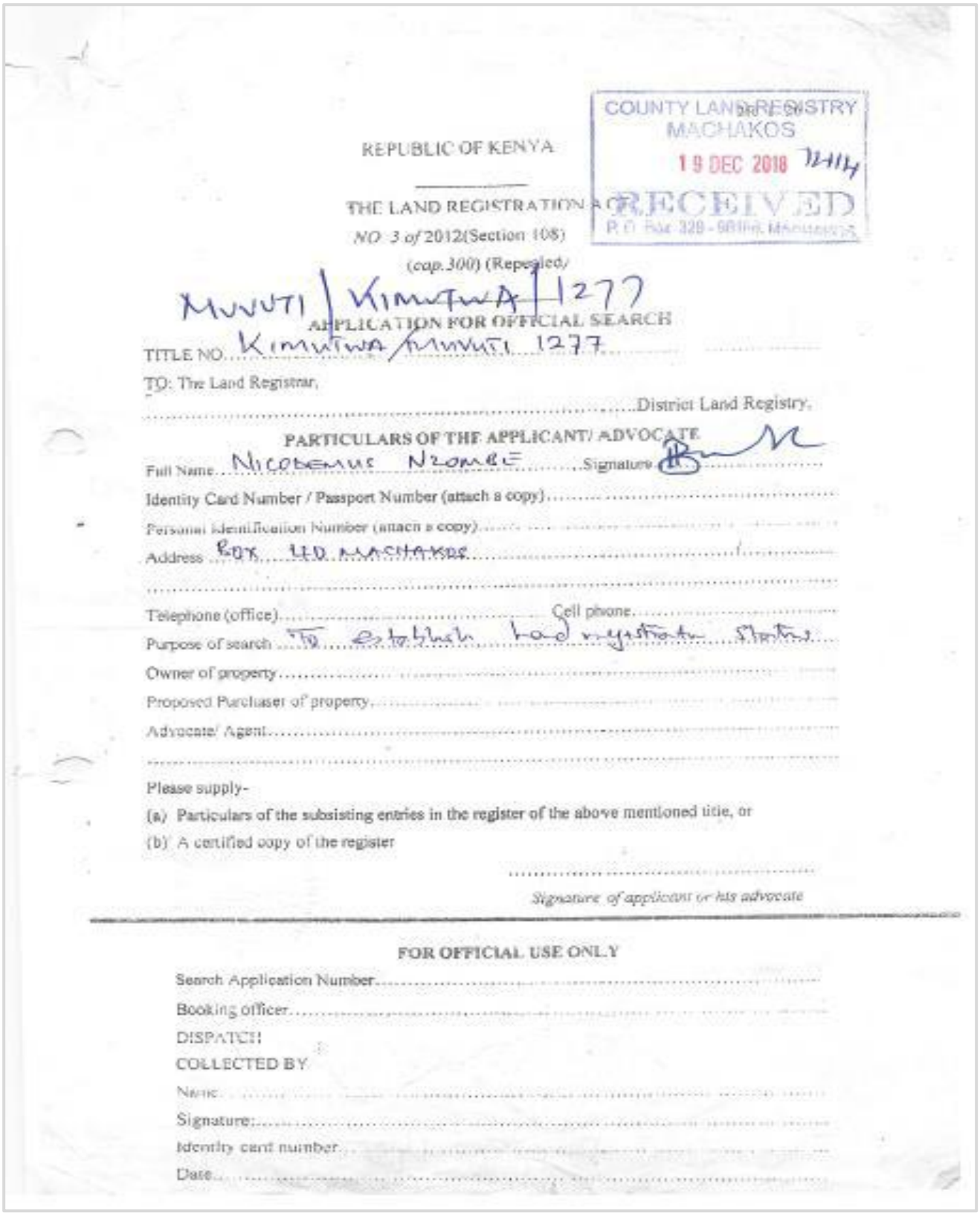
Figure 0-5: Lead Consultant addressing a public baraza

Figure 0-6: NEMA Officer (Grace Maina) representative addressing a public baraza

Figure 0-7: Consultant Addressing Villagers at Makaveti Village (Site location)

Figure 0-8: Assistant Chief in a public baraza at Makaveti Catholic Church

Appendix 6: Land Search Documents



COUNTY LAND REGISTRY
MACHAKOS
19 DEC 2018
RECEIVED
P.O. Box 329 - 90100, Machakos

REPUBLIC OF KENYA

THE LAND REGISTRATION ACT
NO. 3 of 2012(Section 108)
(cap.300) (Repealed)

MUVUTI / KIMUTWA / 1277

APPLICATION FOR OFFICIAL SEARCH

TITLE NO. KIMUTWA/MUVUTI 1277

TO: The Land Registrar,

.....District Land Registry.

PARTICULARS OF THE APPLICANT/ ADVOCATE

Full Name: NICODEMUS NZOMBE ..... Signature .....

Identity Card Number / Passport Number (attach a copy).....

Personal Identification Number (attach a copy).....

Address BOX 110 MACHAKOS.....

.....

Telephone (office)..... Cell phone.....

Purpose of search To establish land registration status.....

Owner of property.....

Proposed Purchaser of property.....

Advocate/ Agent.....

.....

Please supply-

(a) Particulars of the subsisting entries in the register of the above mentioned title, or

(b) A certified copy of the register

.....

Signature of applicant or his advocate

FOR OFFICIAL USE ONLY

Search Application Number.....

Booking officer.....

DISPATCH

COLLECTED BY

Name.....

Signature:.....

Identity card number.....

Date.....

R.L. 2

REPUBLIC OF KENYA

THE LAND REGISTRATION ACT

NO. 3 of 2012(Section 108)

(*cap.300*) (Repealed)

CERTIFICATE OF OFFICIAL SEARCH

Title No MUNUTI/KIMUIWA SEARCH No 1272

On the 19TH day of DEC, 20 13, the

Following were the subsisting entries on the register of the above – mentioned title:

PART A – Property section (Easements, e.t.c) 10.0 METRE ROAD PASSES THROUGH THIS PLOT

Nature of title: ABSOLUTE

Approximate area: TWENTY THREE DECIMAL FIVE (23.5) HA

PART B – proprietorship section

1. 22.5.87 MUTIE MUIA

Inhibitions, cautions and restrictions-

NIL

PART C – encumbrances section (leases, charges, e.t.c)

NIL

The following applications are pending

NIL

The certified copies requested are attached.

The minimum fee Ksh.500 (Five hundred only)

Date this 19TH day of DEC, 20 13

J. K Mundia *224

Land registrar

To: The Land Registrar,

.....District Land Registry.

P.O Box.....

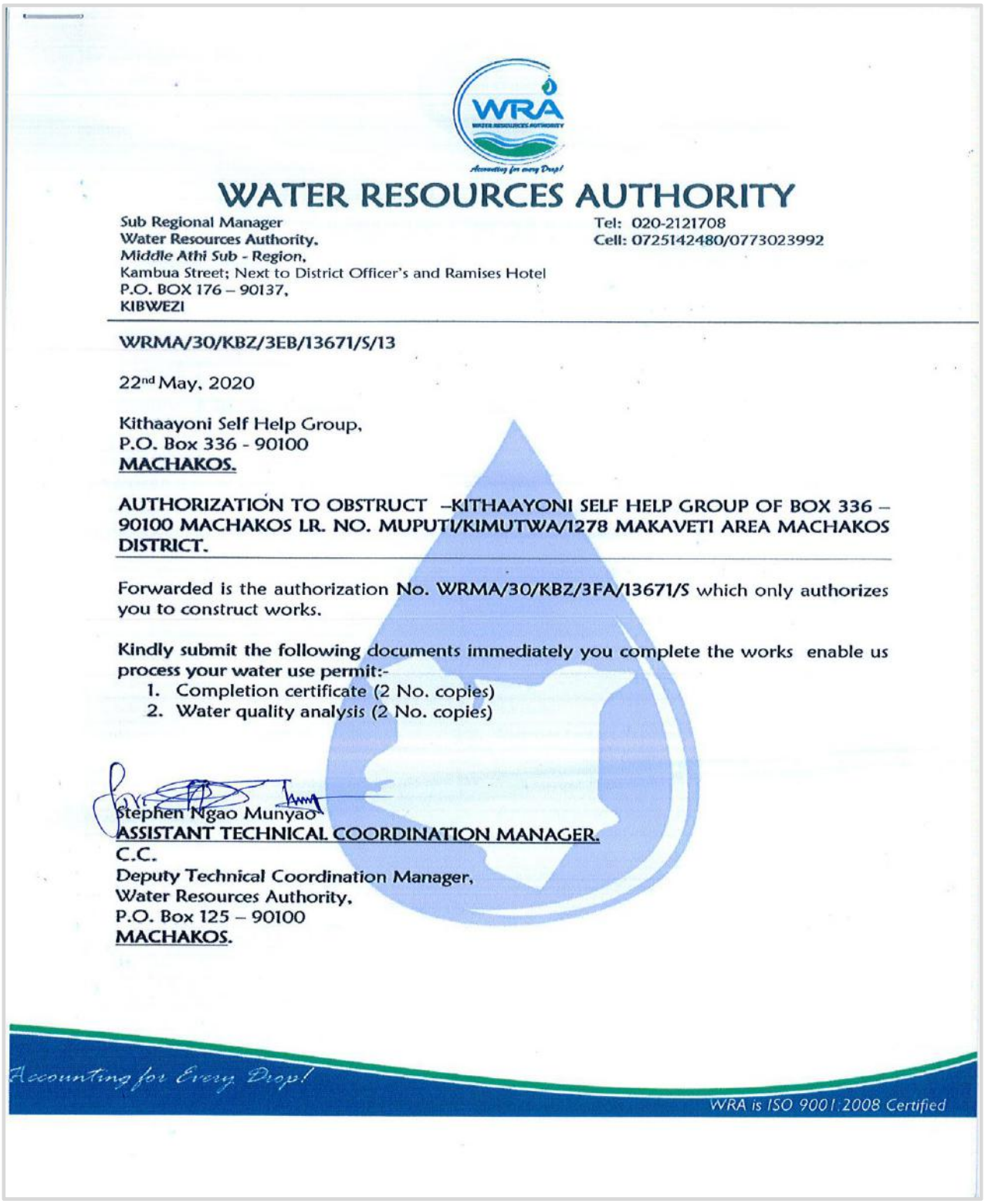
Ksh. .....attached herero

Signature of applicant or his advocate

TO BE SUBMITTED IN DUPLICATE

Appendix 7: Land Title Deed

Appendix 8: Water Resource Authority Construction Permit and Abstraction Licence



WATER RESOURCES AUTHORITY

Sub Regional Manager
Water Resources Authority.
Middle Athi Sub - Region,
Kambua Street; Next to District Officer's and Ramises Hotel
P.O. BOX 176 – 90137,
KIBWEZI

Tel: 020-2121708
Cell: 0725142480/0773023992

WRMA/30/KBZ/3EB/13671/S/13

22nd May, 2020

Kithaayoni Self Help Group,
P.O. Box 336 - 90100
MACHAKOS.

AUTHORIZATION TO OBSTRUCT –KITHAAYONI SELF HELP GROUP OF BOX 336 – 90100 MACHAKOS LR. NO. MUPUTI/KIMUTWA/1278 MAKAVETI AREA MACHAKOS DISTRICT.

Forwarded is the authorization No. WRMA/30/KBZ/3FA/13671/S which only authorizes you to construct works.

Kindly submit the following documents immediately you complete the works enable us process your water use permit:-

1. Completion certificate (2 No. copies)
2. Water quality analysis (2 No. copies)

Stephen Ngao Munyao
ASSISTANT TECHNICAL COORDINATION MANAGER.

C.C.
Deputy Technical Coordination Manager,
Water Resources Authority,
P.O. Box 125 – 90100
MACHAKOS.

Accounting for Every Drop!
WRA is ISO 9001:2008 Certified

The Chief Executive Officer,
Water Resources Authority,
P.O.Box 45250-00100.
Nairobi.

Form: WRA 004
Catchment: Athi
WRMA ID: WRMA\30\46966
File: WRMA/30/KBZ/3EB/13671/S

Water Resources Authority

AUTHORISATION TO CONSTRUCT WORKS FOR THE USE OF WATER

Dear Sir/Madam;

Rule (33)

I have the honour to inform you that the Water Resources Authority has given you approval to construct the proposed works based on your application dated **15-January-2020** for a Water Permit.

Authorization No. WRMA	WRMA/30/KBZ/3EB/13671/S	Dated	21-May-2020

Type Of Water use	Surface water				GroundWater		Effluent discharge	Swamp Drainage
	Diversion	Abstraction	In-stream Works	Storage	Shallow Well	BoreHole		
Tick Box				X				

PARTICULARS OF APPLICANT		DETAILS	
1. Full name of applicant(s) (In Block letters)		KITHAAYONI DAM SELF HELP GROUP	
3. Category of Applicant - Individual, Group [Association, Society], Company, Institution		Group[Association,Society]	
4. ID Number of Applicant (Individual) or Certificate of Incorporation or Registration for Groups or Companies		SD/SH/2019/09/03/5076	
5. PIN Number (where available)		KRA20191251	
Physical Address where water is to be used		Contact of Applicant	
6. L/R Number(s)	MUPUTI/KIMUTWA/1278	7. Box Number	336
8. Village(s)/Ward(s)	MAKAVETI	9. Town	MACHAKOS
10. Sub-location(s)	KIMUTWA	11. Post Code	90100
12. Location(s)	KIMUTWA	13. Telephone Contact (Landline)	+254701578044
14. Division(s)	CENTRAL	15. Telephone Contact (Mobile)	+254701578044
16. District(s)	MACHAKOS	17. Email Contact	kithaayonidam@yahoo.com

WATER RESOURCE DETAILS	
18. Name of Body of Water or Aquifer where water is to be diverted, abstracted or stored	KITHAAYONI SEASONAL STREAM
19. Is the point of abstraction or storage in a Protected Area or a Groundwater Conservation Area? (yes/no)	NO
20. Sub-catchment Number	3EB
21. Class of Water Resource	
22. Name of Body of Water or Aquifer where effluent is to be discharged	
23. Sub-catchment Number (Effluent)	
24. Class of Water Resource (Effluent)	
25. Category of Application (Class of Permit)	B

The Chief Executive Officer,
Water Resources Authority,
P.O.Box 45250-00100.
Nairobi.

Form: WRA 004
Catchment: Athi
WRA ID: WRMA\30\46966
File: WRMA/30/KBZ/3EB/13671/S

SUPPLEMENT TO PERMIT/AUTHORISATION	
26. Are there any supplements approved under Section 21 of WRMA Rules (yes/no)	NO
27. Supplement No.	

28. Brief Description of Project and Intended Use for Water Type of Water Use		STORAGE		
		Surface Water (m3/day)		
Type of Water Use	**Groundwater (m3/day)**	**River - Normal Condition**	**River - Flood Condition**	**Lake**
29. Public				
30. Domestic				
31. Livestock				
32. Subsistence Irrigation				
33. Commercial Irrigation				
34. Industry/Commercial				
35. Hydropower				
36. Others				
37. Sub-total				
38. Quantity Returned				
39. Water Abstracted (row 34 - row 35)				
40. Effluent Discharge				

Having filed the necessary application, maps and plans, and having complied with the provisions of the Water Act 2002, and the Rules there under relating to the applications for Water Permits *is/are hereby authorized to construct, subject to the acquisition of the necessary rights of way or easements therefore, if any, the works shown by the said applications, maps and plans in accordance with provisions of the Water Act 2002, the Rules there under, and the following conditions:

1. The construction of the works hereby authorized shall commence within a period of 0 days and shall be completed within a period of 13 months from the date of this authorization.

2. *(a)Any person who erects or constructs temporary works shall be entitled to divert, abstract, impound, obstruct, store or* use water to such extent only as may be necessary for the construction or erection of the works, and whenever it shall be necessary to divert, abstract or impound water during the erection or construction of the works authorized, such diversion, abstraction, obstruction, impounding, or use of water shall be made at such time and in such manner that the works of other operators are interfered with as little as possible and that no damage will be caused to property of another landholder. Provided that if any damage is caused it shall, failing agreement between the parties concerned, be settled by arbitration under the Arbitration Act.

(b)Unless empowered thereto by the Water Resources Authority in writing, all temporary works shall be removed within a period of three months from the date of completion of the works authorized or from the date of determination of the authorization (whichever be the earlier) and where any temporary works exist, such as quarries, burrow-pits, excavations, cuttings, tunnels or things of a like nature which cannot be economically removed, efficient precautions to the satisfaction of the Water Resources Authority shall be taken, by the person named in the authorization, to render and to maintain all such temporary works safe in the interest of life and property. The Water Resources Management Authority reserves the right to inspect the works authorized by this authorization, and
attention is drawn to section 90 of the Act.

3. Any changes between the original proposed design and final as-constructed arrangement has been documented and such documentation submitted to the Authority.

2

The Chief Executive Officer,
Water Resources Authority,
P.O.Box 45250-00100.
Nairobi.

Form: WRA 004
Catchment: Athi
WRA ID: WRMA\30\46966
File: WRMA/30/KBZ/3EB/13671/S

*Delete words not required

CONDITIONS OF AUTHORISATION	DETAILS
Measuring device	A MASTER METER MUST BE INSTALLED AT THE INTAKE TO MONITOR WATER ABSTRACTION AS PER RULE 99 (1) OF WRM RULES 2007.
Controlling device	A CONTROLLING DEVICE BE INSTALLED AT THE INTAKE NEXT TO THEMASTER METER AS PER RULE 99 (1) OF WRM RULES 2007
Water Quality Report	SUBMIT A FULL CHEMICAL AND BACTERIOLOGICAL ANALYSIS REPORT FROM A RECOGNIZED WATER LABORATORY ON A QUARTERLY BASIS OR AS OTHERWISE ADVISED BY THE AUTHORITY
Evidence of EMCA Compliance	
Soil and Water Conservation Plan	
Compensation Flow (m3/day)	
Inspection Milestones	
1	THE WATER RESOURCES AUTHORITY SHALL UNDERTAKE AN INSPECTION OR A SERIES OF INSPECTIONS OF THE SITE ASSOCIATED WITH A PROPOSED, ONGOING, EXISTING OR ABANDONED POINT OF WATER WORKS
2	
3	
4	
Notification Requirements	
1	THE LICENSED CONTRACTOR MUST INFORM THE REGIONAL/ SUB-REGIONAL MANAGER TWO WEEKS BEFORE WORKS COMMENCES.
2	THE APPLICANT MUST SUBMIT THE DULY FILLED COMPLETION CERTIFICATE (FORM WRMA 008) WITHIN 30 DAYS OF COMPLETION OF WORKS TO FACILITATE WATER USE PERMIT ISSUANCE BEFORE WATER IS PUT INTO ANY USE
3	
4	
Storage	
Airline	
Test pumping	
Other Technical Details	
	ABSTRACTION BY A DAM
Effluent Discharge Requirements	

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The Chief Executive Officer,
Water Resources Authority,
P.O.Box 45250-00100.
Nairobi.

Form: WRA 004
Catchment: Athi
WRA ID: WRMA\30\46966
File: WRMA/30/KBZ/3EB/13671/S

4. This Authorization will be automatically cancelled, when the authorized period expires, without any further reference to you unless extension of time limit is applied for prior to date of expiry.

5. The following details/documents/fees are required to complete your application before a Permit may be issued:

(a) **FORM WRMA 008 - COMPLETION CERTIFICATE.**
(b) **FORM WRMA 007 - INSPECTION REPORT**
(c) **PERMIT FEES KSHS. 7,500**
(d)

SIGNATURE

Yours faithfully,

Signature of WRA Officer	Pr. Dam
Name of Officer	Sylvester O. Omedo
Position	Commercial Officer
Date of Signature	2nd May 2020

MIDDLE ATHI SUB-REGION
WATER RESOURCES AUTHORITY
ATHI CATCHMENT AREA
P. O. Box 176-90137, KIBWEZI

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