

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

FOR

THE PROPOSED REHABILITATION OF NDATHIMI EARTH DAM AND

INTEGRATED FARMING PROJECT IN KARABA LOCATION, LAIKIPIA WEST

SUB-COUNTY – LAIKIPIA COUNTY.



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DECLARATION



This ESIA report has been prepared in accordance with the EMCA 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003 for submission to the National Environment and Management Authority (NEMA). Further, it reflects the views and concerns of the stakeholders on the proposed Ndathimi Integrated Project in Karaba Location, Laikipia West Sub-County, Laikipia County. We hereby declare that to the best of our knowledge and belief the information and particulars provided in this report are correct and true.

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Disclaimer:

This Environmental Impact Assessment Project Report is strictly confidential to the Ndathimi Self Help Group (the Proponent) and any use of the materials thereof should be strictly in accordance with the agreement between the Proponent and the consultant. It is, however, subject to conditions in the Environmental (Impact Assessment and Audit) Regulations, 2003 under the Kenya Gazette Supplement No. 56 of 13th June 2003.

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT REPORT
FOR THE PROPOSED REHABILITATION OF NDATHIMI DAM AND
INTEGRATED FARMING PROJECT IN KARABA LOCATION, LAIKIPIA WEST
SUB-COUNTY, LAIKIPIA COUNTY**

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ABREVIATIONS

ASAL	Arid and Semi-Arid Lands
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
CPP	Consultation and Public Participation
EA	Environmental Audit
ESIA	Environmental and Social Impact Assessment
EMCA	Environment Management and Coordination Authority
ESMP	Environmental and Social Management Monitoring Plan
GoK	Government of Kenya
KCSAP	Kenya Climate Smart Agriculture Project
MoW	Ministry of Works
NCA	National Construction Authority
NDMA	National Drought Management Authority
NEAP	National Environment Action Plan
NEC	National Environment Council
NEMA	National Environment Management Authority
NGO	Non-Governmental organisation
NPEP	National Poverty Eradication Plan
NWHSA	National Water Harvesting and Storage Authority
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment
SHG	Self Help Group
UNFCCC	United Nations Framework Convention on Climate Change
WRMA	Water Resource Management Authority
WRUA	Water Resource Users Association
WRUC	Water Resource Users Committees

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EXECUTIVE SUMMARY



Overview

Kenya Climate Smart Agriculture Project (KCSAP) in its aim to sustainably increase agricultural productivity, adapting agricultural systems, building resilience to climate change and reducing greenhouse gasses (GHG), is supporting Ndathimi Self Help Group to implement rehabilitation of Ndathimi Earth Dam and integrated farming project in Karaba Location, Laikipia County. The proposed project is to rehabilitate Ndathimi Dam to a capacity of 50,000m³ from the current 5,000m³ for use in irrigation of 50 acres of high value horticultural crops. Additionally, the project will have establishment of; agroforestry tree nursery, 16 acres high yielding beans variety as cover crop, bee farming and fish farming in the dam. The dam will store water from Ndathimi seasonal stream and the neighbouring catchment. The proposed project is informed by the need to improve and provide sustainable household incomes and employment at farm level, thereby achieving KCSAP's triple wins, namely: increased productivity; enhanced resilience and reduced greenhouse gas emissions.

National Government's Vision 2030 and Big Four Agenda development strategy has identified farming through irrigation as one of its key enablers in attaining food security. KCSAP proposed for rehabilitation of Ndathimi earth dam for use in agricultural production. The earth dam will be used for farming, domestic and livestock use as well. The dam has been designed to have full reservoir storage capacity of approximately 50,000m³. The dam will be with a surface area of 100m wide by 80m; water depth of 7m. The proposed earth dam will entail all the necessary civil works; excavation, compaction and embankment. The designs have provided for a spillway which shall ensure that excess water is returned to the storm water valley.

In Kenya, pursuant to Environment Management and Coordination Act (EMCA) 1999 and its subsequent amendment EMCA (Amendment) 2015, all new projects listed under second schedule should undergo an Environmental Impact Assessment (EIA) at the project planning stages to ensure that significant impacts on the environment are taken into consideration. The proposed project is listed under the second schedule of the EMCA, (1999) hence should be subjected to EIA prior to commencement of the construction activities. The project is a community-based project, categorised under low risk project according to EIA (Amendment) Regulations, 2019. In an effort to comply with the legal requirement of the Government of Kenya on the fulfilment of the Environmental (Impact Assessment and Audit) regulations 2003, KCSAP commissioned a National Environmental Management Authority (NEMA) registered lead expert, (*Reg. No. 1617*) to carry out an Environmental Impact Assessment for the proposed project.

This Environmental Impact and Social Assessment project report outlines the various activities that will be undertaken during all the phases of the proposed project: construction, operation and decommissioning phases. The ESIA report links the operations of the proposed project with the likely adverse environmental and social impacts that the proposed development may cause. The report also proposes measures to mitigate identified potential negative impacts while enhancing positive impacts in order to be able to achieve the project objectives and sustainability. The proponent is advised to adhere to EMCA, (1999), and EIA regulations 2003 and the subsequent amendments, OSH, (2007) Act among other relevant legislations.

ESIA Objectives and Scope

The broad objective of this assessment was to identify significant potential positive and negative impacts of the project to environment and social aspects; formulate recommendations to ensure that the Proponent takes into consideration appropriate measures to mitigate any adverse impacts to the environment and people's health through all phases of its implementation. Asses the baseline environmental conditions in the project area; study project conditions and requirements in terms of location, construction and operation and preparation of Environmental Management and Monitoring Plan (EMMP). The scope of the assignment largely covered the following areas: baseline conditions, including environmental setting, socio-economic activities in the surrounding areas (land use, human settlements, economic activities, institutional aspects, water demand and use, health and safety, public amenities, etc.), and infrastructural issues (roads, water supplies, power supplies, etc.); legal and policy framework; public and stakeholder consultation; identification and mitigation of environmental and social impacts.

Project objectives

The project aims to assist households cope with impacts of climate change and attain food security in a sustainable manner through improvement of soil and water management. Further to improve operation and maintenance activities at Ndathimi farm especially for desilting works in the earth dam, structural improvement of silt trap facility and strengthening of water users' association (WUA) etc.

Methodology

The methodology involved in this study included: mobilization and planning; desk review of documents; field data collection; project data synthesis; public consultation fora; consultancy debriefing session. A number of key stakeholders from both the government offices and the community were consulted for their inputs to the study through public meetings, key informant interviews and Focused Group Discussions. The applied data collection methodologies included; questionnaires, key informant interviews and site field assessment visits.

Policy and legal framework

The study was carried out in accordance to the following policies: National Water Policy, 2000; Water Catchment Management Policies; National Environment Action Plan (NEAP), 1994; The National Poverty Eradication Plan (NPEP), 1999. Reference was also made to the following legal framework: Environmental Management and Coordination Act (EMCA), 1999; The Environmental Impact Assessment and Audit Regulations, 2003 and subsequent amendments; Water Quality Regulations, 2006; The Agriculture Act (CAP 318); Water Act, 2002; Irrigation Act, 2019 and the Public Health Act (Cap 242). Reference was also made to the Practice Manual for Small Dams, Pans and Other Water Conservation Structures in Kenya. Among other relevant policies in Kenya.

Project Description

Ndathimi SHG wishes to rehabilitate Ndathimi Earth dam through desilting and excavation to increase the capacity of the pan to 50,000m³. Through community contribution of Ksh 2,332,000 and KCSAP additional funding of Ksh 25,720,365, the SHG aims to;

- Rehabilitate already existing Ndathimi Earth dam through desilting and expansion works and construction of other associated facilities (intake, diversion channel, silt trap and water trough for livestock)
- Establishment of agroforestry tree nursery for assorted forestry and fruit seedlings
- Establishment of 16 acres of high-yielding beans varieties.
- Drip-irrigation for 50 acres of high value horticultural crops.
- Fish farming: Stock the dam with fish fingerlings as a project for the youth
- Capacity building of Farmers’ groups on livelihood diversification, building resilience and reducing Greenhouse gas emissions and project management.

Key Findings

The project is likely to have both positive and negative environmental and social impacts during the construction, operational and decommissioning phases.

Positive Impacts

The anticipated positive impacts during the construction phase include:

- Adequate water supply
- Reduced water resources conflict
- Improvement of natural resource
- Creation of employment
- Injection of money into the local economy
- Creation of market for construction materials.
- Improved water accessibility
- Improved well-being of women and children
- Food security
- Climate change mitigation
- Improved livelihoods through job creations

Negative Impacts

Some of the anticipated negative impacts and their mitigation measures throughout the project cycle (construction phase, Operation and Decommissioning phase) are as summarized in the table below include:

Table 1: Summary of Negative Impacts and the proposed Mitigation Measures

Environmental & Social impacts/aspects	Mitigation measure (s)
PLANNING AND DESIGN PHASE	
Drawings/plans approval	<ul style="list-style-type: none"> • Ensure that the drawings are approved by the relevant County Government department • Results from screening and hydro-meteorological and geological survey data should be taken into consideration at detailed design stage • Problems with land acquisition, flood, erosion, cultural

Environmental & Social impacts/aspects	Mitigation measure (s)
	<p>resources, and biodiversity loss to be adequately managed before commencement of detailed design</p> <ul style="list-style-type: none"> • screening through the site with participation of professional experts (e.g. hydrologist, biologist, archaeologist, environmentalist). • Conduct proper investigation of flood flows
Site organization	<ul style="list-style-type: none"> • Develop a clear site organization plan for camp establishment • Deliver and store materials at appropriate location • Hire the right number of workers with clear work schedule/roles and appropriate dress gear
CONSTRUCTION PHASE	
Loss of biodiversity	<ul style="list-style-type: none"> • Strictly confine the excavations of the site only within the sections upon which the construction works will take place • Properly demarcate the project area to be affected
Excess noise & vibrations	<ul style="list-style-type: none"> • Construction activities should only take place between 0800Hrs 1700Hrs so as not to disturb the immediate neighbours. • Equipment to be used should be selected on the basis of the noise minimization during acquisition. • Equipment should also be properly maintained while in use during the construction phase. • The construction equipment will strictly conform to set noise standards. • The proponent should also monitor noise levels and install appropriate noise barriers and acoustic screens.
Ambient air quality (fumes & dust)	<ul style="list-style-type: none"> • Diesel equipment to be equipped with gas absorbers • The proponent will ensure that equipment which will be acquired for on site preparation of pre-cast materials and concrete mixing will utilize the latest technology to have minimum emission. • Watering access roads and the site to suppress dust • Covering truck loads using tarpaulins • Personnel will be provided with dust masks to avoid inhalation of the same. • Stock piles to be covered with tarpaulins
Soil contamination	<ul style="list-style-type: none"> • Consider use of organic fertilizers • Drip trays will be used in maintenance areas • Refuelling & repair of construction equipment will be done in designated areas • A bioremediation plan shall be established for the purpose of oil contaminated soils • All machinery must be keenly observed not to leak oils on the ground, this can be done through regular maintenance of the machinery • Fuel storage tank should be placed on concrete floor & banded • Any contaminated soil at the site should be collected and disposed of by a NEMA authorized waste handler

Environmental & Social impacts/aspects	Mitigation measure (s)
Soil erosion	<ul style="list-style-type: none"> • Excavation should be done under controlled conditions which will include minimizing vegetation removal, avoiding creating large open expanses of bare soil, creating wind breaks • Using of single or few designated tracks to bring materials into the area and watering the access road • The contractor should rock the construction entrance and exit to keep sediment from being tracked onto adjacent roads and keep vehicles off bare soils.
Archeology and cultural sites	<ul style="list-style-type: none"> • Any cultural heritage site discovered during construction will be preserved and the cultural heritage commission informed accordingly.
Solid wastes generation	<ul style="list-style-type: none"> • Materials from excavation of the ground and foundation works shall be reused for embankment, earthworks and landscaping. • Cement empty bags and containers will be re-used or returned to supplier for re-use • The contractor will clear the site of all debris and restore it to a state acceptable to the supervising architect and environmental consultant. • Bins/ receptacles shall be placed at strategic locations within the site as collection centres to facilitate sorting of the various types of wastes. • The contractor and proponent shall work hand in hand to facilitate sound waste management. • Use of an integrated solid waste management system through a hierarchy options i.e. source reduction, recycling, composting and reuse shall be encouraged.
Occupational Safety and Health /public safety	<ul style="list-style-type: none"> • Personnel at construction site to wear complete PPE at all times • Provision of firefighting equipment at the site • Put in place an emergency response plan • Only qualified personnel to operate construction/farm machinery • Designate a Health & Safety officer to be in-charge of enforcing site compliance with OSH rules & regulations • Provision of adequately stocked first aid kit and at least one trained first aider on site • Safety warning signs displayed in different points and the contact numbers of the persons responsible for handling emergencies on the site • Contractor should have workmen compensation cover which should comply with workmen compensation Act • All plant equipment will be subject to a routine maintenance programme to ensure they are in good working order, hence minimising health and safety risks • All workers to go through safety and health inductions upon employment.

Environmental & Social impacts/aspects	Mitigation measure (s)
Spread of disease	<ul style="list-style-type: none"> • Ensure awareness raising on proper sanitation and personal hygiene. • Treat affected local and migrant workers which will control the movement of disease vectors. • Provision of personal hygiene facilities in good condition with adequate water supply • Education and sensitization of workers and the local communities on STIs including provision of condoms to the project team and the public • Institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract
OPERATION PHASE	
Waterborne disease	<ul style="list-style-type: none"> • Capacity building with the community on proper water handling process • Awareness raising on risks of open defecation and proper water handling practices • Limit/restrict access to the earth dam by animals and human beings by fencing off the area • Provide water troughs and taps for human beings to draw water from • Domestic users should be guided on how to acquire and use household water treatment options
Water quality (Pollution)	<ul style="list-style-type: none"> • Reducing the turbidity of water by use of gravel/sand filters • Properly control erosion by avoiding compaction, mulching among other methods • Maintain good catchment condition to avoid degradation. • Provide basic training to committee members on pan water quality • Create vegetated buffer within catchment area • Pesticides, Herbicides, fertilizer and fungicides shall be kept in a properly constructed area with proper ventilation, concreted floor, bunded and lockable shed • Application of these chemicals shall follow the right procedures
Water conflict use	<ul style="list-style-type: none"> • Establishment of communication channels between the representatives of the community (pan committee) and the responsible organisation or administration at county level • Establish Water Users' Association to guide on water usage and solving conflict • Formulation of bylaws in regard to conflict resolution • Establishment and disclosure of grievance mechanism • Notify downstream water users, WRMA and WRUA of likely changes in water quality and quantity
Flooding	<ul style="list-style-type: none"> • Properly design embankment to avoid failure • Determine the spillway dimension accordingly • Detailed design should be taken into account to avoid potential flooding from the pan

Environmental & Social impacts/aspects	Mitigation measure (s)
	<ul style="list-style-type: none"> • Provide sufficient freeboard as per the design • Develop the embankment at layers of 300mm and properly compacted
Soil erosion	<ul style="list-style-type: none"> • Promote soil conservation measures in the area through the use of check dams, gabions and cut-off drains. • Landscaping should be done on the land/embankment. • Lining the pan with gabions or pitched stones • Stabilizing embankment through grassing
Sedimentation	<ul style="list-style-type: none"> • Incorporate silt traps in the design of the earth dam in order to reduce sediment loads which could in turn reduce the storage capacity.
Risk of drowning	<ul style="list-style-type: none"> • Fence off the site to reduce the risk of drowning • Draw-off system should be in place to prevent/reduce drowning • Raise awareness within community regarding the risk of drowning and provide accessible safety flotation rings
Grazing land loss	<ul style="list-style-type: none"> • Pasture improvement on the remaining grazing land • Use grass on the embankment as pasture • Use crops remains/green matter as feeds
DECOMMISSIONING PHASE	
Solid wastes	<ul style="list-style-type: none"> • Safe disposal of waste materials such as concrete rubble, steel and disused pipes and fittings.
Land dereliction	<ul style="list-style-type: none"> • Properly flatten the site and landscaped well with indigenous trees • Fence and signpost unsafe areas until natural stabilization occurs
Site degradation	<ul style="list-style-type: none"> • Implement an appropriate landscaping and re-vegetation programme to restore the site to its original status • Consider use of indigenous plant species in re-vegetation of the site
Soil erosion	<ul style="list-style-type: none"> • Establish plant cover/re-vegetate the open space to reduce soil erosion
Public safety	<ul style="list-style-type: none"> • Secure all unsafe and potentially dangerous areas previously occupied by the earth dam.

Proposed Mitigation and monitoring Plan

Although there is economic and social justification for the proposed project, there are environmental issues associated with its construction and operation. In this regard, a comprehensive Environmental and Social Management Monitoring Plan (ESMMP) that will guide the entire project cycle (construction through to decommissioning) has been prepared. The ESMMP provides the implementation framework for mitigating and monitoring of the potential impacts of the project on the environmental and social settings and for the monitoring of the project performance in accordance to the policy, legal and regulatory requirements.

The overall responsibility for the incorporation of mitigation measures and ensuring environmental protection lies with the Proponent and the Water Resource Users Association (WRUA) that will be established. During the construction of the project, the proponent will be responsible for the day to day management and supervision of the construction activities, the contractor will be directly responsible for the construction, and the WRUA for operation and maintenance once the dam is operational and ensuring that its activities are not environmentally and socially detrimental.

The following aspects must be monitored during the operational phase.

- Cumulative impacts;
- Soil erosion and siltation;
- Water use conflicts; and
- Health and Safety.

Conclusions and recommendations

The Environmental and Social Impact Assessment study of the project showed that it is technically and environmentally feasible and has limited adverse environmental and social impacts during the construction, operation and decommissioning phases. Some of these impacts can be avoided while others will have minimal effects if the potential impacts were to be mitigated properly. It is broadly accepted as a priority by all the stakeholders' consulted and thus will be implemented efficiently and smoothly without any social or economic unrest in the project area.

Considering the positive socio-economic and environmental benefits which will accrue as a result of the proposed development and the ESIA having found no major impacts to arise from the development, it is our recommendation that the project be allowed to proceed on the understanding that the proponent will adhere to the mitigation measures recommended herein and will further still implement the proposed Environmental and Social Management Plan (ESMP) together with the Environmental Monitoring Plan (EMP) to the later. Kenya as a country has a big shortage of such Agroforestry project developments; hence the construction of the proposed project goes a long way in solving food insecurity challenges.

1.0 INTRODUCTION



1.1 Background

Water is critical for human survival, yet water scarcity is the overarching challenge globally. Reduced precipitation brought about by climate change coupled with environmental degradation triggered by human encroachment on watersheds further leads to water shortage. In Kenya, water scarcity has been a major issue for decades, caused mainly by years of recurrent droughts, poor management of water supply, contamination of the available water, and a sharp increase in water demand resulting from relatively high population growth. The lack of rainfall affects also the ability to acquire food and has led to eruptions of violence in Kenya's ASAL areas. In many areas, the shortage of water has been amplified by the government's lack of investment in water, especially in rural areas. Water availability per capita has been declining over time, from 1853m³ in 1963 to 647m³ and the levels expected to fall to 359m³ by 2020 if stringent measures are not put in place (GoK, 2018).

Arid and Semi-Arid Lands (ASAL) are faced with drought due to climate change. According to National Drought Management Authority (NDMA), average distance to water for both households and livestock are likely to increase with ravaging drought in the ASAL areas. This will likely lead to food shortage, some considerable deterioration in livestock body condition, milk production, affecting food security. Presently, farm fields are unutilized due water points drying off as a result of drought. To achieve its role of increased food productivity, enhance resilience and assist household cope with climate change impacts, KCSAP is supporting Ndathimi SHG implement their proposal to rehabilitate Ndathimi earth dam and establish integrated farming in Karaba. With successful implementation of the project, poverty and food insecurity induced by climate change shall be mitigated. Additionally, resilience against drought, sustainable natural resources management shall be realized enhancing the Laikipia communities.

The identified project for implementation by KCSAP falls under schedule II of EMCA. Pursuant to the Environmental Management and Coordination Act (EMCA) 1999 and its subsequent amendment EMCA (Amendment) 2015, the proposed project must be subjected to EIA prior to the commencement of activities. In an effort to comply with the legal requirement of the Government of Kenya, the Proponent commissioned a registered EIA/EA experts to undertake ESIA to ensure that the proposed project activities will comply with national environmental regulations as well as international best practices, and guarantee the long-term sustainability of its operations with minimal impacts on local communities and their environment.

1.2 Proposed Project Objectives

The main objective of the proposed project is to rehabilitate Ndathimi earth dam (desilting, excavation & expansion) to a capacity of 50,000m³ and with associated infrastructures. Establishment of integrated farming in the adjacent farm.

The specific objectives of the project are:

1. To improve food and nutrition security and increase sustainable farm incomes
2. To create employment through engagement of locals in full-time beekeeping, horticultural crops and fish farming.
3. To improve on environment through increased tree cover and reduction of carbon dioxide from the atmosphere through planting of forestry trees and fruits, mainly Mangoes and Avocadoes. (Carbon sequestration)

1.3 Environmental and Social Impact Assessment

ESIA is a systematic analysis of projects to determine their potential environmental impacts, the significance of such impacts and to propose measures to mitigate the negative impacts. ESIA is both a planning and a decision making tool. This ESIA was carried out in accordance with the EMCA of 1999 and its subsequent amendment, EMCA (Amendment) 2015, EIA/EA Regulations of 2003 and subsequent amendment EIA/EA (Amendment) regulations 2019 and in consonance with Environmental Assessment Guidelines as provided in practice manual for small dams, pans and other water conservation structures, 2015.

This ESIA was primarily focused on establishing the likely adverse impacts of the proposed community project. The proponent, in compliance with EMCA, 1999 commissioned a team of EIA Lead Experts to examine all aspects of the project with a view to ensuring some sustainable and environmentally sound strategies for water supply and agricultural production in the project area.

1.4 Objectives and Scope of the ESIA Study

1.4.1 Objectives

The aim of this assessment was to identify significant potential impacts of the proposed project to environment and social aspects and formulate recommendations to ensure that the project takes into consideration appropriate measures to mitigate any likely adverse impacts to the environment and people's health through all phases of its implementation.

The specific objectives are:

1. To present an outline of the background of the proposed project;
2. To review existing legal and institutional policy framework related to the proposed project;
3. To establish the environmental baseline conditions of the project area and review all available information and data related to the proposed project;
4. To identify key areas for environmental, social and safety concerns as well as the anticipated impacts associated with the proposed project implementation and commissioning;
5. To predict likely environmental and social impacts of the proposed project;
6. To establish a comprehensive environmental and social management and monitoring plan covering the construction, operation and decommissioning phases of the project;

7. Preparation of a Project Report in accordance with the environmental legislation and submission to NEMA for further instructions and/or approval;
8. To facilitate the management of environment practice;
9. To raise community awareness on the impact of the project on the environment;
10. To highlight environmental issues with a view to guide policy makers, planners, stakeholders and government agencies to help them understand the implications of the EIA Report and make the necessary decisions;
11. To establish benchmarks for the various environmental aspects relating to the proposed project; and
12. To establish a framework for environmental management system that aims at environmental sustainability.

1.4.2 Scope

The scope of the assignment largely covered the following areas: baseline conditions, including environmental setting, socio-economic activities in the surrounding areas (land use, human settlements, economic activities, institutional aspects, water demand and use, health and safety, public amenities, etc.), and infrastructural issues (roads, water supplies, power supplies, etc.); legal and policy framework; public and stakeholder consultation; identification and mitigation of environmental and social impacts.

i. Description of the baseline environment:

- a. Environmental setting (climate, topography, geology, hydrology, ecology, water resources, sensitive areas, etc.),
 - b. Biological environment: flora and fauna types and diversity, critical habitats.
 - c. Social and cultural environment: Population, land use, planned development activities, community structure, employment and labor market, sources and distribution of income, cultural properties.
 - d. Socio-economic activities in the surrounding areas (land use, human settlements, economic activities, institutional aspects, water demand and use, health and safety, public amenities, etc.),
 - e. Infrastructural issues (roads, water supplies, drainage systems, power supplies, etc.)
- ii. Legislative and Regulatory Framework: Focusing on the relevant national environmental laws, regulations and by-laws and other laws and policies relevant to the project in question.
 - iii. Interactive approach was adopted for the immediate neighbourhood in discussing relevant issues including among others:
 - a. Land use aspects,
 - b. Neighbourhood issues,
 - c. Project acceptability,
 - d. Social, cultural and economic aspects,
 - e. Environmental impacts: Physical impacts, Biological impacts,
 - iv. Development of management plan focusing on set of mitigation, monitoring and institutional measures to eliminate, minimize or reduce to acceptable levels of adverse environmental impacts and/or maximizes socio-economic benefits.

1.5 Terms of Reference

The terms of reference for this study were spelt out by the proponent as follows:

- 1) Preparation of ESIA project report
 - a). Meet the legislative requirement of the NEMA by carrying out an EIA exercise before implementation of the project
 - b). Evaluate the suitability of the proposed location of the proposed project.
 - c). Collect and collate views from the local neighbourhood and stakeholders interested and affected by the presence and operations of the construction and/or rehabilitation works.
 - d). obtain sufficient baseline information on the bio-physical and Socio-economic environment.
 - e) Study issues arising from the proposed project for example livelihood disruption, public safety and rehabilitation of the affected environment.
 - f). Obtain data on significant environmental impacts, including health and safety of the workers, visitors of the project and surrounding environment.
 - g). Collate and analyze information gathered during the assessment, and highlight the followings:
 - Mitigation measures to avoid negative environmental impacts and if possible alternative activities that could be considered.
 - Measures to maximize positive impacts.
 - Possible monitoring indicators for future use/reference.
 - Recommendations
 - h). Preparation of Environmental Impact Assessment project report including ESMMP
- 2) Arrangement of registration and application of necessary approval and permit from NEMA for implementation of the Project
 - a) The prepared project report shall be submitted to NEMA, Laikipia County Director for approval and permit/license issuance.
 - b) Prepare and submit the required application with reference documents in accordance with the relevant regulations of NEMA.
- 3) Preparation of Environmental Screening Checklist, KII guides, Questionnaires and community FGD guides.

1.6 Justification of the Proposed Project

The proposed project informed by the need to enhance community coping mechanisms to climate change and improve food security. Additionally, natural resources management in the area. Karaba residents' main livelihood strategies are maize and bean farming and to some extent livestock e.g. cattle, sheep, goats and poultry, this has led the community to experience low household income as a result of climate change. with the proposed integrated project in the locality, food production will immensely improve as a result of diversified agriculture. Establishment of 50 acres of drip-irrigation for high value horticultural crops and fruit trees will improve and provide sustainable household incomes and employment at farm level, it is against this background that the proponent is proposing to implement the proposed project to achieving KCSAP's triple wins, namely: increased productivity; enhanced resilience and reduced greenhouse gas emissions.

The figure below is a summary of the full ESIA process.

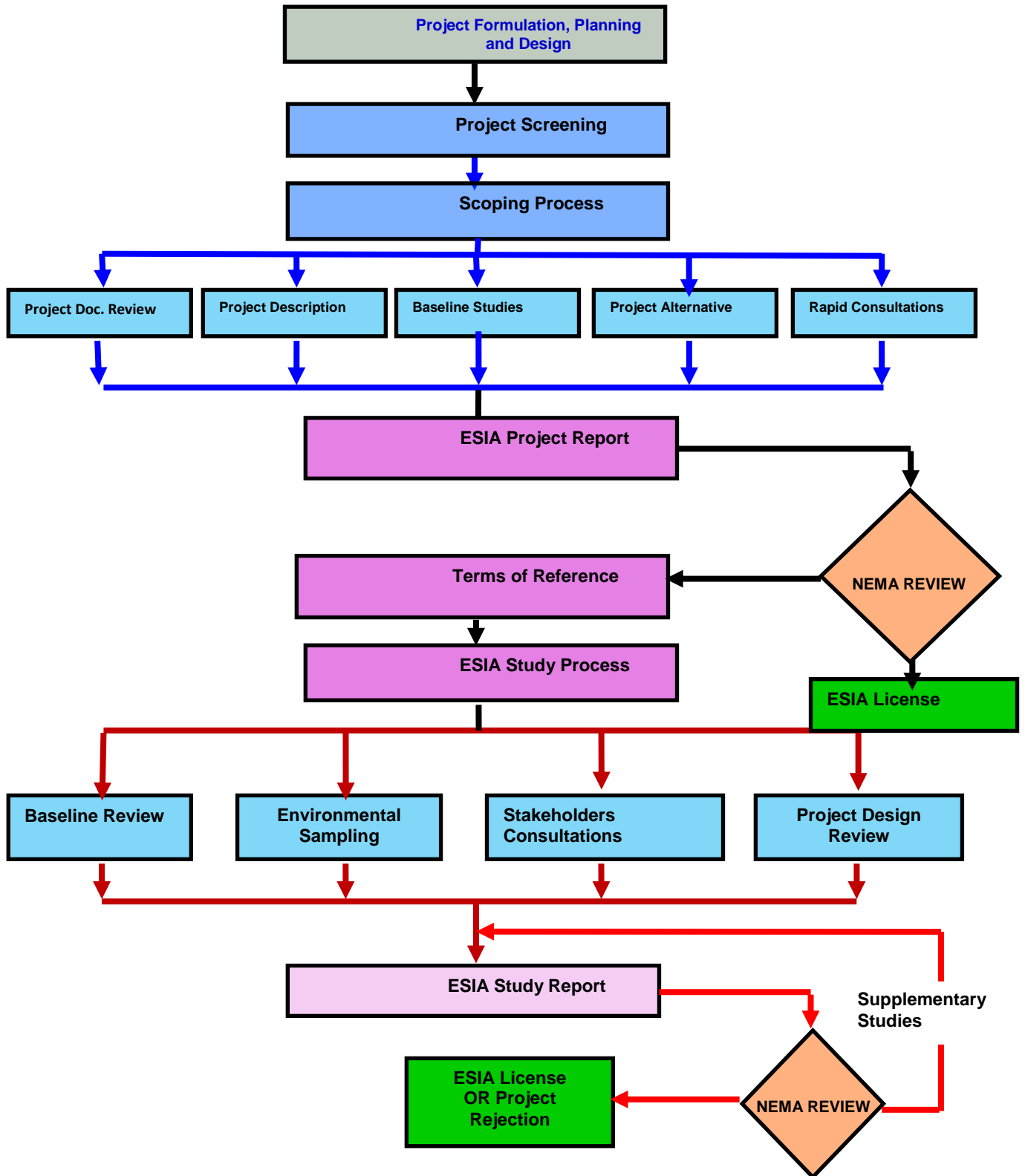


Figure 1: ESIA Process Flow Chart

2.0 METHODOLOGY AND REPORTING



2.1 Introduction

As stated earlier, the ESIA Study was carried out in compliance with the government of Kenya's Environment Management and Coordination Act of 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003 among other relevant laws, regulations and guidelines standards. The guidelines in the *EIA/EA (Amendment) Regulations, 2019* were strictly followed. The following steps were followed in undertaking the assignment.

2.2 ESIA Steps

2.2.1 Environmental Screening

This was the first stage where the proposed project was evaluated guided by EMCA, 1999; EIA/EA regulations 2003 and their subsequent amendments. According to EIA/EA (Amendment) Regulations, 2019 the development activities is listed under the second schedule of the EMCA among the projects requiring EIA report before commencement of the construction activities.

2.2.2 ESIA Study Planning

The consultancy team mobilized upon receiving instructions from the proponent. Before commencement of the study, the consultants met with the Project Manager for discussion and agreement on the scope of work, understanding the ToR and agree on the proposed methodology. During this meeting, the consultancy team presented their detailed program of work in order to agree on specific timing for various inputs, progress meetings and reporting dates. The consultancy team also discussed and finalized the logistical modalities and staff who the client provided to the team during the assignment period.

2.2.3 Environmental Scoping

A result of preliminary physical assessment of the site and its surroundings, helped narrow down to the most critical environmental and social issues requiring attention for detailed evaluation, among the significant issues identified included:

- The physical environmental aspect in the area.
- Wastes generation
- General water use trends in the area.
- Potential risks in terms of accidents via falling into the water
- Human-wildlife conflict and vandalism by the community members
- Social issues especially concerning the immediate neighbourhood, amenities and safety

2.2.4 Desk Review of Documents

The consultancy team reviewed all the relevant available documents on project activities and components from the client. The team also reviewed all the recognized guidelines and standards on ESIA and relevant legislative and regulatory framework.

2.2.5 Field Data Collection

Through field visits and consultation, data were obtained and consult with the relevant stakeholders. The consultancy team established the nature of the surroundings including: existing infrastructure, economic and social set up of the local communities. During the field study, the consultancy team collected existing information and interviewed community members and key informants from lead agencies on the likely adverse impacts of the proposed project.

2.2.6 Consultation and Public Participation Forum

Community Baraza, KII and Focus Group Discussion (FGD) were used as the key tools in CPP. The consultancy team through the local leadership organized and convened public meeting with the project beneficiaries and party of interest in the project area. During this forum, the consultancy team in close consultation with the client shared the project information in terms of its implementation and predicted impacts. Views from the discussions in this forum have been compiled and form part of the main ESIA report.

2.2.7 Project Data Synthesis

Both primary and secondary data collected were analyzed and used in the preparation of the Environmental Management and Mitigation Plan (EMMP) encompassing the potential negative environmental impacts, mitigation measures and monitoring indicators. The EMMP is incorporated in the ESIA project report.

2.3 Reporting Structure of ESIA Study

This project report represents the findings of the ESIA. As per the EIA/EA Regulations (Amendment) 2019, the project report is expected to include a description of, among other issues, the following:

- a) The nature of the project;
- b) The location of the project including the physical area that may be affected by the project's activities i.e. outline the general information of the area;
- c) Review of policy, legislative and institution framework environment, water resources exploitation and development;
- d) The design and activities that shall be undertaken during the three project phases;
- e) The materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal;
- f) The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project;
- g) An action plan for the prevention and management of possible accidents during the project cycle.
- h) A plan to ensure the health and safety of the workers and neighbouring communities.
- i) A monitoring and audit plan based on the ESMMMP;
- j) The project budget; and
- k) Any other information that the Authority may require.

3.0 PROJECT DESCRIPTION



3.1 Introduction

This section highlights details pertaining the proposed rehabilitation of Ndathimi earth dam and integrated farming project. The earth dam is situated within Ndathimi SHG Muhotetu farm. The beneficiaries are the members of the SHG. THE group is registered as CBO with 162 members, each with average farm size of 4 acres. The projects feature, (earth dam capacity; number of beneficiaries; water use; equipment's and materials to be used) and the project influence area. The section examines the compatibility of the proposed project with the local land uses.

3.2 Project Location

The proposed Ndathimi Dam Integrated Project is located in Ndathimi village, Karaba Location, Marmanet Ward, Laikipia West Sub County, Laikipia County. It is located 42 Km from Nyahururu town along the newly tarmacked Muhotetu Junction- Mutanga- Sipili road and 32 Km from Rumuruti town. The dam excavation and its sub-components seats on SHG on GPS coordinates; E 036022' and S 0018' at an altitude of 2,002 m above sea level.

3.3 Project Details

The Global Climate Change has resulted to unpredictable weather patterns whose effects are frequent floods and droughts that lead to food insecurity in the country. Kenya is predominantly a dry country with about 80% (467,200 Km²) of the total area falling under Arid and Semi-Arid Lands (ASAL). The rains in ASALs are low and erratic and vary greatly both in space and time. During rainy seasons, rainfall events are generally intense causing considerable runoff leading to soil erosion. According to the 1999 census, 34.4% of the Kenyan population lives in ASAL areas. With high temperatures, these areas experience high evaporation and evapo-transpiration rates. The ASAL areas are food insecure since rain-fed agriculture is hampered by inadequate moisture, precipitated by erratic and poorly distributed rainfall. The proposed Ndathimi Dam Integrated project has several components and activities as summarized below

- De-silting and rehabilitation of Ndathimi Dam to a capacity of 50,000M³ with associated infrastructures; (Fence, elevated water tank, watering troughs, pump house, community water draw-off points among other ancillary facilities.
- Establishment of an Agro-forestry tree nursery for assorted forestry and fruit tree seedlings
- Installation of 50 Langstroth beehives as an income generation project

- On-farm establishment of high-yielding beans varieties e.g. Chelalang', Tasha, Ciankui, KAT X56; both under rain-fed farming irrigation regimes
- Establishment of beans seed-dressing and packaging to add value to the beans, in order to earn more incomes and minimize exploitation by middlemen and brokers
- Establishment of a 4-acre drip-irrigation demonstration farm for high value horticultural crops e.g. French beans, tomatoes, onions, capsicums, indigenous vegetables, dhanian and courgettes, among others.
- Fish farming: Stock the dam with fish fingerlings as a project for the youth.

3.4 Ndathimi Earth Dam Rehabilitation

3.4.1 Ndathimi Earth Dam Construction Features/Activities

The project will entail rehabilitation and excavation to increase the dam capacity to a 50,000 M³ dam covering an area of 100 x 80 m with a depth of 6-7 M. The dam will store water from Ndathimi seasonal stream and the neighbouring catchment. The rehabilitated dam will mainly be used for watering livestock and for drip irrigation and in addition for supplementing domestic water needs when the piped water supply is unavailable. Drip irrigation technology is environmentally friendly since it controls soil salinity besides conserving water. Some of the key features during commencement of the construction activities of the earth dam includes;

- Desilting through silt scooping, debris and other materials removal;
- Expansion of the pan; excavation to the desired length, width, depth and elevation
- Construction of the inlet and the spill way, slit trap;
- Construction of water drawing facilities e.g. Trough, tap
- Improving the embankment of the pan
- Grassing of the embankment
- Construction of pump house, installation of solar pump, pump assemblage and pipeline for delivery of water to the drip irrigation system
- Construction of sanitary facilities/ablution block
- Fencing of the site

The main construction works input for the earth dam are as follows:

Desilting works

- Silt collected at the bottom of the earth dam will be removed using excavators. Silt deposit reduced the water depth in the earth dam, it further increased risk of flooding of the neighbouring area. Using excavators, the board looks on to removing silts and excavating further in aid to increase the capacity of the pan

Site preparations:

- Site clearance for expansion of the site will entail removal of any vegetation within the identified area for expansion. Tractors, loaders and bulldozers will be used

Excavation works

- The earth dam will be excavated to the desired depth. Excavators, shovels and tipper will be used
- Excavated materials will be used in embankment of the pan, levelling and compaction of the embankment will be done to the engineering specification.

Construction of the inlet, silt trap and the spill way

- Inlet well placed and linked to the catchment drainage system to be able to bring the maximum available run-off into the earth dam; silt traps facilitate deposition of silt away from the dam during the rainy seasons which means that the silt traps can then be target for maintenance (de-silting) instead of the whole earth dam.

Construction of water drawing facilities

- Water drawing facilities will be constructed at the earth dam for easy water accessibility by the households and livestock.
- Cattle trough will be constructed metres away from the site; concrete materials, sand, ballasts, pipes and taps will be used
- Tap will be provided for humans to draw water from
- Water filtering unit using rocks will be placed inside the pan

Compaction and Embankment of the pan

- The design concepts and criteria for the design of the proposed dam are based on internationally recognized design standards and guidelines
- Using the materials excavated from the pan, embankment will be made to the engineering design specification. Compaction work will be done to control pan failure.
- Grassing and landscaping of the embankment will be done using the indigenous vegetation (trees/grass)

Spill way

Application of the various spillway types depends on the topography, space availability and design flood flow. A 5 m wide side spillway is considered adequate for the proposed pan due to availability of space and also the design flood is considered small. This width will effectively protect the soil from eroding. However, other conservation measures will be taken to protect it from erosion from flood flows

Free board

- A free board of 1.5M will be included to ensure there is no danger of water topping over the pan embankment during recharge of the pan by pumping. This freeboard is adequate to contain any amount of recharge and waves from over-topping the embankment. Pumping will be done during day time and closely monitored to prevent overflows.
- WRA classifies dams according to risks to downstream settlements and development in case of dam failure. The classification is on the basis of the height, reservoir impoundment area and the dam catchment as shown in the table below.

Table 2: Classification of dams

Class of dam	Maximum depths of water at normal water level (m)	Reservoir Impoundment (m³)	Catchment area (Km²)
A (Low risk)	0-4.99	<100,000	<100
B (Medium risk)	5-14.99	100,000 – 1,000,000	100-1,000
C (high risk)	>15.0	>1,000,000	>1,000

The proposed earth dam is 7M deep, including the free board, with total storage capacity of approximately 50,000M³. There are no significant settlements and developments downstream of the proposed project. The dam is thus classified as low risk pan of medium depth due to its storage capacity.

Fencing of the pan

- The site will be fenced off properly as part of safety measures. Metallic pole well founded on earth with galvanized chain-link fencing.



Present status of Ndathimi Earth Dam

The source of water is ephemeral Ndathimi streams in the area, precipitation and surface run off from the high areas around the site. The rehabilitated dam will mainly be used for watering livestock and for drip irrigation and in addition for supplementing domestic water needs when the piped water supply is unavailable

The construction works output for the earth dam are as follows:

- The soils from the excavation that will be used in wall embankment activities of the earth dam.
- Noise emissions from construction machinery, motor vehicles, among others; and
- Air emissions from machinery (Carbon Dioxide (CO₂), Carbon Monoxide (CO), Nitrogen Oxide (NO_x), Nitrogen Dioxide (NO₂), PPM etc.)

3.4.2 Operation Phase Activities

Upon completion of the earth dam, the main use will be water provision for irrigation, domestic and livestock use. The operation and management activities of the earth dam shall entail periodic desilting, maintenance of the inlet and the spill way, protection and maintenance of the fence and the livestock ramp. During the operation phase;

- Establishment and strengthening of water user's organization is key in conflict management;
- Improvement of operation and maintenance system and regulations through training program to be conducted by NIB.

3.4.3 Project Monitoring and Review

This stage involves a continuous process of employing monitoring and improvement activities. Some of the areas of concern include;

- Public safety issues;
- Sanitation and hygiene issues;
- Water quality; and
- Soil erosion issues

3.4.4 Decommissioning phase

This phase involves closure of the project. Removal of the pipes, concrete materials, fittings and backfilling of the earth dam. This could be as a result of natural calamities, legal requirement and public safety issues of concern. An environmental impact assessment of the decommissioning activities should be undertaken. Backfilling of the site should be done and landscaped with indigenous plant/vegetation cover. This will be in line with set requirements of the relevant laws and regulations.

3.4.5 Project Sustainability

The sustainability of the proposed project will be ensured through compliance with the existing regulatory legislations regarding the proposed works. The proponent must comply with the planning and the national construction policies and Water Act, 2016 on the development of proposed project. The use of energy efficient equipment, approved engineering designs and use of approved materials are important in ensuring the sustainability of the proposed project. (*Engineering drawings are appended to this report*).

3.4.6 Expected Benefits

With the implementation of the proposed project, the local community of Karaba Location will enjoy wide range of benefits from the earth dam, among them:

- Easy water access
- Reduced conflict over water resources
- Improved food security

3.4.7 Construction Considerations

Seepage – If possible, provide 300mm clay blanket on the bed and sides compacted in 150mm. Gravel, murrum, laterite and sand (old river-bed) under the dam and reservoir area should be detected as these can cause excessive seepage losses and potentially even cause dam failure.

Inlet - The inlets should be well placed and linked to the catchment drainage system to be able to bring the maximum available run-off into the water dam. Inlets should be cleaned regularly, be able to direct all the water from the catchments area while silt traps facilitate deposition of silt away from the earth dam during the rainy seasons which means that the silt traps can then be target for maintenance (de-silting) instead of the whole the water dam.

Spillway – provide spillway channel for excess water to flow behind the silt trap and provide a masonry sill at the off-take point to prevent erosion.

Side slopes: Upon excavation of the reservoir, provide side slopes of 1:2.5 to 1:3 to facilitate ease of access in to the earth dam and prevent accident for people and livestock.

Bed slope: the earth dam bed should have a slope of 5% from inlet to the embankment to provide non eroding flow of water. The water dam bed is usually compacted upon completion to reduce seepage, if not sitting on rock as is the case for this particular pan.

(practice manual for small dams, pans and other water conservation structures in Kenya, 2015).

3.5 Horticulture Farming

horticulture sub-sector of agriculture has grown since 2000 to become a major foreign exchange earner, employer and contributor to food needs in the country. Using water from the earth dam, approximately 50 acres of farm for horticultural crops will be established under drip-irrigation. The following activities will be undertaken

3.5.1 setting up phase

setting up will involve; land clearance and leveling to allow for setting up of drip irrigation kit, it is required therefore that the land is leveled as much as possible. Other processes of development including ploughing, harrowing and application of organic manure. The process will require water from overhead for easy application with overhead tank in place, water from the dam will be pumped up into the tank before the farm is fed trough gravity.

3.5.2 Operation pahse

This phase shall involve activities such as; procurement of inputs, procurement of labour force planting of different varieties of fruits and vegetables, fertilizers application, irrigation, disease and pest control, plants management through pruning, harvesting, storage, packaging for the market, transportation of harvested products to other neighbouring towns for and having proper waste management activities.

3.5.3 Decommissioning phase

General decommissioning of a facility and property include the removal of hazardous materials and wastes, cleaning and removal of equipment, decontamination and remediation and the termination of the operational permits and licenses, land physical reconstitution. Although the decommissioning of this project is not probable it is still a probability. It is therefore prudent to develop a decommissioning strategy.

3.6 Aquaculture practice in the dam

The proposed project will also involve establishment and operation of fish farming at Ndathimi SHG farm. The project will involve sourcing and procurement of 100,000 Tilapia and mud fish fingerlings. This will boost fish farming in the dam and source of employment for the youths. The project will be part of youth income generating project.

4.0 BASELINE INFORMATION



4.1 Introduction

This chapter examines the baseline environmental, socio-economic and cultural characteristics of the proposed project area. The chapter provides information on the existing environmental conditions including sensitive areas that will be potentially impacted by the project. The objective is to document the status quo for the purpose of establishing and assessing the impacts of the project in future.

4.2 Project Location

The proposed Ndathimi Dam Integrated Project is located in Ndathimi village, Karaba Location, Muhotetu Division, Marmanet Ward, Laikipia West Sub County, Laikipia County. It is located 42 Km from Nyahururu town along the newly tarmacked Muhotetu Junction-Mutanga- Sipili road and 32 Km from Rumuruti town, the sub county headquarters. The dam excavation and its sub-components will be sponsored by Kenya Climate Smart Agriculture Project, funded by the World Bank in collaboration with Laikipia County Government. The site's GPS coordinates are E 036o22' and S 0o18' at an altitude of 2,002 m above sea level.

4.3 Physical Environment

4.3.1 Topography and Geology

The main topographical feature in the Sub County is the Laikipia plateau, which bears gentle slopes that are interrupted by low undulating hills. The slopes flatten to plain-like features encouraging formation of marshlands and swamps. The project area is gently undulating in relief, with gentle slopes of between 3% and 8 %, at an altitude of 2002 m above sea level. The larger Laikipia is underlain by metamorphic rocks of Pre-Cambrian age which form part of the extensive African Basement Complex. These rocks are exposed in some parts of the county. Volcanic sediments in the project area were washed down from Mt Kenya.

4.3.2 Soils

The Soils in Karaba location are well drained, moderately deep to deep, dark reddish brown, friable to firm clay, with humic topsoil. These soils are variable in fertility but most of them are of low to moderate fertility. The soils at the site of the proposed dam are well drained, shallow to moderately deep, strong brown to brown, firm, sandy clay to clay loam.

4.3.3 Vegetation

The vegetation comprises mainly sparse savannah grass vegetation and indigenous trees and shrubs, predominantly acacia species. The vegetation is suitable for pastoralism through grazing and browsing of sheep, goats and cattle. Other predominant tree species include *Cupressus lusitanica*, *Vepris spp*, *Trichclaudus ellipticus*, *Juniperus procera*, *Cassipoures rotundifolia*, *Eucalyptus spp*, *Nuxia congesta*, *Rhus natalensis*, *Scutia myrtina* and *Olea Africana*.

4.4 Climate

4.4.1 Rainfall

The proposed project area is located in Lower Highland 5 (LH5) Agro-Ecological Zone. Karaba location experiences an average annual rainfall of 600-800 mm, whereas the rest of the sub county receives between 500 mm and 1200 mm in the upper areas around Nyahururu, Marmanet, Laikipia University, Gatero and Kinamba. However most of the area receives very unreliable and erratic rainfall, with occasional and recurrent droughts.

4.4.2 Temperature

Temperatures range between 19°C and 27°C with an average of 23° C. Night temperatures average 12°C but at times fall to 9-10°C.

Table 3: Project area weather characteristics

Name of station	Altitude	Agro-Ecological Zone	Annual Rainfall Mm	Mean Max °C	Mean Min °C
Rumuruti D.C.'s Office	1850 m	LH 5	683	27.3	19.3
Karaba Limited, Rumuruti	1930 m	UM 6	556	26.6	18.9
MoW, Rumuruti	1768 m	UM 5	711	27.7	19.6

Source: Farm Management Handbook of Kenya, 2006 Central Kenya, Vol. 2 B, North Rift Valley

4.5 Hydrology and Drainage

Occurrence of surface water is very rare in the Project area. Only after heavy rains, shallow pools and seasonal water courses may be filled with water up to a maximum of a few weeks. The drainage ways in the Project area mostly Ephemeral streams. during rainy season, the streams are filled up mostly with surface run off from surrounding Hills. Generally, Laikipia county is drained by the Ewaso Ng'iro River and its tributaries, which originate from Mt. Kenya and the Aberdare's. The main tributaries are Ewaso Narok (Ngare Naro), Narumoru, Likii, Sirimon, Ontulili, Ngare ndare, Melwa, Ngare Naro, Ngobit, Rongai, Timau, Moyak, Pesi, Suguroi, Mutara, Nanyuki, and Burguret rivers. Boreholes, pans, dams, shallow wells, springs and sub-surface dams are also a common feature in the county for domestic and irrigation purposes. Rock catchments in the northern parts of Laikipia are increasingly being exploited.

4.5.1 Water Sources

The community relies mainly on piped water from Lariak- Karaba water project for domestic and livestock use. Ndathimi dam is mainly used for livestock and irrigation and to supplement domestic needs when the piped water supply is unavailable. Other water sources include shallow wells and roof catchment.

4.6 Sanitation

In the larger Laikipia County, there are 79,295 households with latrines. The distribution of main toilet facility reflects that 11.8 per cent use flash toilets, 60.2 per cent use pit latrines, and 16.4 per cent use uncovered latrines or buckets whereas 11.3 per cent use other methods of disposal such as natural bushes. Nanyuki and Nyahururu towns have established sewer

and treatment services. On human waste disposal 72.8%, of households use pit latrines with 97% in Laikipia East sub-county in 84.9% in Laikipia west sub-county and 41.9% in Laikipia North sub-county On hand washing, 1.9%, of the population does it four critical times with those washing with soap at 49.7%. in the project area, most of the households have pit latrines.

4.7 Socio-Economic Environment

4.7.1 Administrative Location and Demography

The project site is in Karaba Location, Marmanet Ward. The site lies 42 km from Nyahururu town and 32 Km from Rumuruti town, which is the administrative headquarters of Laikipia West Sub County. The population of the area was 4,971 comprising 1,199 households, according to provisional results of the recently conducted 2019 census. The proposed Ndathimi dam rehabilitation project and its sub components will contribute immensely to the economic transformation of the location. This will lead to increased demand for housing, water, schools and other social amenities.

Table 4: Project Location population data

Location	Male	Female	Total	Households (HH)	Persons per HH
Karaba	2,492	2,479	4,971	1,199	4

Provisional population data for Karaba Location: Source -KNBS-2019 Census

4.7.2 Economic Activities

Agriculture is the dominant economic activity. Majority of residents keep livestock and grow different food crops such as maize, carrots, peas, potatoes, wheat and cash crops as well as horticultural crops. Laikipia County is known for its big open ranches like Solio, Borana and Oljogi which provide a significant source of beef for local consumption and export. The county also benefits from tourism due to the many wildlife conservancies and ranches. Because of its diverse wildlife, it's one of the top destination for local and foreign tourists. Some of the tourist attraction sites include; ole Pejeta conservancy, Thomson falls, Laikipia Plateau reserve among others.

4.7.3 Infrastructure

The location has limited coverage of classified roads; gravel surface and earth Surface roads which are frequently maintained by the ministry of roads. The area is accessible by newly tarmacked Muhotetu Junction- Mutanga- Sipili road. Electricity in the area is supplied through KPLC, with a few household using solar. Being a semi-arid county, reliable sunshine throughout the year provides high potential for harnessing of solar energy. Mobile phone coverage extends to the area, Safaricom has upgraded mobile service connectivity from 2G to 3G network, Airtel and Telkom services also available in the area.

4.7.4 Education and Health Facilities

Karaba has four early childhood development centers (ECDEs), three primary and one secondary schools, both public and privately-owned and is served by Karaba dispensary and Rumuruti Sub County Hospital. Referral Health services are available at Nyahururu Level 4 hospital and several private health facilities, situated 42 Km from Karaba.

4.7.5 Agriculture

The main crops grown include maize, beans, wheat, potatoes and vegetables. Maize covers about 51 per cent of the total planted area. Crop farming is mainly undertaken in the western and south western parts of the county due to favourable weather conditions. There is an

emerging trend of increased horticulture and floriculture production both at large-scale and small-scale levels. The proposed project is proposing to set up integrated farming in the area, involving; horticulture, bee keeping and fish farming. Over the years the community has continued to experience high food insecurity, to improve food and nutrition security and increase sustainable farm incomes the SHG is propping to implement integrated farming through KCSAP support.

4.7.6 Land use and ownership

Land is a primary factor of production in an economy and has aesthetic, cultural and traditional values. Land types in Laikipia County is broadly classified as ranch, game reserve, townships, agriculture and grazing lands, with largest proportion under ranch. The primary form of land use and production in the area is agricultural production. The community depend on farming to meet large part of their livelihood needs. Proposed earth dam is on a SHG land.

4.7.7 Current irrigation practices

The county is heavily dependent on rain fed agriculture. There is potential of 203,965 hectares for irrigation in the medium potential areas. There are 22 operational small-scale irrigation clusters mainly in the southern and western parts of the County at Jikaze, Mutaro, Munanda, Gatitu Muthaiga, Mutara, South Imenti, Thome, Mwiyo, Nkando, Nturukuma, Nyambogichi, Mukima, Marura, Gakeu, Mia Moja, Melwa, Pesi, Ngarengiro, Ngarachi/Thigio and Wangwaci. Using the earth dam, the SHG are looking forward to implementing irrigation practice, an estimate of 50 acres of land under horticultural farming.

4.7.8 Religion

Muslims, Christians and adherents of traditional religions all inhabit the town. Close to 40% living in the area are christians, 32% muslims and 28 adhering to other religion and traditional believes. Missionaries were the first settlers of the area spreading christrianity.

5.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK



5.1 Introduction

There is a growing concern in Kenya that many forms of development cause damage to the environment (degrade soils and water resources, alter landscapes, destroy biodiversity, trigger land use conflicts). This is aggravated by lack of awareness and inadequate information amongst the public on the human-environment interactions as well as the lack of community involvement in project planning and management. Recognizing the importance of the environment to human wellbeing, the Kenyan Government has put in place policy, legal and administrative framework for guiding it in environmental management. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound.

Kenya's environmental policy and legislation are scattered in a multiplicity of resource and sector specific laws and policy papers. The institutions and departments that deal with environmental issues are numerous. Sector specific laws are piecemeal, deficient, often competing and are characterized by fragmented and uncoordinated sectoral legal regimes that are developed to facilitate resource allocation and to deal with environmentally adverse effects of resource exploitation.

5.2 Policy Framework

5.2.1 *Environment and Development Policy Sessional Paper No.6 of 1999*

The Environment and Development Policy covers the following environment and development issues: biological diversity; land and land based resources; water resources; fisheries and marine resources; energy resources; atmospheric resources; waste management; management of toxic and dangerous chemicals; radiation management; environmental health and occupational safety; human settlements; disaster management; implementation strategies; priorities for action; human resources development; environmental planning; environmental laws; environmental impact assessment; environment and land use practices; environment, industry and economic development; environment, research and technology coordination and participation; regional and international cooperation; and environmental management authority.

The overall goal is to integrate environmental concerns into the national planning and management processes and provide guidelines for environmentally sustainable development.

5.2.2 National Policy on Water Resources Management and Development

The National Water Policy is outlined in the Sessional Paper No.1 of 1999. It tackles issues pertaining to water supply and sanitation facilities development, institutional framework and financing of the sector. According to the policy, in order to enable sustainable water supply and sanitation services, there is need to apply alternative management options that are participatory through enhanced involvement of others in the provision of these services but particularly the private sector.

The overall objective of the National Water Policy is to lay the foundation for the rational and efficient framework for meeting the water needs for national economic development, poverty alleviation, environmental protection and social well-being of the people through sustainable water resource development and management. It is important for the proposed project management to factor in sanitation facilities in the proposed project to avoid contamination of water resources.

5.2.3 Land Policy of 2009

The Sessional Paper No. 3 of 2009 on National Land Policy was formulated to address the critical issues of land administration, access to land, land use planning and environmental degradation. It also addresses restitution of historical injustices, conflicts, unplanned proliferation of informal urban settlements and information management. It recognizes the need for security of tenure for all Kenyans. The overall objective of the National Land Policy is to secure rights over land and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives. Among others, the Policy provides the framework for the maintenance of a system of land administration and management that will provide efficient and effective utilization of land and land based resources.

The Policy designates all land in Kenya as public, community and private land. Most significantly, the Policy establishes a mechanism for securing the tenure of public land by placing all public land under the National Land Commission to hold and manage the land in trust for the people of Kenya. The Policy has provisions aimed at protecting forest reserves and water catchment areas through establishment of mechanisms for repossession of any public land acquired illegally or irregularly and establishment of an appropriate system for registering public institutional land. Through the Policy, the Government will ensure that all land is put into productive use on a sustainable basis by facilitating the implementation of key principles on land use, productivity targets and guidelines as well as conservation.

5.2.4 National Environment Action Plan, 1994

According to the Kenya National Environment Action Plan (NEAP), 1994 the Government recognized the negative impacts on ecosystems emanating from economic and social development programmes that disregarded environmental sustainability. In this regard, establishment of appropriate policies and legal guidelines, as well as harmonization of the existing ones, has been accomplished, while some others are in the process of development. Under the NEAP process Environmental Impact Assessment (EIA) was introduced and among the key participants identified were the institutions dealing with water resources management. Chapter 4 sub-section 4.1.3 the NEAP report recommends that EIA be made a pre-condition for approval of all projects as well as post investment impact assessment for all related operations. The Environmental Management and Coordination Act (EMCA, 1999) provides for the formulation of the National, County environmental action plans after the duration of five years.

5.2.5 National Poverty Eradication Plan, 1999

National Poverty Eradication Plan (NPEP 1999) have spelt out the strategies to fight poverty. The vision is to halt the current increase in the incidence of poverty through implementation of well-planned poverty alleviation programmes. The NPEP has the objective of reducing incidences of poverty as well as strengthening the capabilities of the poor and vulnerable groups to earn income.

The proposed project will provide employment opportunities during implementation to casual workers and thereafter will offer employment to various service providers like water users' committee; during operation the water from the pan can be used for irrigation to help enhance food security in the area. This will go a long way in poverty alleviation.

5.2.6 Constitution of Kenya

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

- Equitable access to land;
- Security of land rights;
- Sustainable and productive management of land resources;
- Transparent and cost effective administration of land; and
- Sound conservation and protection of ecologically sensitive areas.

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

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

Further, Article 70 states that if a person alleges that a right to a clean and healthy environment

recognized and protected under Article 42 has been, is being or is likely to be, denied, violated,

infringed or threatened, the person may apply to a court for redress. The sub-project should ensure compliance with the constitution in so far as equitable sharing of the resources, between the stakeholders. Further, the project should ensure the sustainability of livelihoods and biological resources within the project areas are protected. Any development proposals should also be cognizant of the increased powers under the Constitution given to communities and individuals to enforce their rights through legal redress.

5.2.7 Agricultural Sector Transformation and Growth Strategy 2019-2029

This document focuses on agriculture as a key sector for growth and employment. It discusses in detail the agricultural sector policy framework and the need for increased support to agro-processing industries in the rural areas and trade. The strategy will enhance sustainable irrigation and water basin management whereby the Government will ensure that efficient technologies are available and affordable and that water is accessible. Water resource authorities will have to monitor and regulate water abstraction to maintain a defined minimum water level. With respect to this legal direction, the proposed development will immensely contribute towards sustainable agricultural development through the creation of income opportunities, wealth generation and empowerment of the youth in economic development through agriculture. This is also in line with the Economic Recovery Strategy for Wealth and Employment Creation which addresses issues of promoting sustainable livelihoods.

5.2.8 Kenya Vision 2030

Kenya Vision 2030 is the current national development blueprint for period 2008 to 2030. One of the aims of the vision is to make Kenya to be a nation that has a clean, secure and sustainable environment by 2030. This will be achieved through promoting environmental conservation to better support the economic pillar. Improving pollution and waste management through the application of the right economic incentives in development initiatives is critical.

5.2.9 The Big Four Agenda

Through deliberation of the big four agenda, Kenya have made an expedient decision to steer itself back on the fast track towards realizing Vision 2030. Food Security is at the heart of Kenyan government policy because higher agricultural output means higher incomes for farmers, food resilience within their households and, that their farms are as productive as possible. The proposed earth dam to be used in farming is in line with the president's big four agenda of enhancing food security and nutrition.

5.3 Legislative Framework

5.3.1 Environmental Management and Coordination Act of 1999 (EMCA)

The Environmental Management and Coordination Act of 1999 (EMCA) provides the legal and institutional framework for environmental management in Kenya. EMCA seeks to coordinate the activities of the various institutions (Lead Agencies) with regard to the environment.

Part II of EMCA CAP 387 states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. It is worth noting that the entitlement to a clean and healthy environment carries a collective duty. Hence, there is not only the entitlement to a clean and healthy environment, but also the duty to ensure that the environment is not degraded in order to facilitate one's own as well as other persons' enjoyment of the environment. NEMA is a body established under the Act and has the legal authority to exercise general supervision and co-ordination over all matters relating to the environment, and is the principal arm of the Government charged with the implementation of all policies relating to the environment.

Discretionary approvals required: The Act requires that projects acquire approval before their commencement. NEMA approves and issues an environmental license after an

Environmental Impact Assessment or a Project report depending on whether the project assessment and report satisfies it.

The Project Proponent has commissioned the environmental impact assessment study in compliance with the Act. The environmental management and monitoring plan laid out in this report shall be adhered to by the Proponent.

5.3.2 The Environmental Impact Assessments and Audits (Amendment) Regulations, 2019

These regulations stipulate how an EIA project report should be prepared and specifies all the requirements that must be complied with. It highlights the stages to be followed, information to be made available, role of every stakeholder and rules to be observed during the whole EIA project Report making process. It also requires that during the EIA process a proponent shall in consultation with the Authority seek views of persons who may be affected by the project or activity. Every proponent undertaking a project specified as being low or medium risk, shall submit to the Authority a summary project report of the likely environmental effect of project. The proposed community water project is listed under low risk.

The proponent has taken the initiative by contacting us, the EIA/EA Experts to prepare this report for his implementation. It is also a prerequisite requirement by the fisheries department for the proponent to be licensed.

5.3.3 The Water Act 2016

The Water Act aims to “make better provision for the conservation, apportionment and use of water resources of Kenya.” It prohibits persons from diverting, abstracting, obstructing or using water from a body of water except as provided for in the Act (Section.5).

The Act stipulates that a permit is required in all cases of proposed diversion, abstraction, obstruction, storage or use of water, with minor exceptions relating to use for domestic purposes (Section.36). Under the Water Act (General) Rules, it is stated that any rights acquired under the permit are subject to the Public Health Act and the Malaria Prevention Act, in addition to the Water Act itself. Part II Section 5 states that Every water resource is vested in and held by the national government in trust for the people of Kenya. The Water Act clearly defines a reserve and it states that a reserve refers to “quantity and quality of water in relation to a water resource required to satisfy basic human needs for all people who are or may be supplied from the water resource; and to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the water resource.

In utilizing water resources, a national public water works for domestic use shall, subject to the acquisition of a permit from the Authority in case of inter basin water transfer, take precedence over all other water works for the use of water or the drainage of land. Additionally, Subject to the Land Act, 2012, land required for national public water works may be acquired in any manner provided by law for the acquisition of land for public purposes. The Cabinet Secretary may, after reasonable notice to any landholder concerned, cause to be constructed and maintained upon any land such works as the Cabinet Secretary may consider necessary for the purposes of any national public water works. The Cabinet Secretary shall, within one year of the commencement of this Act and every five years thereafter, following public participation, formulate a National Water Resource Strategy. The object of the National Water Resource Strategy shall be to provide the Government’s plans and programs for the protection, conservation, control and management of water resources.

5.3.4 Water Resources Management Rules 2007

These Rules shall apply to all policies, plans, programmes, and activities that are subject to the Water Act 2002. The rules set out the procedures for obtaining water use permits and conditions placed on permit holders. Satisfactory evidence may consist of, but is not limited to, an authentic title deed, lease agreement, easement, wayleaves or a letter from the land owner or community endorsed by the provincial administration (Sec 20, Part 3). Ndathimi Dam Self Help group will be required to submit their dam completion records to the Water Resources Authority within 12 months of the commencement of the rules as stated in Part II Section 17 (1). Failure to submit the documents may be used as a basis for revocation, variation or cancellation of the permit or authorization.

5.3.5 Water Quality Regulations, 2006

Regulation 8 of these regulations provides for compliance with water quality standards. It states that all operators and suppliers of treated water, containerized water and all water vendors shall comply with the relevant quality standards in force as may be prescribed by the relevant lead agencies. Regulation 9 of these regulations provides for water quality monitoring. It states that the Authority in consultation with the relevant lead agency, shall maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as set out in the second schedule to these regulations.

Part II Sections 4-5 as well as Part V Section 24. Part II Section IV of the Act states that “Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution”. Part IV Section 24 states that “No person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants or permit any person to dump any such matter into water meant for fisheries, wildlife, recreational purposes or any other uses”.

5.3.6 Forest (Conservation and Management) Act, 2016

This law was enacted by Parliament of Kenya to give effect to Article 69 of the Constitution with regard to forest resources; to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socioeconomic development of the country and for connected purposes. Section 48 of the Act requires that All indigenous forests and woodlands shall be managed on a sustainable basis for purposes of conservation of water, soil and biodiversity; (b) riparian and shoreline protection; (c) cultural use and heritage; (d) recreation and tourism; (e) sustainable production of wood and non-wood products; carbon sequestration and other environmental services; (g) education and research purposes. (h) habitat for wildlife in terrestrial forests. Community participation as provided for under Section 71 (2) (d) of the Act should be encouraged. The most appropriate would be initiation of participatory forest management in these forest reserves so that the local community and organization can have a significant input with Kenya Forest Service (KFS) office playing a coordination role

5.3.7 The Wildlife Conservation Act, 2013

The Wildlife and Conservation Act deals with the conservation and management of wildlife in Kenya. The Act provides that wildlife should be conserved so as to yield optimum returns in terms of cultural, aesthetic, scientific and economic benefits. The Act requires that full account be taken of the inter-relationship between wildlife conservation and land use. The Act controls activities within the national parks, which may lead to the disturbance of wild animals. Unauthorized entry, residence, burning, damage to objects of

scientific interest, introduction of plants and animals and damage to structure are prohibited under this law.

A person who engages in sport hunting or any other recreational hunting commits an offence and shall be liable, on conviction. Under section 98; A person who engages in hunting for bush meat trade, or is in possession of or is dealing in any meat of any wildlife species, commits an offence and shall be liable on conviction to a fine of not less than two hundred thousand shillings or to imprisonment for a term not less than one year or to both such fine and imprisonment.

5.3.8 The Agriculture Act (Cap 318)

This Act of Parliament promotes agriculture, provides for the conservation of soil and its fertility and to stimulate agricultural development in accordance with accepted practices of good land management and good husbandry. Under Section 184 of the Act the Minister may make general rules for the preservation utilization and development of agricultural land. Section 48 part 1 the Minister may make rules considered necessary or expedient so to do for the purposes of the conservation of the soil of, or the prevention of the adverse effects of soil erosion on, any land, prohibiting grazing or watering of livestock and or the firing, clearing or destruction of vegetation including stubble. (3) Any person who cultivates, cuts down or destroys any vegetation, or depastures any livestock on any land of which the slope exceeds 35 per cent shall be guilty of an offence:

(6) Any person who, except with the written permission of an authorized officer, cultivates or destroys the soil, or cuts down any vegetation or depastures any livestock, on any land lying within 2 metres of a watercourse, or, in the case of a watercourse more than 2 metres wide, within a distance equal to the width of that watercourse to a maximum of 30 metres, shall be guilty of an offence

5.3.9 Irrigation Act 2019

According to the Act, irrigation any process, other than by natural precipitation, which supplies water to crops or any other cultivated plants, livestock, aquaculture and desired forest trees. Section 16 (6) states that the Cabinet Secretary shall, in consultation with county governments, ensure that the design of national or public irrigation schemes and others, takes into account the needs of various irrigation water users, including livestock and fish producers and the impact the irrigation scheme is likely to have on the environment. Section 20 (1)- a resident of a catchment area who is a crop farmer, livestock producer, fish pond user, or small rural industry entrepreneur or otherwise uses water for irrigation purposes from a common water source may, together with other members or persons' resident in the same area, form or join an irrigation water users' association.

5.3.10 The Public Health Act (Cap 242)

The Public Health Act governs all matters related to public health and safety. Its core function is the prevention of diseases, treatment and care of the sick (curative services) and control of nuisance. The Act therefore makes regulations and lays standards for a healthy living environment. Part XI of the Act provides certain regulations as enshrined in the following sections. *Section 129* places the responsibility of protecting water supplies on the local authorities.

During the implementation of the proposed construction activities of the water project, this Act is relevant in various ways:

- *Section 115* - During construction, a nuisance is prohibited especially for all conditions liable to be injurious or dangerous to health.

- *Section 118* - Outlines nuisance liable to be dealt with i.e. accumulation or deposit of refuse, offal, manure or any other which is offensive or injurious or dangerous to health and an accumulation of stone, timber or other machine likely to harbor rats or rodents.
- *Sections 136 – 143 Breeding places of mosquitoes:* The civil and building contractors will ensure that during construction, breeding places of mosquitoes and nuisance yards are kept free from bottles, whole or broken. The project area shall not be overgrown by grass, the wells etc. to be covered together with the less pits.
- *Section 163 – Powers of entry and inspection:* It should be noted that a medical officer, health inspector or a police officer above the role of an inspector shall enforce compliance and offences are punishable by law.

The EMMP advises the Proponent on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring, and estimated cost.

5.3.11 The Penal Code, CAP 63

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils, water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or violates the atmosphere in any place to make it noxious to health of persons /institution is dwelling or business premises in the neighborhood or those passing along public way, commit an offence. In particular, section 191 states that: “Any person who voluntarily neither corrupts nor fouls the water of any public spring or reservoir so as to render it less fit for the purpose for which it ordinarily used is guilty to a misdemeanor”. The proponent will be required to ensure strict adherence to the Environmental Management Plan throughout the project cycle in order to guard against any possible negative impacts.

5.3.12 County Government Act, 2012

This law empowers the County Government with powers, functions and responsibilities to deliver services and for connected purposes.

Section 110 of the Act reserves that There shall be a ten-year county GIS based database system spatial plan for each county, which shall be a component part of the county integrated development plan providing spatial plan; (j) indicating areas designated for conservation and recreation.

(1) As an entity exercising constitutional authority, a county government shall be a body corporate with perpetual succession and shall have all the powers necessary for the discharge of its functions.

(2) Without prejudice to the generality of subsection (1), a county government may:

- (a) Enter into a contract;
- (b) Acquire, purchase or lease any land; or
- (c) Delegate any of its functions to its officers, decentralized units or other entities within the county.

(3) A county government may enter into partnerships with any public or private organization in accordance with the provisions of any law relating to public or private partnerships for any work, service or function for which it is responsible within its area of jurisdiction.

(4) All contracts lawfully entered into under this section shall be valid and binding on the county government, its successors and assigns.

(5) To ensure efficiency in the delivery of service or carrying out of a function for which the county government is responsible, the county government may:

(a) Establish a company, firm or other body for the delivery of a particular service or carrying on of a particular function; or

(b) Contract any person, company, firm or other body for the delivery of a particular service or carrying on a particular function.

5.3.13 Physical and Land Use Planning Act, 2019

This is an Act of Parliament to make provision for the planning, use, regulation and development of land and for connected purposes. It establishes the principles, procedures and standards for the preparation and implementation of physical and land use development plans at the national, county, urban, rural and cities level. It provides for a hierarchy of plans in which guidelines are laid down for the future physical development of areas referred to in a specific plan. The ostensible intention is that the three -tier order plans, the national development plan, regional development plan, and the local physical development plan should concentrate on broad policy issues.

The Act also promotes public participation in the preparation of plans and requires that in preparation of plans, proper consideration be given to the potential for economic development, socio-economic development needs of the population, the existing planning and future transport needs, the physical factors which may influence orderly development in general and urbanization in particular, and the possible influence of future development upon natural environment. In the Act, planning authorities require applications for major developments to be subjected to environmental and social impact assessment. Any change of use of the actual development without authority constitutes an offence.

57. (1) No person shall carry out development within a county without a development permission granted by the respective county executive committee member.

57. (2) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding five hundred thousand shillings or to an imprisonment not exceeding two months or to both.

(3) A county executive committee member shall require a person who has commenced a development without obtaining development permission to restore the land on which the development is taking place to its original condition or as near to its original condition as is possible and that such restoration shall take place within ninety days.

(4) Notwithstanding the provisions of subsection (3) the relevant county executive committee member may undertake to restore the land as required and shall recover the cost of the restoration from the person required to undertake the restoration.

58 (1). A person shall obtain development permission from the respective county executive committee member by applying for development permission from that county executive committee member in the prescribed form and after paying the prescribed fees.

45 (1)9 A county government shall prepare a local physical and land use development plan in respect of a city, municipality, town or unclassified urban area as the case may be. 46 A county government shall prepare a local physical and land use development plan for — (a) zoning, urban renewal, or redevelopment (b) guiding and coordinating the development of infrastructure; (c) regulating the land use and land development.

5.3.14 The Occupational Safety and Health Act, 2007

The Act makes provision for the health, safety and welfare of persons employed in factories and other places of work. The provision requires that all practicable measures be taken to protect persons employed in places of work or a factory from any injury. The provisions of the act are also relevant to the management of hazardous and non-hazardous wastes, which may arise at the project site. The act provides that all measures should be taken to ensure safety, health and welfare of all the stakeholders in the work place. Under Section 6 of this Act, every occupier is obliged to ensure safety, health and welfare of all persons in his workplace. The occupier shall achieve this objective by preparing and as often as may be appropriate, revising a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy (Section 7).

To promote health and safety of employees who are at risk of being exposed to chemical substances, section 84 (3) and 85 (4) requires every employer to maintain at the workplace material safety data sheets and chemical safety data sheets respectively for all chemicals and other hazardous substances in use and ensure that they are easily available to the employees. The employers' positive contribution towards the welfare of the employees include provision and maintenance of adequate supply of wholesome drinking water - section 91 and a first aid box or cupboard of the prescribed standard – section 95 at suitable point (s) conveniently accessible to all employees.

Part IX of the Occupational Safety and Health Act, 2007 also provides for Chemical Safety, Part X provides for Welfare – General Provisions, Part XI Health, Safety and Welfare Special Provisions and Part XII special applications.

5.3.15 National Construction Authority Act, 2011

Section 5 of the Act stipulates the mandate of the National Construction Authority (NCA) which is to oversee the construction industry and coordinate its development. Section 5 subsection 2 part (f) states that the authority shall provide consultancy and advisory services with respect to the construction industry; part (g) promote and ensure quality assurance in the construction industry; part (k) accredit and register contractors and regulate their professional undertakings; (l) accredit and certify skilled construction workers and construction site supervisors; (m) develop and publish a code of conduct for the construction industry; and (n) do all other things that may be necessary for the better carrying out of its functions under the Act. Hence, the management should make sure that it adheres to the provision of the Act.

5.4 Institutional Framework

There are several organizations involved in water resource and environment management in the country. These organizations include the Ministry of Water and Irrigation, Ministry of Environment and Natural Resources, NEMA, WRMA etc. The key institutions are as highlighted below.

5.4.1 The National Environmental Management Authority (NEMA)

The National Environmental Management Authority (NEMA) is established under Section 7 of EMCA, 1999. NEMA is the principal institution charged with the overall supervision and co-ordination of all matters relating to the environment. NEMA is also responsible for implementing all policies on the environment as well as dealing with EIA/EA. EIA/EA reports/study are submitted to the authority for approval/licensing. NEMA's mandate is designated to the following committees.

(i) County Environment Committees

According to EMCA, CAP 387 No. 8, the Cabinet Secretary by notice in the gazette appoints County Environment Committees of the Authority in respect of every county respectively. The County Environment Committees are responsible for the proper management of the environment within the counties in respect of which they are appointed. They are also to perform such additional functions as are prescribed by the Act or as may, from time to time be assigned by the CS by notice in the gazette. The decisions of these committees are legal and it is an offence not to implement them.

(ii) Public Complaints Committee PCC

The Public Complaints Committee is established under Section 31 of EMCA. The PCC is concerned with the investigation of complaints relating to environmental degradation. The PCC has powers to investigate complaints against any person or even against NEMA or on its own motion investigate any suspected case of environmental degradation. PCC is required by law to submit reports of its findings and recommendations to NEC. The law however is weak in that it does not provide PCC with the mandate to see its recommendations enforced.

(iii) Standards and Enforcement Review Committee

The Standards and Enforcement Review Committee (SERC) is a technical committee established under Section 70 of EMCA. The Committee is responsible for formulating environmental standards, methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures. The Permanent Secretary in the Minister of environment chairs SERC. They consist of representatives of various relevant government ministries and parastatals that are Lead Agencies as well as those responsible for matters such as economic planning and national development, finance, labour, public works, law and law enforcement. Other members are drawn from public universities, and other government institutions.

To operationalize the Act, NEMA through this committee has issued Regulations which have a bearing on the proposed project in regard to compliance with national requirement:

- Environmental Impact Assessment/Audit Regulations, 2003. Legal Notice No. 1
- Environmental Management and Coordination (Water Quality) Regulations, 2006, Legal Notice No. 120.

(iv) National Environmental Tribunal (NET)

The NET is established under Section 125 of EMCA for the purpose of hearing appeals from administrative decisions by organs responsible for enforcement of environmental standards. An appeal may be lodged by a project proponent upon denial of an EIA licence or by a local community upon the grant of an EIA licence to a project proponent. NEMA may also refer any matter that involves a point of law or is of unusual importance or complexity to NET for direction. The proceedings of NET are not as stringent as those in a court of law and NET is not bound by the rules of evidence as set out in the Evidence Act. EMCA provides that any person aggrieved by a decision or award of NET may within 30 days' appeal to the High Court.

(i) National Environmental Council (NEC)

The National Environment Council (NEC) is established under Section 4 (1) of EMCA no 8 of 1999. NEC is chaired by the Minister in charge of the environment, and is responsible for policy formulation and direction as stipulated under EMCA. NEC sets national goals and objectives and promotes public-private partnerships in environmental protection.

5.4.2 Water Resource Management Authority (WRMA)

The Water Resources Management Authority is a corporate responsible for water resource management. The Authority develops principles, guidelines and procedures for the allocation of water resources assess and re-assessment of water resource potential receives and determines applications for permits for water use, monitors and enforces conditions attached to the permits for water use. WRMA regulates and protects water resources quality from adverse impacts, manages and protects catchment areas, determines charges and fees to be imposed for use of water from any water source, gathers and maintains information on water resources from time to time to publish forecasts, projections and information on water resources and also liaise with other bodies for the better regulations and management of water resources. It establishes offices in the Catchment Areas called Catchment Area Advisory Committee whose membership consists of Government Officials, Stakeholders and Communities.

5.4.3 Ministry of Water and Community water supply

The Ministry of Water and Community water supply has its fundamental goal of conserving, managing and protecting water resources for socio-economic development. Its aim is to improve the living standards of people by ensuring proper access to available water resources. The Ministry was created in 2003 following a separation from the Ministry of Environment and Natural Resources. The split was aimed at consolidating the responsibility for the management and development of water resources under a single Ministry.

5.4.4 National Water Harvesting and Storage Authority

The National Water Harvesting and Storage Authority (NWHSA) was established under Water Act, 2016. The functions of the authority shall be to undertake on behalf of the national government, the development of national public water works for water resources storage and flood control; maintain and manage national public water works infrastructure for water resources storage and to develop a water harvesting policy and enforce water harvesting strategies.

5.4.5 Water Services Regulatory Board

The Board regulates the provision of services by registered Water Services Providers through the Water Services Boards. NWHSA under section 30 of the Water Act 2016 has a new extended mandate to undertake on behalf of the National Government, the development of National Public Water Works for Water Resources Storage and flood control among other activities.

5.5 International Conventions and Treaties

5.5.1 United Nations Framework Convention on Climate Change

The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. The Convention enjoys near universal membership, with 191 countries having ratified.

UNFCCC agreement between committed signatories, "non-binding aim" to reduce atmospheric concentrations of greenhouse gases with the goal of "preventing dangerous anthropogenic interference with Earth's climate system.

Kyoto protocol is an international treaty extending the 1992 UNFCCC. It is an agreement negotiated as an amendment to the UNFCCC, which was adopted at the Earth Summit in Rio de Janeiro in 1992. All parties to the UNFCCC can sign or ratify the Kyoto Protocol, while non-parties to the UNFCCC cannot.

5.5.2 The Ramsar Convention on Wetlands of International Importance

Kenya ratified the Convention in June 1990. The Ramsar Convention on Wetlands is primarily concerned with the conservation and management of wetlands. Wetlands are defined by the Ramsar Convention as “areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salty, including areas of marine water the depth of which at low tide does not exceed six meters”. The National Wetland Standing Committee of Kenya’s Inter-Ministerial Committee on Environment (IMCE) defines wetlands as “areas of land that are permanently, seasonally or occasionally water logged with fresh, saline, brackish or marine water, including both natural and man-made areas that support characteristic biota” while EMCA defines wetland as “an area permanently or seasonally flooded by water plants and animals have become adapted. The project site is located along an ephemeral stream channel. For this reason, the proposed project is expected to strictly observe the Ramsar Convention’s principles of wise use of the wetlands in the project area.

5.5.3 Convention on Biological Diversity (CBD)

The CBD is one of the outcomes of the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. The CBD establishes a global legally binding framework for the conservation of biodiversity, the sustainable use of its components and the fair and equitable sharing of benefits arising out of utilization of genetic resources. The provisions of this convention should be taken into account in the conservation of various species of plants, animals and the variety of ecosystems in the project area.

5.5.4 The Rio Declaration and Agenda 21

The Rio Declaration and Agenda 21, the action plan for the 21st century are two non-legally binding instruments adopted by the 1992 United Nations Conference on the Environment and Development (UNCED). While the Rio Declaration contains general principles and objectives, Agenda 21 contains detailed guidance on their practical implementation. Principle 4 of the Rio Declaration provides that in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it. Principle 25 accentuates this by stating that peace, development and environmental protection are interdependent and indivisible. Principle 17 of the Rio Declaration provides that environmental impact assessment as a national instrument shall be undertaken for proposed activities that are likely to have a significant impact on the environment and are subject to a decision of a competent national authority.

5.5.5 The World Commission on Environment and Development

The World Commission on Environment and Development (Brundtland Commission of 1987) on “Our Common Future” focused on the environmental aspects of development, and emphasized on sustainable development that produces no lasting damage to the biosphere and to particular ecosystems. It postulates that economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resources. While social sustainable development is development that maintains the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for health and well-being, adequate nutrition, and shelter, cultural expression and political involvement. The key aspect of sustainability is the interdependence of generations. The concept of EIA is embodied in many multilateral environmental agreements.

6.0 ANALYSIS OF PROJECT ALTERNATIVE

6.1 Introduction

The analysis of alternatives should yield a well-informed decision on the optimal project design, based on consultations with stakeholders and experts. This calls for the comparison of feasible alternatives for the proposed project site, technology, and/or operational alternatives. Alternatives may be compared in terms of their potential environmental impacts, capital and recurrent costs, suitability under local conditions, acceptability by neighbouring land users, among other pertinent factors. This section analyses the possible project alternatives from various facets applicable to the proposed project. The major aspects that will be considered for alternatives are; project site, technology scale and waste management strategies.

6.2 Alternative Project Location

The proposed site was arrived at as a result of the already existing earth dam, topographical survey undertaken in the area and the agricultural potential through irrigation. The farm to be integrated also lies adjacent to the Ndathimi earth dam. The earth dam was designed to have a capacity of 5,000m³, with the rehabilitation activities, the dam will be increased to hold a capacity of 50,000m³ and hence its suitability in the current location. Relocating the proposed project to another site is not a viable option.

6.3 Alternative Design

The reservoir lies in an area that not close to important structures i.e. residential houses. Based on dam classifications as shown in Table 1, the dam is of low risk. The design has employed a simple technology that lowers the cost of construction based on the prevailing geographical formation. Based on area, height and storage, the earth dam is of low risk. Due to the huge risk of flooding neighbouring structures, the design team has resulted to designing the overflow spillway for the 1: 10,000 flood which is for the extreme risky conditions. The spillway has also been checked to ensure that it can accommodate the Probable Maximum Flood (PMF) flow within the available 1m free board without spilling at other parts of the pan structure. Embankment of the pan is of 300mm, with well compacted soil.

Sustainability of the proposed dam would enhance growth and development. This is because, water, just like energy is major factor determining growth and development in an area. Sustainability would mean the ability of the dam to continuously serve the proponent without adverse impacts within the project influence area. This would call for designs that would factor in maintenance of the pan that is cost effective. This translates to affordability of the proposed project. The identified dam design is fit for implementation of the project and need not to change.

6.4 Alternative Construction Material/Technology

The proposed project will be constructed using environmentally accepted and materials compliant to engineering standards but locally available materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. As noted on the previous section, the project will entail use of locally available materials like sand, red soil & polythene sheets or similar approved materials that would not have adverse impacts on the environment. The technology to be used is environmental friendly.

6.5 Alternative Water Source

Drilling of a borehole could be an alternative to the proposed earth dam project. But, as it is widely known, it is very hard to drill a borehole that can yield water adequate enough for all the agricultural uses. It is also known that boreholes dry up after sometime and that their water is not assured to be soft. Drilling of boreholes is also associated with drying of lands due to their effect on underground water levels; unlike surface water resources such as earth dam that lead to high levels of underground water as well as leading to creation of conducive micro-climates around them. Additionally, borehole in the area could be very expensive in terms of maintenance. Hence, drilling of a borehole is not a viable alternative to the proposed earth dam.

6.6 The No Project Alternative

Under the 'No Project' alternative, the Proponent would not carry out the intended construction works; the anticipated impacts resulting from commissioning and operation of the development as proposed, would not occur. Additionally, the resultant socio-cultural/economic benefits that would be created by the proposed development would also be foregone. Additionally, this option will lead to challenges experienced in providing water for various domestic uses and irrigation activities, this will deny the local residents the benefits associated with adequate water supply. From the analysis above, it becomes apparent that the "No Project" alternative is not suitable to the community.

6.7 Integrated Farming options

The proponent of the farm has decided on cultivation of fruits and vegetables using water from Ndathimi dam and rain fed for beans.

Under 'no project option', the farm would remain under-utilized under bush land conditions and the proponent, the community and the country would lose out on the economic and social benefits that will accrue from the project.

The farm design will be use of irrigation to undertake horticultural farming; application of fertilizer will be through the drip kits. Pesticide spray will be through centralised pump. Alteration of the farming design will lead to uncontrolled use of water, pesticide and fertilizer.

7.0 CONSULTATION AND PUBLIC PARTICIPATION

7.1 Introduction

Stakeholder Engagement and Public Participation Process particularly with local citizens affected by development proposals, is frequently construed as an integral aspect of successful decision making in the ESIA processes for major developments. As such, Public Participation is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58, on ESIA. It is an important process through which stakeholders including beneficiaries and members of public living in project areas (both public and private), are given an opportunity to contribute to the overall project design by making recommendations and raising concerns projects before they are implemented. In addition, the process creates a sense of responsibility, commitment and local ownership for smooth implementation. The Stakeholder Engagements were done in order to foster better mutual understanding, address concerns and incorporate opinions to this report. This chapter describes the process of public consultation and participation that was followed in order to identify the key issues and impacts of the proposed project.

7.2 Purpose and Objectives of the CPP

The purpose of the public consultation was to identify the positive and negative impacts and subsequently mitigate the identified impacts. It also helped in identifying other issues which may be the source of conflict during project implementation. The objective of the Public Participation as required in EMCA, (1999) was to disseminate information to the public about the proposed project with special reference to its key components and expected impacts.

7.3 Stakeholder Engagement and CPP Methodology

During the field data collection, in-depth consultations were held with the with key informants, the general public and the interested parties from the project area.

Public baraza, Focused Group Discussion (FGD) and interviews were used as a tool for data collection. The process provided an opportunity to the participants to raise their concerns about the proposed project and make recommendations on how negative impacts can be minimized. Questionnaires were also issued to these groups in order to gain much more information concerning the project and its impact on the environment. Interested and Affected Parties Consulted.

7.3.1 Key Informants Interviews

Relevant government departments and county departmental heads were consulted, standard questionnaires were administered and filled in by the directors/CECs of the relevant departments. The interviews also assisted in the identification of miscellaneous issues that if overlooked may introduce conflicts that may hamper the implementation of the project. The consultant presented the details of the project to the stakeholders. The following are the key stakeholders consulted:

- Water Resource Management Authority
- National Environment Management Authority
- Water Resources Management Authority
- Laikipia County Departments
 - ✓ Department of Water
 - ✓ Department of Agriculture, Livestock and Fisheries
 - ✓ Department of irrigation
- Ministry of interior (Chief)

Notes were taken from the discussions with the officers who opted not to fill in the questionnaires. A few KII questionnaires filled in by the departmental heads

7.3.2 Community Consultations

The Public participation meeting was held on 21st January 2020 at Karaba Location, Muhotetu farm. The views from the general public/local communities, local leaders, relevant institutions and development partners who in one way or the other would be affected by the proposed project were sought. The meeting was chaired by the area Senior Chief. The following issues were raised by the community members during public consultation with information sourced through structured questionnaires.

Expected project benefits:

- Farmers' economic self-improvement through income generated from the sale of irrigated horticultural crops
- Employment creation at the farm level, transport sector and marketing of produce
- Boosting horticultural sector through irrigation during dry seasons
- Optimal use of land for horticultural production, beekeeping, and fish farming.
- Environmental benefits from increased tree cover by the agroforestry and fruit trees
- Improved food and nutrition security and increased farm incomes.

Negative Concerns

- Noise pollution from earth-moving, excavation and compaction activities
- Non-employment of local youth in the project construction phase
- Vegetation loss and Dust pollution;
- Exhaust fumes generated by heavy earth-moving machines and transport trucks at dam excavation phase
- Fuel and oil spills from earth-moving machines, transport trucks may contaminate soil and water at the dam site.
- Noise and vibration from construction trucks/machineries/equipment's
- Accidents and hazards during construction that may affect workers and passers-by
- Generation of solid wastes from dam excavation activities

Proposal for improvement suggested include: -

- Give first priority to local community in employment during project implementation
- Undertake intensive tree planting at the site to rehabilitate it and control soil erosion
- Avoid water pollution from fuel and oil spills since downstream communities depend on the river for their domestic and livestock use
- If possible, the dam site should be fenced off to prevent accidental drowning of residents and livestock

7.3.3 Focused Group Discussion

FGDs were conducted at Karaba Location, Muhotetu Farm. To ensure adequate public participation in the ESIA process, FGD conducted was grouped for men and women (elderly, youth). The exercise was conducted by experienced experts using questionnaires designed in such a way that the concerns, comments and issues were comprehensively captured.

7.3.4 Need for the project

The locals are experiencing difficulties in accessing water in the area. Additionally, with water shortage, farming in the area is not possible. With rehabilitation and expansion of the already existing earth dam, the locals will practice farming through irrigation. With proposed integrated farming, the project will achieve the KCSAP main objective of increasing agricultural productivity, enhancing resilience to impacts of climate change and contribute to reduction in GHG emissions.

7.3.5 Project Support

The concerned stakeholders are in full support of the proposed. The project phases of (Construction, operation and decommissioning) should embrace the spirit of engagement throughout periods. this will provide an opportunity for addressing arising matters/ issues while at the same time ensuring sustainability of the earth dam.

8.0 IMPACTS IDENTIFICATION AND MITIGATION MEASURES

8.1 Introduction

Proposed project activities can bring about several potential impacts during implementation and operation of the project. The potential Impacts to the environment can be positive or negative, direct or indirect, reversible or irreversible. The extent of environmental impact is determined by its significance, adversity, temporary or permanent, long-term or short-term, localized or widespread. Some impact mitigation has already been proactively addressed in the design while others would be undertaken through incorporation in the implementation of the project and guided by the EMMP developed under this report.

8.2 Positive Impacts

8.2.1 During the Planning/Design Phase

8.2.1.1 Employment Opportunities

Creation of employment during the planning/design phase, especially for the professionals in the field of Engineering, Environment, Ecologists, Sociology among other relevant field. The engagement on the planning/design task will earn the professional fees bettering their lives.

8.2.1.2 Awareness Creation

Through consultation with relevant department and area leadership, a lot of awareness created on different aspects of the proposed project. Awareness on the proposed project for the community helps in identification of suitable site for the earth dam.

8.2.2 Construction and Operation Phase

8.2.2.1 Employment Creation

The construction activities will require skilled and unskilled labour; this will create employment opportunities for the community, Economically, it means abundant unskilled labour will be used. Socially these people will be engaged in productive employment and minimize social ills like alcohol abuse which is rampant in the project area.

8.2.2.2 Injection of money into the local economy

A large sum of the project money shall be released into the local economy due to the construction activities. This money will be in form of payments for skilled and unskilled labour; purchases of construction materials; and payments for local provisions including fuel, foods and accommodation.

8.2.2.3 Creation of market for construction materials

The project will require materials, most of which will be locally sourced within the project area. Some of this include sand and hard-core for the construction of the structures packaged with the earth dam including the water trough, latrine etc. Local suppliers will be given first priority in supply of construction materials.

8.2.2.4 Flood control

The dam will receive run off from ephemeral seasons streams, during rainy season the streams can control flood havoc in the area. Run off and the water from the streams will be stored averting possible flood in the area. The cover crops grown will enhance water infiltration, reducing flooding.

8.2.2.5 Water Accessibility

The locals will access water for domestic use and their livestock from the dam. Through farming activities, the locals' livelihood will improve in return.

8.2.2.6 Environment Conservation

During rainy season, surface run off water and the ephemeral streams water goes to waste. The earth dam will immensely conserve the water by tapping the rain water. Retained water would be used in further construction works, farming activities etc. reducing pressure on available water resources. Agroforestry farming will help improve environmental set up of the area.

8.2.2.7 Land value increase

With easy accessibility of water, the land neighbouring the dam will increase in value. The land can be used for crop production and hay through irrigation using water from the dam.

8.2.2.8 Improved food security

With water availability in the pan, the locals can do farming to grow crops and hay for the livestock. Food production will be greatly boosted in the area. Food production of diversified food sources like Fish, fruits, vegetables, pulses and cereals.

8.3 Negative Impacts

8.3.1 During Construction Phase

8.3.1.1 change of Physical Setting

The proposed construction activities will interfere with the physical setting of the site. Excavation works and embankment of the earth dam will change the local topography. Laying of pipes will require trenches dug. Ephemeral streams flow set up will be interfered with affecting water quantity downstream and the set up downstream.

Mitigation measures

- The structures to be developed should be aesthetically acceptable to blend in with the surrounding;
- Restoration shall be undertaken to ensure that the original setting is as much as possible retained;
- The design shall in no way propose to implement developments that will hinder drainage or introduce physical changes that are not in harmony with the physical setting of the project area.

8.3.1.2 Noise and Vibration

Construction of the proposed project will most likely result in noise emissions as a result of the machines that will be used and vehicles delivering materials to site. Noise can be a nuisance to the local community if drilling works begin too early in the day and continues into the night. The project proponent through the contractor shall put in place several measures that will mitigate noise pollution during the construction phase. The following noise-suppression techniques will be employed to minimize the impact of temporary construction noise at the Project site.

Mitigation

- Best available work practices will be employed on-site to minimize occupational noise levels;
- All equipment will be regularly inspected and maintained in good working condition;
- Provision of appropriate PPE e.g. ear muffs, to the workers working with noise producing equipment;
- Limit construction activities between 8am-5pm;
- Use equipment designed with noise control element.

8.3.1.3 Ambient Air Quality (Dust and Fumes)

Construction vehicles and machineries will emit fumes from the exhaust causing air pollution. Excavation works and construction vehicles will emit dust. This is likely to affect site workers, in extreme situations leading to respiratory problems. The following mitigation measures are suggested for implementation to reduce the impacts.

Mitigation

- Any stockpiles should be watered during dry or windy conditions to reduce dust emissions;
- Construction trucks removing soil from the site, delivering sand and cement to the site should be covered to prevent material dust into the surrounding areas;
- PPE should be provided to all personnel in areas prone to dust emissions throughout the period of construction;
- Maintain all machinery and equipment, including the generator, in good working order to ensure minimum emissions including carbon monoxide, NO_x, SO_x and suspended particulate matter;
- Construction equipment's to be acquired should utilize the latest technology to have minimum emission
- Diesel equipment to be equipped with gas absorbers

8.3.1.4 Solid waste generation

Construction activities of the dam will result in the generation of spoil materials and debris. Packing papers, plastics, cuttings and trimmings of materials will be generated at the site. Dumping around the site will interfere with the aesthetic status and has a direct effect on the surrounding community. Disposal of the same solid wastes off - site could also be a social inconvenience if done in the wrong places. The off-site effects could be aesthetic, pest breeding, pollution of physical environment including water resource, invasion of scavengers and informal recycling by communities.

Mitigation

- Maximizing the re-use of excavated materials in the works as far as feasible to ensure that no permanent spoil dumps are created;
- Properly disposing off the spoil in an area identified by the design team and approved by the confirmed land owners as well as by NEMA;
- Construction waste should be recycled or reused as much as possible to ensure that materials that would otherwise be disposed-off as waste are diverted for productive uses
- Appropriate measures should be in place for construction materials estimation to minimise wastage;
- Skips and bins should be strategically placed within the labour campsite to avoid littering; and
- Appropriate measures should be in place to ensure that waste materials from the project are disposed at suitable sites.

8.3.1.5 Loss of Biodiversity

Expansion and construction of the earth dam will involve site clearance and excavation; this will lead to loss of vegetation cover. Additionally, habitat will be destroyed. Soil organisms like, protists, microfauna, bacteria, mesofauna and fungi can be affected, the geological and physical characteristics of the site will hence be altered by the development. It was however noted that, a relatively smaller area will be occupied.

Mitigation

- Properly demarcate the project area to be affected;
- Excavations of the site will be confined only within the sections upon which the earth dam construction is taking place;
- Strict control of construction vehicles to ensure that they operate only within the area to be disturbed by access routes and other works; and
- The earth removed for external disposal will require to be deposited on sites without the risk of being washed down during rains and where it will not compromise other land use activities in those areas;

8.3.1.6 Soil contamination

The principal chemicals held on the site during the construction site are likely to be vehicle fuel and greases/ oils. Accidental spills and leakages are bound to occur from the construction vehicles/machineries. Spillage or escape of such compounds are likely to have an immediate impact upon the local water resources and consequently on the terrestrial and aquatic flora and fauna. The most appropriate options for spill management are as follows:

Mitigation

- Always make use of drip trays in maintenance areas;
- Refuelling and repair of construction equipment's' should controllably done;
- Periodic maintenance of the machineries should be done to avoid oil leaks soil;
- Fuel storage tanks should be placed on concrete plinths and bunded;
- Bioremediation plan should be established for the purpose of oil contaminated soils;
- Any contaminated soil at the site should be collected for proper disposal by an authorised waste handler.

8.3.1.7 Soil Erosion

The activities involved in the site preparation and construction phase of the development may have impacts on soil and geology of the project site. This is due to the removal of vegetation from the site exposing considerable areas of soil to the elements, which may result in soil erosion. Heavy machinery will be traversing the site due to the construction activities this may lead to soil compaction and erosion of the soil. Uncontrolled soil erosion can have adverse effects on the earth dam, leading to sedimentation and turbidity.

Mitigation

- Excavation should be done under controlled conditions which will include minimizing vegetation removal, avoiding creating large open expanses of bare soil, creating wind breaks.
- Using of single/few designated tracks to bring materials into the area
- Always keep construction vehicles off bare soil to avoid compaction of soil

8.3.1.8 Occupational Safety and Health/Public Safety

Anticipated health and safety risks will include; fire, inhalation of fumes and physical injury from workplace accidents. Construction workers are likely to have injuries and hazards as the construction works unavoidably expose workers to occupational health and safety risks. The workers are also likely to be exposed to risk of accidents and injuries resulting from accidental falls, injuries from hand tools and construction equipment.

Mitigation

- proponent will be required to commit the contractor to site Occupational Health and Safety rules and regulations;
- Only qualified personnel should operate the construction machinery;
- The project contractor will be required to provide appropriate PPE and a safe and healthy environment for construction workers;
- There should be an emergency response plan in place;
- Designate a Health and Safety officer to be in charge of enforcing site compliance with OSH rules and regulations;
- The project contractor should train workers on how to use various PPE;
- Provide adequately stocked first aid kit and at least one trained first aider on site;
- Clearly display safety warning signs for use by the workers and the general public;

8.3.1.9 Spread of Disease

During the construction phase there is a risk of spread of communicable and infectious diseases. Aspects of the physical environment that promote transmission of diseases include: disposal of wastes; ventilation and unprotected sex which are likely to occur during the construction phase of the project. Labour camps including workers' living and eating areas; grounds where equipment will be stored and serviced; and where construction materials will be stockpiled is likely to bring a temporary influx of migrant workers. This may stimulate business in the project area and also propagate the spread of STI's including the dreaded syndrome of HIV/AIDS. There could also be cases of unwanted pregnancies as the migrant workers interact and get into relationships with the local people.

Mitigation

- Ensure awareness raising on proper sanitation and personal hygiene to promote proper health;
- Institute HIV awareness and prevention campaign amongst workers for duration of the contract; and
- Education and sensitization of workers and the local people on STI and provision of Condoms to the project team and the public.
- Public Health Officer to sensitize the migrant workers on risky sexual behaviour;
- The contractor and project contractor to provide shelter, toilets, washing facilities and adequate water supply onsite for the construction workers

8.3.2 During Operation Phase

8.3.2.1 Risk of drowning

Drowning in earth dams/pans is a major risk for young children If left unfenced, steps have to be in place in order to reduce the risk. The following steps should be taken towards mitigating the risk of drowning.

Mitigation

- Properly fence of the earth dam and clearly display safety signage of no authorised entry to reduce the risk of drowning;
- Draw-off system should be in place to prevent the risk;
- Raise awareness with the community on the risk of drowning; and
- Provide accessible safety floatation rings.

8.3.2.2 Spread of Water Borne Disease

Ndathimi dam once complete will provide water for domestic and livestock use. Being an upon source, the water can easily be contaminated causing water borne disease risk if the water is untreated. The following measures should be taken to reduce the cases:

Mitigation

- Capacity building with the community on proper water handling process;
- Raise awareness on risks of open defecation and proper domestic water handling;
- Limit/restrict access to the earth dam by animals and human beings by fencing of the site;
- Provide water troughs and taps for human beings to draw water from; and
- Domestic water users should be guided on how to acquire and use household water treatment options

8.3.2.3 Water Quality (Pollution)

In its operation stage, water quality can easily be interfered with. High turbidity and catchment contamination. Agrochemicals can further contaminate the dam water.

Mitigation

- Reduce water turbidity by use of gravel/sand filters;
- Use pesticide/herbicide on the farm controllably;
- Consider use of organic fertilizer;
- Provide basic training to committee members on pan water quality and establishing good catchment condition; and
- Creating vegetated buffer within the catchment area.

8.3.2.4 Water Use Conflict

The area being water scarce region; conflict may arise of the water resource. These can be resolved/managed through the following steps:

Mitigation

- Establishment of communication channel between the representatives of the community (pan committees) and the responsible organisation or administration at the County level;
- Establish water users' association to guide on water usage and solving conflicts;
- Formation of bylaws in regard to conflict resolution;
- Establishment and disclosure of grievance mechanisms; and
- Notify downstream water users, WRMA and WRUA of likely changes in water quality and quantity

8.3.2.5 Flooding

Overflow of the earth dam can easily cause flooding of the nearby areas if proper measures are not in place.

Mitigation

- Properly design the embankment to the approved standards to avoid failure;
- Accordingly determine the spillway dimensions;
- The design of the earth dam should be taken into consideration/strictly followed by the contractor to avoid potential flooding;
- Provide sufficient freeboard as per the design; and
- Develop the embankment at layers of 300mm and properly compacted

8.3.2.6 Soil erosion

With poorly designed inflow and under estimated spillway dimension. Water flow can easily cause erosion. The following should be in consideration to protect the area from erosion.

Mitigation

- Promote soil conservation measures in the area through use of check dams, gabions and cut-off drains
- Landscaping using the right indigenous species should be done in the area and on the embankment
- Proper lining of the earth dam with gabions or pitched stones
- Stabilize the embankment through grassing

8.3.2.7 Sedimentation

Due to soil erosion, particles may eventually find their way to the earth dam; this as a result will shorten the life span of the dam. Proper soil conservation measures should be implemented in the catchment area.

Mitigation

Incorporate silt traps in the design of the earth dam to help reduce sediments loads which could in turn reduce the storage capacity of the earth dam.

8.3.2.8 Grazing Land Loss

The Proposed project would normally have a significant effect on the community pasture land. NIB should consider improving the remaining grazing land through plantation of fodder trees and hay.

8.3.2.9 Eutrophication of the Dam

Run off from the farms and fish feeds remains may cause eutrophication of the dam. Eutrophication of the dam will lead to blocking of oxygen from the fish causing loss of the stock.

Mitigation

- Run off from the structure at the shore should be properly controlled
- Effluent from the structure outside the water body should be treated properly before discharge
- Monitor feed rates to avoid overfeeding

8.3.2.10 Fish Mortalities

Lack of oxygen, parasites and disease easily leads to mortalities of the fish stock. This in turn affects the water quality.

Mitigation

- Daily routine of collecting mortalities on the farm will be conducted
- All mortalities should be disposed in a proper way
- Closely monitor the fish stock

8.3.3 During Decommissioning Phase

Decommissioning phase in the project cycle is wind up of a project's operational activities. It refers to a project's life span end and involves removal of associated materials at the expiry of the project. If such a stage is reached, the proponent needs to remove all materials resulting from the decommissioning of the site. The impacts projected to arise at a possible decommissioning phase of the project require proper handling to ensure that the impacts have low significance. Such mechanism should include water users appropriately served with notice allowing them adequate time. Further, the proponent would undertake a due diligence safety and environmental audit to identify and mitigate any impacts that may arise from decommissioning of the earth dam. Among the dangers/impacts of the project decommissioning includes:

- (i) Site degradation
- (ii) Solid wastes
- (iii) Soil erosion and
- (iv) Public safety

The following mitigation measures should be in place:

- Remove all underground facilities from the site e.g. pipes to the water drawing point
- The site should be well landscaped by flattening the mounds of soil and planting indigenous trees and flowers
- All the equipment should be removed from the site
- Fence and signpost unsafe areas until natural stabilization occurs
- Backfill surface openings if practical.

9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

9.1 Purpose and Objective of Environmental Management Plan

EMMP is a very important output of an environmental impact assessment, it provides the framework for project monitoring and evaluation/audit. The EMMP for the proposed project outlines all the proposed mitigation measures for addressing the identified adverse environmental impacts as well as a monitoring program for parameters that indicate if mitigation was working for each of the identified impact as proposed in chapter 8. The proponent will monitor how well the mitigation measures have been implemented and if they were working in redressing identified impacts.

Environmental monitoring and audit are essential in project's lifespan as they are conducted to establish if project implementation has complied with set environmental management standards for Kenya as spelt out in EMCA 1999, The EEIA/EA Regulations, 2003 and their subsequent amendment as of EMCA (Amendments) 2015 and EIA/EA (amendments) Regulations 2019.

In line to the identified impacts, a comprehensive EMMP has been developed for the whole of the project cycle. Onsite environmental supervisor should be trained to oversee the project, looking into issues such as environmental integrity, site health and safety and the welfares of the community and the workers. Additionally, environmental and social issues such as noise, dust emissions, water use, clearing and disposal of debris, and the workforce's welfare issues have been addressed in this project report. Responsibility for the incorporation of mitigation measures for the proposed development lies with the contractor and the beneficiary community, who must ensure specified mitigation measures are implemented. The mitigation measures provided are not entirely exhaustive, but would require in situations where more appropriate and cost effective measures are found, are adopted to address the issues or concerns during the project cycle.

Table 5: ESMMP for the project cycle (Planning-Decommissioning)

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
Planning/ Design Phase						
Acquisition of relevant permits, licenses and payment of levies	<ul style="list-style-type: none"> Acquire all the relevant licenses and permits before commissioning of the project. The permits should be renewed required by the regulations. 	Availability of all requisite permits, licenses etc.	<ul style="list-style-type: none"> PMC/Proponent 	Proof of requisite licenses, permits or payment of fees or levies	Annually/depending on the terms of license	Internal cost
Construction Phase						
Loss of biodiversity	<ul style="list-style-type: none"> Properly demarcate the project area to be affected Strictly confine site excavation works only within sections which the construction shall take place 	Biodiversity and habitat conservation	<ul style="list-style-type: none"> Contractor PMC 	<ul style="list-style-type: none"> Vegetation cover on all open spaces around the site Number of trees 	Continuous	30,000
Noise pollution and vibrations	<ul style="list-style-type: none"> Strictly stick the construction hours to between 0800Hrs-1700Hrs to avoid disturbance to the neighbours Provide ear muffs to construction workers Select construction 	Reducing level of noise emanating from the site	<ul style="list-style-type: none"> Contractor 	Noise levels from the site (Decibels)	Continuous	1000/ ear muff

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
	equipment on the basis of noise minimization <ul style="list-style-type: none"> • Construction equipment's' should conform to the set noise standards • Monitor levels of noise emanating from the site 					
Ambient air quality (fumes & dust)	<ul style="list-style-type: none"> • Equip diesel equipment's/machineries with gas absorbers • Equipment/machineries acquisition will be based on technology to have minimum emission • Provide PPE to the workers e.g. dust masks • Properly cover the stock piles with tarpaulins • Maintain all machinery and equipment in good working order to ensure minimum emissions • Use diesel with low Sulphur content • Frequently monitor emissions from the equipment's/genset if any 	<ul style="list-style-type: none"> • Dust suppression • Reduction of gas and fumes from diesel powered machines 	<ul style="list-style-type: none"> • PMC • Contractor 	<ul style="list-style-type: none"> • Emission levels • Visual assessment 	Weekly- emissions	30,000/sample 20,000-PPE

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
Soil contamination	<ul style="list-style-type: none"> • Make use of drip trays in maintenance areas (Service bay) • Undertake refueling and repair of the construction equipment's at a designated area • Establish a proper bioremediation plans for the oil contaminated soil • Keenly observe all the equipment's not to leak oil on the ground • Undertake regular maintenance of the construction machineries • Place fuel storage tanks on concrete plinth and bunded • Use NEMA designated waste handler in collecting contaminated soil 	<ul style="list-style-type: none"> • Prohibiting soil contamination 	<ul style="list-style-type: none"> • Contractor • PMC 	<ul style="list-style-type: none"> • Fuel/oil spillage • Vehicle maintenance area 	Continuous	O&M Cost

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
Solid waste generation	<ul style="list-style-type: none"> All materials from the site excavation activities should be re used- for embankment, earthworks and landscaping Plastic wastes, polythene bags should be returned to the supplier or re used Clear the site of all debris and restore it to the acceptable state Provide bins/waste receptacles at strategic points around the site area Put integrated solid waste management system into use i.e. reduction-recycling-composting-reuse 	<ul style="list-style-type: none"> Waste management Improving aesthetic of the area 	<ul style="list-style-type: none"> Contractor PMC 	<ul style="list-style-type: none"> Waste free site Waste receptacles availability 	Continuous	200,000
Occupational safety and health	<ul style="list-style-type: none"> Personnel at construction site to wear complete PPE at all times Provide firefighting equipment at the site Put in place an ERP 	<ul style="list-style-type: none"> Accident minimization Enhance public and workers safety 	<ul style="list-style-type: none"> Contractor PMC 	<ul style="list-style-type: none"> Accident free OSH register ERP in 	Continuous	300,000

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
	<ul style="list-style-type: none"> • Only qualified personnel should operate construction machinery • Designate a Health & Safety officer to be in-charge of enforcing site compliance with OSH rules & regulations • Provide adequately stocked first aid kit and at least one trained first aider on site • Clearly display safety warning signs in different points and the contact numbers of the persons responsible for handling emergencies on the site • Contractor should have workmen compensation cover which should comply with workmen compensation Act • Subject all plant equipment to a routine maintenance programme to ensure they are in good working order, 			<ul style="list-style-type: none"> • PPE use 		

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
	minimizing health and safety risks <ul style="list-style-type: none"> All workers to go through safety and health inductions upon employment. 					
Spread of disease	<ul style="list-style-type: none"> Ensure awareness raising on proper sanitation and personal hygiene. Treat affected local and migrant workers to control the movement of disease vectors. Provide personal hygiene facilities in good condition Educate and sensitize workers and the local communities on STIs including provision of condoms to the project team and the public Institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract 	<ul style="list-style-type: none"> Reducing infectious communicable disease both and 	<ul style="list-style-type: none"> Contractor PMC 	<ul style="list-style-type: none"> Healthy community HIV write up 	Continuous	100,000

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
Operation Phase						
Increased spread of water borne disease (Public health)	<ul style="list-style-type: none"> • Proper capacity building with the community on proper water handling • Erect fence around the earth dam to restrict/limit access by animals and human beings • Provide water troughs and taps for human being to draw water from metres away from the pan • Guide the domestic water users on how to acquire and use household water treatment options • Proper hygiene, sanitation within the site locality and around the site 	<ul style="list-style-type: none"> • Reducing cases of water borne disease • Locals access to clean water 	<ul style="list-style-type: none"> • Contractor • PMC • Community 	<ul style="list-style-type: none"> • Water borne disease cases • Household water treatment methods 	Continuous	300,000
Risk of drowning	<ul style="list-style-type: none"> • Properly fence off the earth dam to reduce the risk of drowning • Provide draw-off system in the design • Raise awareness within community regarding the risk of drowning and • Provide accessible safety flotation rings 	<ul style="list-style-type: none"> • Reducing drowning risk 	<ul style="list-style-type: none"> • WUA • PMC • Contractor 	<ul style="list-style-type: none"> • Drowning cases reported 	As required	300,000

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
Water quality (Pollution)	<ul style="list-style-type: none"> • Use gravel/sand filters to reduce water turbidity • Properly control soil erosion through; mulching, among other methods • Maintain good catchment condition to avoid degradation; • Enlighten the locals on proper waste management • Closely monitor fishing activities in the dam • Provide basic training to committee members on dam water quality • Create vegetation buffer within the catchment area • Frequently monitor the quality of water 	<ul style="list-style-type: none"> • Improving water quality • Protecting the water from contamination/pollution 	<ul style="list-style-type: none"> • PMC • Contractor • Community 	<ul style="list-style-type: none"> • Water quality monitoring • Trees, shrubs and ground cover 	Continuous/ required as	100,000 20,000/sample
Water use conflict	<ul style="list-style-type: none"> • Establish proper communication channels between the community and/representatives 	To make sure all the stakeholders are comfortable with the project.	<ul style="list-style-type: none"> • PMC • Community 	<ul style="list-style-type: none"> • Number of meeting held • WRUA 	Continuous/ required as	

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
	<p>(pan committee) and the responsible organisation or administration at county level</p> <ul style="list-style-type: none"> • Establish WUA to guide on water usage and solving conflict • Formulate of bylaws in regard to conflict resolution • Establish and disclose grievance mechanism • Notify downstream water users, WRMA and WRUA of likely changes in water quality and quantity 					
Flooding	<ul style="list-style-type: none"> • Properly design embankment to avoid the pan failure • Accordingly determine the spillway dimensions • Provide sufficient freeboard as per the design • Develop the embankment at layers of 300mm and properly compacted 	Flood control around the site	<ul style="list-style-type: none"> • The MoA, L, F&I • Contractor 	Flood control measures	Continuous	

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
Soil erosion	<ul style="list-style-type: none"> • Restrict livestock access near the earth dam • Promote proper soil conservation e.g. use of check dams, gabions and cut-off drains. • Undertake grassing of the embankment. • Lining the pan with gabions or pitched stones • Stabilizing embankment through grassing 	Protecting Soil from erosion	<ul style="list-style-type: none"> • PMC • WUA • Community • Contractor 	Soil erosion control measures in place	Continuous	
Sedimentation	<ul style="list-style-type: none"> • Incorporate silt traps in the design to help reduce sediments loads. • Minimise site disturbance 	Controlling Siltation/sedimentation	<ul style="list-style-type: none"> • PMC • Contractor 	Sediment control/water turbidity	As required/Continuous	
Fish disease/parasite	<ul style="list-style-type: none"> • Practice proper husbandry practice • Monitor the brood stock for sign of disease/parasite 	Pasture land protection Prevent de-vegetation	<ul style="list-style-type: none"> • Community 	Pasture availability	Continuous	10,000
Decommissioning Phase						
Site degradation/Land dereliction	<ul style="list-style-type: none"> • Properly flatten the site and landscaped well with indigenous trees • Implement an appropriate landscaping and re-vegetation 	Public safety Land management	<ul style="list-style-type: none"> • PMC • Community • Contractor 	Backfilling and landscaping of the area	One off	100,000

Environmental Impacts	Mitigation Measure/s					
Impact domain	Mitigation/s Remedial Action/s	Mitigation target	Implementing agency (ies)	Monitoring Indicators	Frequency	Cost/s (Kshs)
	<p>programme to restore the site to its original status</p> <ul style="list-style-type: none"> Fence and signpost unsafe areas until natural stabilization occurs 					
Solid wastes	<ul style="list-style-type: none"> Safe disposal of waste materials such as concrete rubble, steel, disused pipes etc. 	<p>Waste management Aesthetic of the area</p>	<ul style="list-style-type: none"> PMC Contractor 	Waste management	One off	30,000
Soil erosion	<ul style="list-style-type: none"> Plant grass and other native vegetation at the site. Maintain soil conservation works until the site stabilizes. 	Soil conservation	<ul style="list-style-type: none"> Contractor 	Plant cover	One off	20,000
Public safety	<ul style="list-style-type: none"> Secure all unsafe and potentially dangerous areas. Provide safety warning signs. 	Public safety/ reduced risk	<ul style="list-style-type: none"> PMC Contractor 	Secured site area	One off	30,000
Water shortage	<ul style="list-style-type: none"> The in line ministry to prepare communities for a transition strategy when de-commissioning. Alternative water sources should be developed. 	Water stress reduction	<ul style="list-style-type: none"> PMC 	<p>Water availability Awareness created</p>	One off	Internal cost

10.0 CONCLUSION AND RECOMMENDATIONS

10.1 Conclusions

The environmental impacts from the implementation of this project are minimal and can be adequately addressed by putting in place the proposed mitigation measures to ensure that they pose no threat to the environment or any danger to the community. On the basis of all the information gathered in the field, the dam construction and abstraction of water from the dam will fulfil the water requirements for the community and enable them to expand horticultural production at their farms. Consequently, incomes and employment opportunities will increase and the economic growth of the area will be realized. Additionally, the project will sustainably improve agricultural production and as a result of it food security in the project area and Kenya at large; create rural employment opportunities for vulnerable groups; reduce overgrazing pressure on the local ecosystems; and champion the SHG in becoming a leading regional food producer.

In general, there are no environmental risks or projected negative social impacts which will not be accounted for through implementation of the ESMP. The mitigation measures proposed for every impact will adequately ensure that the identified negative impacts are fully addressed. Environmental Monitoring and Evaluation will be integrated into the project through the line ministry. Therefore, it is recommended that the ESIA project report be approved subject to compliance with the EMMP and applicable laws.

10.2 Recommendations

From the foregoing discussions, below recommendation should be considered:

- a) The proposed mitigation measures should put in place. Soil erosion, pollution and land degradation impacts that may occur can be effectively alleviated. All the identified negative impacts on the natural environment are all localized and confined mostly to the project area.
- b) Training/awareness creation on sustainable water use to prevent or reverse water scarcity in the area.
- c) Put in place proper management of occupational health and safety hazards which could be injurious to human health. Such impacts are significant and irreversible, and it is therefore critical to put in place proper mitigation measures as provided.
- a) Construction works in the planned project be carried out in accordance with approved designs, regulations, policies and laws;
- b) An action plan for catchment protection and conservation be developed and implemented in line with the requirements of the EMCA and any other applicable laws;

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ANNEXES

Annex I	Self Help Group Reg. Certificate
Annex II	Project Layout Plans
Annex III	Land Allocation document(s)
Annex IV	Minutes of CPP Meeting
Annex V	List of Stakeholders Consulted
Annex VI	Pictorial Presentation
Annex VII	NEMA Practicing License for the Lead Expert

Annex I: Self Help Group Reg. Certificate

Project Budget

PROJECT COMPONENT	TOTAL COST KSH
Dam de-silting and rehabilitation	18,947,000
Drip irrigation kit	979,365
Mango and Avocado Orchards establishment	1,452,000
Beans establishment (Seeds and herbicides)	960,000
Langstroth beehives package	520,000
Establishment of agroforestry and fruit trees nursery	732,000
Procurement of Fish fingerlings	630,000
Capacity building and project management	1,500,000
Total (Amount requested from KCSAP)	25,720,365
Community Contribution	2,332,000
Grand total	28,052,365

Annex II: Project Layout Plans

Annex III: Land Allocation Document(s)

Annex IV: Minutes of CPP Meeting

Annex V: List of Stakeholders Consulted

Annex VI: Pictorial Presentation



Current status of the Ndathimi Earth



Land adjacent to the earth dam to be utilized for irrigation farming



Stakeholder engagement at the proposed site-Karaba location



Consultant briefing the participants on the project scope/component



View of the dam surrounding- with grass/bush/shrubs



FGD at Karaba Location-Project site

Annex VII: NEMA Practicing License for The Lead Expert