



2019

# ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT



Project location zone 37N Northing 379756.171m Easting 718322.898 m

## ESIA STUDY REPORT

### FOR THE PROPOSED Rehabilitation of Gari water pan PROJECT

MCG

## Certification

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**For: KCSAP Mandera County-2019**

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## ACKNOWLEDGEMENT

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To all persons that contributed in one way or another to ensure the success of this ESIA and have not been mentioned, kindly receive our appreciation.

## ACRONYMS

CPP	Consultation and Public Participation
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act, 1
EMS	Environmental Management System
ERP	Emergency Response Plans
EM&MP	Environmental management and Monitoring Plan
FPC	Farmers Project Committee
GoK	Government of Kenya
HIV/AIDS	Human Immuno Deficiency Sysndrome
LR	Land Registration
MOA	Ministry of Agriculture
MOWI	Ministry of Water and Irrigation
NEAP	National Environmental Action Plan
NEMA	National Environment Management Authority
OSHA	Occupational Health and Safety Act
PSCC	Pilot Scheme Coordinating Committee
TORs	Terms of Reference
WARMA	Water Resource Management Authority
WUA	Water Users Association
MCG	Mandera County Government

# Contents

CERTIFICATION .....	I
ACKNOWLEDGEMENT .....	III
ACRONYMS .....	IV
LIST OF TABLES .....	IX
LIST OF FIGURES .....	X
LIST OF ANNEXURES .....	XI
EXECUTIVE SUMMARY .....	XII
5.1 INTRODUCTION .....	XII
5.2 CLIMATE SMART AGRICULTURE .....	XII
5.3 GARI REHABILITATION WATER PAN PROJECT .....	XIII
5.4 SPECIFIC PROJECT OBJECTIVE .....	XIII
5.5 ESIA OBJECTIVE .....	XIII
5.6 JUSTIFICATION OF THE NEED OF THE REHABILITATION OF GARI WATER PAN .....	XIII
5.7 ESIA METHODOLOGY .....	XIV
5.8 POLICY, LEGAL AND REGULATORY FRAMEWORK .....	XIV
5.9 MAIN PROJECT COMPONENTS .....	XIV
5.10 PROJECT COST .....	XIV
5.11 SUMMARY OF IMPACT FINDINGS .....	XIV
5.12 POSITIVE IMPACTS .....	XV
5.13 MITIGATION MEASURES .....	XVI
<b>CHAPTER 1: INTRODUCTION .....</b>	<b>1</b>
1.1 BACKGROUND .....	1
<b>1.1 CLIMATE SMART AGRICULTURE .....</b>	<b>1</b>
1.2 SPECIFIC PROJECT OBJECTIVES .....	1
1.3 ESIA OBJECTIVES .....	1
1.4 TERMS OF REFERENCE .....	2
1.5 PROJECT JUSTIFICATION .....	3
1.6 STUDY METHODOLOGY .....	3
1.7 ESIA SCOPE .....	5
<b>CHAPTER 2: PROJECT DESCRIPTION .....</b>	<b>7</b>
2.1 PROJECT LOCATION .....	7
2.2 DESIGN CONCEPT .....	7
2.2.1 Overview .....	7
2.2.2 Inlet .....	7
2.2.3 Silt trap .....	7
2.2.4 Water reservoir .....	7
2.2.5 Filtration chamber .....	8
2.2.6 Draw off system .....	8
2.2.7 Community tap stand: .....	8
2.2.8 Cattle trough .....	8
2.3 PROJECT COST .....	9
2.4 PROJECT ACTIVITIES .....	9
2.5 PROJECT INPUTS .....	10
2.5.1 Land .....	10
2.5.2 Public and Workers Access .....	10
2.5.3 Sanitary Provision .....	10

2.5.4	Labour Supply .....	10
2.5.5	Construction material .....	10
<b>CHAPTER 3:</b>	<b>BASELINE CONDITIONS .....</b>	<b>11</b>
3.1	BIO-PHYSICAL ENVIRONMENT LOCATION .....	11
3.1.1	Physiography and Drainage.....	11
3.1.2	Climate.....	11
3.1.3	Rainfall.....	12
3.1.4	Temperature .....	13
3.1.5	Agro-ecological zone.....	13
3.2	TOPOGRAPHY .....	14
3.3	SOILS .....	14
3.4	WIND .....	14
3.5	SUNSHINE.....	14
3.6	VEGETATION .....	15
3.7	FAUNA .....	15
3.8	SOCIAL ECONOMIC SETUP .....	16
3.8.1	Population Size.....	16
3.8.2	Land Use .....	16
3.8.3	Total water Demand Estimates .....	16
3.9	HEALTH ACCESS AND NUTRITION .....	16
3.9.1	Health Access (Health Facilities, Personnel) .....	16
3.9.2	Morbidity .....	16
3.9.3	Nutritional Status.....	16
3.9.4	Immunization Coverage.....	16
3.9.5	Access to Family Planning Services/Contraceptive Prevalence.....	17
<b>CHAPTER 4:</b>	<b>NATIONAL POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK .....</b>	<b>18</b>
4.1	GENERAL OVERVIEW .....	18
4.2	NATIONAL POLICY FRAMEWORK .....	18
4.3	NATIONAL LEGAL FRAMEWORK.....	18
4.3.1	The Environmental Management and Coordination Act, 1999 .....	19
4.3.2	The Forest Act .....	20
4.3.3	The Public Health Act (Cap. 242).....	20
4.3.4	The Occupational Health and Safety Act (2007) .....	20
4.3.5	Water Act (2002) .....	21
4.3.6	Water Resource Management Rules (2007) .....	21
4.3.7	Water Quality Regulations (2006) .....	23
4.3.8	Local Government Act (Cap 265) .....	23
4.3.9	The Land Planning Act (Cap 303).....	24
4.3.10	Building Code By-Laws.....	24
4.3.11	Waste Management Regulations (2006) .....	25
4.3.12	Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 .....	25
4.3.13	Irrigation Act (CAP 347).....	26
4.3.14	Wildlife Conservation and Management Act (CAP 376).....	26
4.4	NATIONAL ADMINISTRATIVE FRAMEWORK .....	26
4.4.1	The National Environment Council .....	26
4.4.2	The National Environment Management Authority .....	27
4.4.3	The Standards and Enforcement Review Committee.....	27
4.4.4	Energy Regulatory commission.....	27
4.4.5	Key Institutional Organs .....	27
4.5	WORLD BANK SAFEGUARDS POLICIES.....	27
4.5.1	Policy OP/BP 4.01 Environmental assessment.....	28
4.5.2	Policy OP/BP 4.04 Natural habitat.....	28



4.5.3	OP/BP 4.36 Forests .....	28
4.5.4	OP/BP 4.10 Indigenous people.....	28
4.5.5	OP/BP 4.11 Physical Cultural Resources .....	29
4.5.6	OP/BP 4.12 Involuntary Resettlement .....	29
4.5.7	OP/BP 4.09 (Pests Management) .....	29
4.5.8	OP/BP 4.37 (Safety of Dams) .....	29
5.14	INTRODUCTION.....	30
5.15	SIGNIFICANCE OF ALTERNATIVES .....	30
5.16	THE 'NO PROJECT' ALTERNATIVE .....	30
5.17	ALTERNATIVES IN PROJECT DESIGN(S) TECHNOLOGY .....	31
5.18	6.4 ALTERNATIVES FOR CONSTRUCTION PROCESS .....	31
5.19	6.5 ALTERNATIVES FOR SITE.....	31
<b>CHAPTER 6:</b>	<b>CONSULTATIVE PUBLIC PARTICIPATION .....</b>	<b>32</b>
6.1	OVERVIEW.....	32
6.2	OUTCOME OF STAKEHOLDER'S CONSULTATIVE MEETINGS .....	33
6.2.1	<i>Socio-economic concerns</i> .....	33
6.2.2	<i>Environmental Concerns</i> .....	33
6.3	SUMMARY OF COMMENTS DURING PUBLIC PARTICIPATION .....	33
6.4	ADMINISTRATION OF QUESTIONNAIRES.....	34
6.4.1	<i>Summary of questionnaires responded</i> .....	34
6.4.2	<i>Environmental issues</i> .....	34
6.4.3	<i>Natural habitat concerns</i> .....	35
6.4.4	<i>Social Economic Concerns</i> .....	35
6.4.5	<i>Use of Pesticides concerns</i> .....	36
<b>CHAPTER 7:</b>	<b>ANTICIPATED IMPACTS AND MITIGATION MEASURES .....</b>	<b>37</b>
7.1	INTRODUCTION.....	37
7.2	IMPACTS DURING CONSTRUCTION .....	37
7.2.1	<i>Positive Impacts</i> .....	37
7.2.2	<i>Loss of Vegetative Cover</i> .....	37
7.2.3	<i>Construction Waste Generation</i> .....	38
7.2.4	<i>Soil erosion and increased sediment loads</i> .....	39
7.2.5	<i>Water Quality Degradation</i> .....	39
7.2.6	<i>Air Quality</i> .....	39
7.2.7	<i>Risk of leaks and spills</i> .....	40
7.2.8	<i>Occupational Health and Safety Issues</i> .....	40
7.2.9	<i>Noise and Vibration</i> .....	41
7.2.10	<i>HIV/AIDS</i> .....	42
7.2.11	<i>Loss of Grazing Grounds</i> .....	42
<b>CHAPTER 8:</b>	<b>ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP).....</b>	<b>43</b>
8.1	GENERAL.....	43
8.2	MANAGEMENT PLAN PRINCIPLES .....	43
8.3	SPECIFIC MANAGEMENT ISSUES.....	43
8.3.1	<i>Management Responsibilities</i> .....	43
8.3.2	<i>Environmental Management Guidelines</i> .....	44
8.3.3	<i>Environmental and Social Management Plan</i> .....	44
<b>CHAPTER 9:</b>	<b>ENVIRONMENTAL AND SOCIAL MONITORING PLAN .....</b>	<b>47</b>
9.1	MONITORING PARAMETERS .....	47
9.1.1	<i>Construction</i> .....	47
9.1.2	<i>Operations</i> .....	47
4.6	9.2 MONITORING SCHEDULE .....	48
<b>CHAPTER 10:</b>	<b>CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>49</b>



8.4 CONCLUSION..... 49

8.5 RECOMMENDATIONS ..... 49

**REFERENCES ..... 51**

**ANNEXURES ..... 52**

List of Tables

TABLE 1: SUMMARY OF POTENTIAL NEGATIVE ENVIRONMENTAL IMPACTS ..... XXII

TABLE 2: INSTITUTIONAL ORGANS OF RELEVANCE TO THE PROPOSED PAN REHABILITATION ..... 27

TABLE 3: SHOWING THE ESMP ..... 45

## List of figures

FIGURE 1: MANDERA COUNTY GIS MAP .....	XII
FIGURE 2: ESIA EXECUTION FLOW CHART .....	4
FIGURE 3: SKETCH OF COMPLETE COMPONENTS OF WATER PAN .....	7
FIGURE 4: SHOWING STANDARD DRAWOFF SYSTEM.....	8
FIGURE 5: SHOWING COMMUNITY TAP STAND .....	8
FIGURE 6: SHOWING STAND CATTLE TROUGH.....	9
FIGURE 7: GOOGLE MAP PICTURE SHOWING PROJECT LOCATION .....	11
<b>FIGURE 8: PICTURE SHOWING MANDERA COUNTY WATER WAYS .....</b>	<b>11</b>
FIGURE 9: MANDERA RAINFALL DATA AND AVERAGE ETO .....	12
<b>FIGURE 10: MANDERA AVERAGE TEMPERATURE VARIATIONS.....</b>	<b>13</b>
FIGURE 11: AGRO-ECOLOGICAL ZONES OF KENYA .....	14
FIGURE 12: GRAPH OF WIND SPEED .....	15
FIGURE 13: <i>VIEW OF FOCUS GROUP DISCUSSION MEETING HELD AT THE PROPOSED PROJECT SITE MEETING HELD AT GARI VILLAGE .....</i>	<i>32</i>
FIGURE 14: <i>VIEW OF MEMBERS OF THE WOMEN GROUP POSE AT THE PROPOSED EARTH PAN DESILTING AND EXPANSION PROJECT SITE AT GARI VILLAGE CONDUCTED BY EIA TEAM AND COMMUNITY MEMBERS .....</i>	<i>32</i>
FIGURE 15: ENVIRONMENTAL CONCERN .....	34
FIGURE 16: SUMMARY OF ECONOMIC CONCERN .....	35
FIGURE 17: ENVIRONMENTAL ISSUES CONCERNS .....	36

List of Annexures

ANNEXURES 1: LEAD EXPERT PRACTICING LICENSE..... 52

ANNEXURES 2: LIST OF PUBLIC PARTICIPATION ..... 53

ANNEXURES 3: SAMPLE QUESTIONNAIRE/ CHECK LIST ..... 54

## 5.1 Introduction

### Mandera County

Mandera County is one of the 47 counties in Kenya, located in the North Eastern part of Kenya and borders Ethiopia to the North, Somalia Republic to the East and Wajir County to the South. It is about 1,100km from the capital city of Nairobi by road. The county has an approximate population of 1,025,756 and covers an area of 25,991.5 km<sup>2</sup>. The County Administratively is subdivided into six Sub Counties namely Mandera West, Mandera South, Banisa, Mandera North, Mandera East, Kutulo and Lafey. Further to 30 administrative wards. Mandera Town is the head quarter of Mandera County.

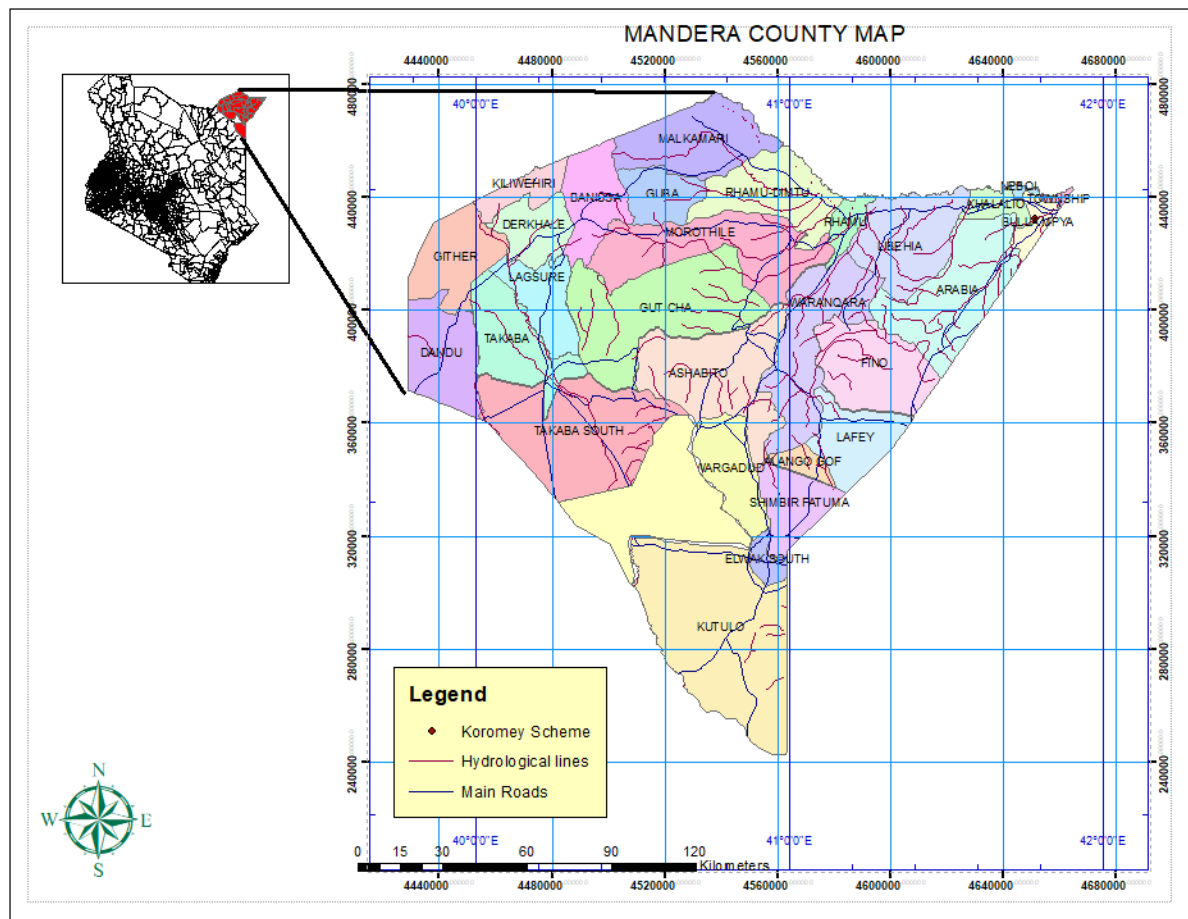


Figure 1: Mandera County GIS map

## 5.2 Climate Smart Agriculture

Climate Smart Agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate. CSA aim to tackle three main objectives:

- To ensure sustainable agricultural productivity and incomes;
- To adapt and build resilience to climate change;
- To reduce and/ or remove greenhouse gas emissions, where possible.

CSA is an approach for developing agricultural strategies to secure sustainable food security under climate change. CSA provides the means to help stakeholders from local to national and international levels identify agricultural strategies suitable to their local conditions.

### 5.3 Gari Rehabilitation Water Pan Project

Mandera County Government is proposing rehabilitation and expansion of Gari Water Pan for domestic and animal watering. Project funding is from World Bank through Kenya Climate Smart Agriculture Project.

### 5.4 Specific Project objective

The main objective of project is to:

- Mitigating and cushion droughts impact due to the ongoing climate change through rehabilitation of Gari water pan to combat persistent water shortage in the village in a bid to address the existing national initiatives such as Kenya Government Sessional Paper No 2 of 2008 on National Livestock Policy, and the Kenya Vision 2030.
- To sustainably provide adequate water to pastoralists and agriculturalists in the project area in order to increase resilience to medium and long-term climate related vulnerabilities with a focus on livestock related livelihoods being the mainstay of the economy.
- Provide food security and nutrition as enshrined in mandates of Mandera County Government
- Sustainable livelihood to the vulnerable community

### 5.5 ESIA Objective

The objective of this assignment is to ensure that the potentially adverse environmental and social impacts can be minimized and the positive impacts enhanced. This ESIA project report provides relevant baseline information of the project area, anticipated impacts to the environment and social aspects, appropriate mitigation measures necessary for incorporation into the project implementation, as well as a comprehensive environmental management and monitoring plan. Approval will, therefore, be sought on the grounds that environmental performance will be assured throughout the project phases through the implementation of the environmental management actions and monitoring programs recommended in this report and subsequent environmental audits.

The Kenya Government policy on all new projects requires that an Environmental Impact Assessment (EIA) study be carried out at the project planning stages to ensure that significant impacts on the environment are taken into consideration. Water pan rehabilitation is one of the projects listed under the second schedule of the Environmental Management and Coordination Act (1999) that should undergo an ESIA.

Therefore the team was contracted by KCSAP Mandera County to conduct an ESIA for the proposed Gari water pan rehabilitation as per terms of reference that were developed for this study. The objective of this assignment is to ensure that the potentially adverse environmental and social impacts can be minimized and the positive impacts enhanced.

### 5.6 Justification of the need of the rehabilitation of Gari Water Pan

In its present state, Gari Village is incapable of meeting any major present future water demands unless this Project is implemented. The reasons are: -

- The current Physical water unavailability due to climatic condition.
- The lack of security against drought conditions.
- Lack of domestic clean water supply
- cushion to climate change
- Drive for sustainable development

- Drive to venture into alternative sustainable livelihood
- Lack of quality water supply as most of water from borehole water not fit for use

### 5.7 ESIA Methodology

The study was carried out at desk level and also through a detailed and structured field study. The process included: collection of baseline data to describe the status of the project site before project implementation commences; data analysis and evaluation; public participation to identify the concerns of persons likely to be affected by the project; and preparation of an ESIA study report encompassing the details specified in the Environmental Impact Assessment/Audit Regulations (2003).

### 5.8 Policy, Legal and Regulatory Framework

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

### 5.9 Main Project Components

The main proposed project components shall involve:

- Pan Reservoir
- Inlet and silt trap
- filtering chamber
- Drawoff system
- spillway
- Community water tapstand
- Standard cattle trough
- Tree nursery
- Kitchen garden
- Irrigation demonstration plot
- Solar pump unit
- Sanitation block
- Fence

### 5.10 Project Cost

The proposed project is estimated to cost as in the BOQ

### 5.11 Summary of Impact Findings

A number of positive and negative anticipated impacts to the environmental and social wellbeing were identified. During the construction phase, they relate mainly to waste generation; soil erosion and sedimentation; loss of vegetation cover, the potential for hazardous materials to contaminate the environment; and occupational health and safety issues. In the operations phase, positive impacts such as availability of water for domestic, animal and irrigation use, increased business opportunities were identified. Potentially negative impacts



included increased human/wildlife conflict, loss of land, water quality degradation and a number of occupational health and safety issues.

## 5.12 Positive Impacts

### Potential Beneficial Impacts

- The communities in the project areas/counties are both subsistence agriculturalists and pastoralists who keep cattle, goats, and sheep. Rehabilitation of Gari pan will improve upon their pastoral livelihood and access to alternative livelihood and sustainability
- Distribution of drought tolerant crops will provide the IPs and vulnerable groups will enable them partially overcome food insecurity. The IPs will also benefit from extension services to realize sustainable food production. This will enhance the agricultural skills of the IPs to enable them go beyond subsistence farming to producing crops for sale in the long-term.
- Since drought is one of the key challenges faced by the IPs targeted region, early warning information for droughts will help their communities plan on how to deal with drought periods.
- Famine is an issue among the IPs and the vulnerable groups and construction of Gari water is likely to ensure availability of water to avoid losses (animals, crops and even human lives in long run) due to drought
- Negative impacts of pastoralism shall be gauged to a lower scale (settlement)
- 

### Potential Negative Impacts

Adverse project impacts include:

- There is a risk that new infrastructure improvements undertaken by the KCSAP project could increase conflict and instability e.g. denial to access water without restriction
- Risk of deforestation due to overstocking within the Pan environs
- Healthy risks brought about by water related ailments and overcrowding
- Human wildlife conflict
- Governance issues on project management
- Environmental degradation resulting from use of agrochemicals

### Proposed Mitigation Measures

To avoid or minimize adverse impacts and, at the same time, ensure enhancement of benefits and full participation of the Indigenous People and vulnerable groups, the PMU at MALF in collaboration with the partner implementing agencies should apply the following:

- Ensure that IP communities and vulnerable groups in general and their organizations are not excluded by any means in activities such as design, and implementation processes of the earth pan;
- KCSAP/PMU should ensure Pan Rehabilitation in the project area is such that the IPs and vulnerable groups exercise equity in resource distribution and inclusion of all stakeholders.
- Provision of public health facilities and carrying out awareness of likely negative impacts
- Build on robust extension services
- Livestock husbandry is encouraged
- Capacity building of community on issues of project governance and conflict resolutions
- Provision of medical facilities

- KCSAP/PMU should undertake the necessary tasks in order to adopt appropriate mitigation measures. The most important in this respect is intensive consultation with the IP communities, community elders/leaders, civil society organizations like NGOs and others who have experience working with IPs and other vulnerable groups.

### 5.13 Mitigation Measures

Although there is indisputable justification of the proposed development of the proposed rehabilitation of Gari water pan project, there are significant environmental and social issues associated with the construction and operation of the proposed project that are summarized as follows:

#### Range of likely Impacts in wider context

##### The direct positive impact

- ✓ **Clean Water for domestic and animal watering:** this is direct impact for reliable clean source of water.
- ✓ **Increased Agricultural Activities:** Increased agricultural activities resulting from increased expansion of land under agriculture.
- ✓ **Expansion of Land under Irrigated Agriculture:** Expansion of land under irrigated agriculture as well as improved land management programmes are likely to result in increased agricultural outputs.
- ✓ **Improved Food Security and Nutritional Status:** There is set to be an increase in the quantity of food produced once the project is operationalized. Food security will be achieved both at individual household level and at the national level due to the increase in food production. Increased farming of different crop varieties will ultimately lead to improved nutrition as well as improved health in the long run. These areas are ASALs and have been experiencing drought and famine thereby leading to overdependence on food reliefs from the government. There is meant to be a boost in the amount of food available for consumption to the residents thereby reducing dependence levels
- ✓ **Improved Land Conditions:** There will be improved land conditions due to improved land management from the land and water conservation activities such as soil conservation programmes resulting in improved soil fertility.
- ✓ **Improved Water Supplies:** There will be increased water supplies due to enhanced water storage facilities such as micro-dams, sand dams, sub-surface dams, water pans, development of wells, roof catchments.
- ✓ **Enhanced Livestock Feed Supplies:** Improved livestock feed supplies due to increased soil conservation measures such grass bands, planting of leguminous agro-
- ✓ **Improved Soil and Water Conditions:** There will be increased soil and water conservation measures and activities as well as improved watershed management programmes whose net impact will be improved soil and water conditions.
- ✓ **Employment Opportunities:** Increased employment opportunities will arise due to increased recruitment of labour to be involved in the project works and agricultural production activities.
- ✓ **Improved Infrastructure:** The project will result in improved infrastructure due to expansion of the access roads into the villages which will ultimately lead to opening up to the markets and hastening of transportation of farm produce.
- ✓ **Capacity Building:** Direct capacity building programmes will enhance the knowledge base of the local communities hence enhance their production potentials resulting in improved agricultural production.
- ✓ **Market Infrastructure:** The project will result in improved market infrastructure and market

access facilities hence improved trade.

- ✓ **Agricultural produce storage:** The project proposes to improve basic storage facilities and basic value chain systems. This will result improved agricultural produce storage hence minimising post-harvest losses.
- ✓ **Enhanced values of the agricultural produce:** Through the project, farmers will be empowered to carry out basic value chain addition. This will result in improved value of agricultural produce through the value addition processes.

#### ***Indirect positive impacts***

- ✓ Enhanced water harvesting programmes will subsequently lead to improved soil water moisture content
- ✓ Enhanced soil and water conservation programmes will result in enhanced ground water percolation and recharge hence increased and sustained river flows
- ✓ An increase in the population of the workers will lead to an increase in the demand for consequent services such as food demand and other services e.g. housing, health care and transport among others. These are set to be provided by the local communities thereby creating new income opportunities
- ✓ Improved infrastructure will consequently lead to improved revenue growth which will precipitate the development of other social amenities which is highly desirable in solving prevalent social issues
- ✓ There have been many challenges that arise out of the undeveloped roads especially in transportation of farm products during the rainy seasons and now with the opening up of these areas, accessibility shall be made easy. Consequently, the improved revenue growth will precipitate the development of other social amenities which is highly desirable in solving prevalent social issues
- ✓ The expansion of the irrigation project and improvement of access roads into the villages will require construction materials which majority will be sourced from local hardware stores. This will inject much needed income into the local economy benefiting local businesses.

#### ***Positive social and economic impacts***

The positive social and economic impacts have been identified and include:

- (i) direct employment in the construction sites for both skilled and unskilled workers from among the community members;
- (ii) increased income hence improved socio-economic conditions of the people within the targeted areas.

#### ***Gender and social analysis***

The African Development Bank Group's (AfDB) gender policy, approved in July 2001, provides the requisite conceptual and operational framework for promoting gender responsive development in Africa. In Kenya women constitute nearly 51% of the population and constitute the majority of those engaged in agriculture. The new project will fulfil a major priority area in the Kenyan Gender Policy on gender and livelihoods which include developing and implementing interventions that respond to diverse livelihood needs of both men and women and developing incentive frameworks to improve the earning potential of poor women and men. The Project will employ a gender sensitive approach in order to maximise the productivity of women at household levels while minimising biases in the attainment of economic development and empowerment.

#### ***Possible cumulative impacts***

No serious negative cumulative impacts have been identified. All the negative impacts are reversible and some of them will be addressed in the site-specific EIAs that have been developed during the design stage or those that will be developed in the implementation phase of the project.

Major long term positive environmental impacts will include:

- (i) Improved Land Conditions; and
- (ii) Improved Soil and Water Conditions.

### ***The negative impacts and proposed mitigation measures***

- **Vegetation loss.**

#### **Mitigation:**

- (i) where possible, avoid the clearing of vegetation, particularly of indigenous vegetation;
- (ii) where clearing is done, land should be landscaped and reclaimed by planting more trees and other vegetation;
- (iii) where erosion may occur due to vegetation loss, erosion control measures need to be put in place.

- **Loss of biodiversity and destruction of the natural habitat**

#### **Mitigation:**

- (i) avoid clearing of habitats and construction within sensitive and protected habitats;
- (ii) where possible buffer areas considered of ecological importance when doing the constructing work.

- **Loss of land due to infrastructure development**

#### **Mitigation:**

- (i) develop resettlement or relocation plan for those who might be affected;
- (ii) ensure compensation for people whose land might be taken for the infrastructure development;
- (iii) ensure adequate consultations including written agreements prior to the commencement of the project.

- **Potential conflicts**

#### **Mitigation:**

- (i) ensure a well negotiated settlement plans prior to the project implementation;
- (ii) have compensation plans;
- (iii) ensure inclusion of upstream residents into other economic activities of the project; (Catchment area)
- (iv) where necessary, develop plan to include upstream and downstream users to benefit.

- **Soil Compaction and destabilization of the geological balance**

#### **Mitigation:**

- (i) avoid moving machineries and other equipment anyhow and away from designated transport routes;
- (ii) unnecessary vehicular and machinery movements should be avoided;
- (iii) reclaim and re-vegetate once work is completed to reduce run off.

- **Pollution of Rivers and Wetlands**

#### **Mitigation:**

- (i) ensure adequate and regular checks on the equipment in use to ensure they are well maintained and in good working condition to prevent leaking oils and fuels;
- (ii) refueling should be done in safe locations where there is no likelihood of spillages;
- (iii) access roads should not venture into the sensitive areas such as wetlands around the project area; (iv) apply sediment control procedures to prevent sediment returning into the rivers; (v) ensure all construction equipment and machineries are clean and mud free

- **Destabilisation of the geological balance, destruction of the natural habitats and pollution due to extraction of Construction Materials**

#### **Mitigation:**

- (i) ensure that construction materials are sourced from appropriate and approved sites;
- (ii) ensure adequate re-use of the excavated waste materials to minimise unnecessary

- excavations;
- (iii) the selection of the proposed quarry sites and barrow pits should be done carefully to minimize impacts on various land uses;
  - (iv) the quarry sites and barrow pits should be clearly indicated on a plan and approved by the local authorities and should have EIAs done;
  - (v) after excavation, ensure adequate reclamantion and landscaping, backfilling and draining of the depressed areas to prevent breeding grounds for disease vectors such as mosquitoes;
  - (vi) the quarries and barrow pits should be located at reasonable and acceptable distances from water courses and in a position that should facilitate the prevention of storm water runoffs;
  - (vii) where there is potential for blasting within the quarries, adequate mitigation measures should be implemented including seeking authorization from the Department of Mines and Geology in the Ministry of Mining and ensure supervision by a qualified and registered blaster and with adequate notification as required by law;
  - (viii) the contractors should take the necessary precautions so as to prevent damages to special features and the general environment and that any damage is to be repaired at the expense of the contractors or compensated adequately.
    - **Increased incidences of water-borne diseases and accidental deaths due to the construction of water harvesting structures such as micro-dams, water pans, and water ponds**

**Mitigation:**

- (i) ensure the structures are not constructed near homesteads;
- (ii) the communities should be educated and made aware of such dangers, particularly of water-borne diseases to ensure they take preventive measures such as boiling drinking water or chemically treating the water;
- (iii) community members should also be encouraged to use preventive measures such as sleeping under mosquito nets;
- (iv) such waterbodies should be protected against direct access by fencing or planting trees around them which will help in avoiding contamination while at the same time minimise likely accidents;
- (v) Construction could be done in such a way that water can be allowed to flow by gravity to minimise pumping which helps in avoiding the use of petroleum products.
  - **Reduction of water supplies downstream due to abstraction of water upstream**

**Mitigation:**

(i) ensure negotiated agreements well in advance prior to the start of the project; (ii) the long term management of the project should ensure adherence to the laws governing the use of water resources including necessary permits.

x. Pollution; Dust and Air Quality Concerns

**Mitigation:**

- (i) ensure all vehicles transporting raw materials especially soil should be covered or avoid overloading to reduce dust emissions;
- (ii) (ii) the workers in dusty areas should be provided with requisite protective equipment such as dust masks and dust coats;
- (iii) the movement and speed of the construction machineries and vehicles should be controlled and managed;
- (iv) the removal of vegetation should be avoided and denuded surfaces should be re-vegetated;

- (v) noisy machinery should be fitted with proper silencers to minimise noise emissions;
- (vi) ensure good and appropriate selection of construction machinery and equipment;
- (vii) sprinkle water in construction yards, dusty roads and soil heaps to minimise dust;
- (viii) ensure the construction work takes the shortest time possible, in addition, the activities generating dust should be carried out in calm weather;
- (ix) ensure the noise levels are kept at the minimum acceptable levels and the construction activities are confined to the working time limits

- **Transmission of HIV/AIDs and other diseases**

**Mitigation:** Challenges due to infections could be addressed through:

- (i) enhancing education and sensitization of workers and the local communities on the dangers and prevalence of disease;
- (ii) regular sensitization campaigns and monitoring of the spread diseases;
- (iii) development of brochures and other materials that will convey information about diseases and infections;
- (iv) regular provision of adequate prevention measures such as condoms;
- (v) provision of drugs such as anti-retrivival drugs (ARVs). 18

## 6. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

### 6.1. ESMP monitoring programme

The overall objective of environmental and social monitoring will ensure that mitigation measures are implemented and are effective. Environmental and social monitoring will enable response to new and developing issues of concern during implementation hence ensuring compliance with environmental provisions and standards of the Bank and the Government of Kenya. The overall responsibility of the environmental and social monitoring will lie with the Ministry of Agriculture, Livestock and Fisheries (MoALF), respective county governments and the National Environmental Management Authority – NEMA. The ESMP will focus on monitoring:

- (i) the status of the biological conditions;
- (ii) status of the physical works;
- (iii) the technical and environmental problems encountered;
- (iv) proposed solutions to the problems encountered; and,
- (v) the effectiveness of environmental and social mitigation measures adopted.

Below is a summary of potential environmental impacts associated with the proposed project and a brief description of their mitigation measures:

Potential Negative Environmental	Mitigation Measures
<p>1. Disruption of existing natural environment and modification of micro-climate –</p> <ul style="list-style-type: none"> <li>✓ Increased development density</li> <li>✓ Increased glare/solar reflection</li> <li>✓ Reduced natural ground cover</li> <li>✓ Obstruction of ventilating wind</li> <li>✓ Increased surface run-off</li> </ul>	<p>-Development to be restricted to approved criteria</p> <ul style="list-style-type: none"> <li>✓ Careful layout and orientation of structures to respect wind and sun direction</li> <li>✓ Adequate provision of green and open space planted with grass, shrub and tree cover</li> <li>✓ Minimum use of reflective building material and finishes for roof, walls and pavements</li> <li>✓ The flow of underground water to be harmonized and directed to well-designed drainage channels.</li> </ul>
<p>2. Pollution and Health hazards</p> <ul style="list-style-type: none"> <li>✓ Dust and other waste</li> <li>✓ Noise generation from construction and transportation activities</li> </ul>	<ul style="list-style-type: none"> <li>✓ Dumping down of site e.g. sprinkling water to dusty areas during site preparation &amp; construction and operation</li> <li>✓ Containment of noisy operations, including locating noise operations away from sensitive neighborhoods</li> <li>✓ Limit construction work to day time only</li> <li>✓ Construction work to take shortest time possible</li> <li>✓ Ensure adequate height so as to prevent concentration of emissions at the ground</li> <li>✓ Regular management of waste</li> </ul>
<p>3. Increased loading on infrastructure services</p> <ul style="list-style-type: none"> <li>✚ Increased vehicular and/or pedestrian traffic</li> <li>✚ Increased demand on utilities and services</li> <li>✚ Increased surface run-off</li> </ul>	<ul style="list-style-type: none"> <li>-Have paved local access road and walkway system</li> <li>-Encourage rainwater harvesting</li> <li>-Provide adequate storm water drainage system</li> <li>-Frequent checks and proper maintenance of existing infrastructure</li> </ul>



4. Worker accidents and health Effects	<ul style="list-style-type: none"> <li>✚ Employ skilled and trained workers</li> <li>✚ Provide personal protective equipment</li> <li>✚ Prepare clear work schedule and the organization plan</li> <li>✚ Ensure adequate worker insurance cover</li> <li>✚ Enforce occupational health and safety standards</li> </ul>
5. Increased population and social conflicts	<ul style="list-style-type: none"> <li>✚ Encourage formation of community policing and neighborhood associations</li> <li>✚ Increase economic activities which will also increase employment opportunities, income earnings and market capital stock formation</li> </ul>
6. Impacts on vegetation (felling of trees and removal of grass)	<ul style="list-style-type: none"> <li>✚ clear trees only on areas to be occupied by the farm, leave 15% of the land under tree cover and encourage planting of indigenous trees where possible.</li> <li>✚ replant grass on the lawns around the offices and pack house to</li> </ul>
7. Impacts on culture and traditions from influx of new people coming to work on the farm	<ul style="list-style-type: none"> <li>✚ sensitize the local community to maintain their culture and</li> <li>✚ sensitize the immigrants to respect the culture of the local people</li> </ul>
8. impact on Soil pollution and erosion	<ul style="list-style-type: none"> <li>✚ put in place soil conservation measures and best farming practices.</li> <li>✚ reduce to the bare minimum any incidences of soil contamination</li> <li>✚ regulate the use of artificial fertilizers and where applicable use organic manure</li> <li>✚ ensure controlled and efficient use of agricultural chemicals</li> </ul>
9. Impact on water resources (increased demand for water)	<ul style="list-style-type: none"> <li>✚ sensitize all workers on the need for water conservation,</li> <li>✚ install water meters to monitor the use of water,</li> <li>✚ put in place measures for water recycling where applicable.</li> <li>✚ harvest rainwater to supplement the proposed water supply</li> <li>✚ get authorization from WRMA and stick to the authorized water use per day.</li> </ul>

**Table 1: Summary of potential negative environmental impacts**

We have provided the proponent of the proposed project with adequate guidelines to enable him follow the laid down regulations, standards, laws and engineering drawings as designed and approved by the relevant authorities and professionals respectively. Other laws governing the operations of the project are to be adhered to the letter.

Our conclusion is that the project is important for economic development of the proposed area as it will provide employment to people living in the vicinity of the proposed project, water for domestic, livestock and irrigation.

We have given adequate measures to mitigate the negative impacts and proposed an environmental monitoring and management plan for the proponent to adhere to.

We therefore recommended that the proposed project be approved subject to the adherence of recommendations given in this report.

### **Environmental Management Plan**

Following the desk studies, field investigations and public consultations undertaken in this study, an Environmental management Plan (EMP) has subsequently been developed. The responsibility for the incorporation of mitigation measures for the project implementation lies with Mandera County Government who must ensure that the Contractor implements all specified mitigation measures. The Supervising Engineer is responsible for assessing the Contractor's environmental management plan

### **Conclusions and recommendation**

The primary objective of the Rehabilitation of Gari water pan is domestic and animal water supply that shall enhance national social-economic development of the community. There is acceptability and goodwill from the community living in the project area, but there are significant environmental and social issues associated with the construction and operation of the proposed project. To that end, mitigation measures have been integrated in the components of the environmental management plan (EMP) in this report for consideration in the final design, construction operation and maintenance of the Gari water Pan.

A summary of the recommendations for the prevention and mitigation of potentially adverse environmental and socio-economic impacts are stated below:

- The proponent to implement the mitigation guideline provided in the environmental management plan;
- Construction works in the planned project be carried out in accordance with approved designs, regulations, policies and laws;
- The Proponent should ensure rehabilitation of all sites that may be used for construction activities such as camps, sites for storage materials and any paths, tracks that may be established during the rehabilitation phase is done;
- The Operation and Maintenance of the proposed water pan Project to comply with the best management practices and the principles of environmental management including the principles of sustainability, intergenerational equity, prevention, precaution and polluter pays;
- Institute effective communication, education and awareness towards the project beneficiaries for enhanced acceptability and social harmony;
- A complete audit be undertaken and submitted to NEMA a year after the project is commissioned to ensure that all the proposed mitigation measures have been complied with.

Overall, considering the proposed location, construction, management, mitigation and monitoring plan that will be put in place and the importance of this Water pan, the development of this project is considered strategic and beneficial and should therefore be allowed to proceed.

## CHAPTER 1: INTRODUCTION

### 1.1 Background

Mandera County Government is proposing rehabilitation and expansion of Gari Water Pan for domestic and animal watering. Project funding is from World Bank through Kenya Climate Smart Agriculture Project. The objective of this assignment is to ensure that the potentially adverse environmental and social impacts can be minimized and the positive impacts enhanced.

This ESIA project report provides relevant baseline information of the project area, anticipated impacts to the environment and social aspects, appropriate mitigation measures necessary for incorporation into the project implementation, as well as a comprehensive environmental management and monitoring plan.

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

### 1.1 Climate Smart Agriculture

Climate Smart Agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate. CSA aim to tackle three main objectives:

- To ensure sustainable agricultural productivity and incomes;
- To adapt and build resilience to climate change;
- To reduce and/ or remove greenhouse gas emissions, where possible.

CSA is an approach for developing agricultural strategies to secure sustainable food security under climate change. CSA provides the means to help stakeholders from local to national and international levels identify agricultural strategies suitable to their local conditions.

### 1.2 Specific Project objectives

- Mitigating and cushion droughts impact due to the ongoing climate change through rehabilitation of Gari water pan to combat persistent water shortage in the village in a bid to address the existing national initiatives such as Kenya Government Sessional Paper No 2 of 2008 on National Livestock Policy, and the Kenya Vision 2030.
- To sustainably provide adequate water to pastoralists and agriculturalists in the project area in order to increase resilience to medium and long-term climate related vulnerabilities with a focus on livestock related livelihoods being the mainstay of the economy.
- Provide food security and nutrition as enshrined in mandates of Mandera County Government
- Sustainable livelihood to the vulnerable community

### 1.3 ESIA Objectives

The objective of the Environmental Impact Assessment is to assess the potential impacts that the proposed Water pan project will have on both the biophysical and social environment.

The assignment was meant to specifically:

- Determine whether the proposed projects for development of the Pan will have adverse impacts on the environment and recommend mitigation measures for any adverse impacts identified;

- Find out the positive socio-economic and environmental impacts and benefits associated with the proposed project for the purpose of enhancement;
- Analyze possible project alternatives in terms of site, designs and other criteria and seek justification for the preferred options;
- Seek the views and inputs of neighbours and members of the public in carrying out the proposed development;
- Promote environmentally and ecologically friendly development;
- Identify health and public safety concerns associated with the implementation of the proposed project and provide an action plan for managing public health and safety;
- Provide an Environmental Management Plan for managing the negative environmental impacts of the proposed development during and after the implementation of the project
- Enable Mandera County Government comply with the requirements of the Environmental Management and Coordination Act (EMCA) and other relevant Acts of parliament that supports the compliance to EMCA

#### 1.4 Terms of Reference

The Terms of Reference for this assessment are based on the NEMA Environmental Impact Assessment and Audit Regulations, dated June 2003. The report should contain descriptions of the following where possible:

- The physical location of the project including the baseline conditions of the project area;
- A description of the project including: project objectives, project design, activities, technology, procedures and processes, materials to be used, Products, by-products and waste generated, during the project construction, operation and de-commissioning phases;
- A description of the national environmental legislative and regulatory framework, baseline information and any other relevant information related to the project;
- Description of the recipient environment;
- The potential environmental effect of the project, including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated;
- Alternative locations, technologies or process available, analysis of alternatives, and reasons for preferring the proposed option;
- An environmental management and monitoring plan matrix outlaying the activities, associated impacts, mitigation measures, monitorable indicators, implementation timeframes, responsibilities, and cost;
- An Action Plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects:
- Measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
- Conclusions, recommendations and identification of gaps and uncertainties which were encountered in compiling the report;
- Any other Information that NEMA may require.
-

## 1.5 Project Justification

In its present state, Gari Village is incapable of meeting any major present future water demands unless this Project is implemented and more others. The reasons are:

- ✓ The current Physical water unavailability due to climatic condition.
- ✓ The lack of security against drought conditions.
- ✓ Domestic clean water supply
- ✓ cushion to climate change
- ✓ Drive to venture into alternative sustainable livelihood

## 1.6 Study Methodology

The approach to this exercise was structured such as to cover the requirements under the EMCA, 1999 as well as the EIA/Audit regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003. It involved largely an understanding of the project background, the preliminary designs and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the site and the surrounding areas, public consultation (which included discussions with local administration and the community), photography, as well as discussions with the Proponent.

- The key activities undertaken during the assessment were as follows:
- Literature Review: A detailed review of available documentation;
- Consultations with the Proponent and regarding the proposed project details, the site planning and implementation plan;
- Interviews and consultations with the local community surrounding the
- Pan as well as representatives of various organizations;
- Data collection and physical inspections of the proposed site;
- Evaluation of the activities around the site and the environmental setting of the wider area through physical observations as well as from existing information in literature; and
- Reporting, review and submissions.

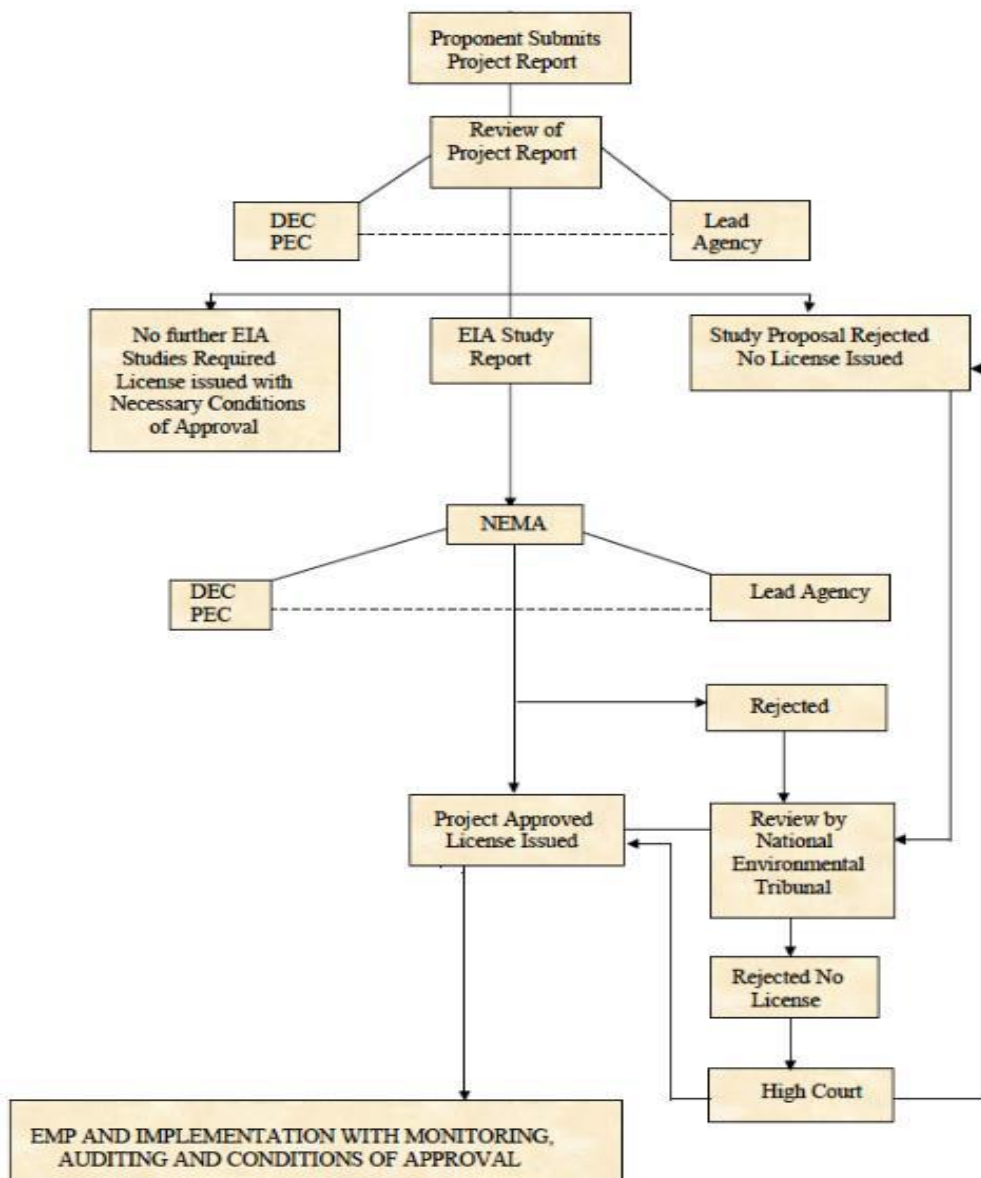


Figure 2: ESIA execution flow chart

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

### Step 1: Environmental Screening

This is the first stage when the proposed project was evaluated guided by EMCA, 1999. In screening we try to confirm whether or not a particular project falls within a category that requires an EIA prior to commencement. Pans Development is listed under schedule 2 of EMCA, 1999 among projects requiring an EIA. In addition, other considerations during the screening process included physical site location, environmental sensitivity of the areas surrounding the proposed site, nature of community and social activities in the project area.

### Step 2: Environmental Scoping

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



**Step 3: Desk Study**

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

**Step 4: Field Assessment**

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

**Step 5: Baseline Conditions**

Physical inspections and observations constitute the exercise for collecting baseline information.

**Step 6: Consultations**

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

## 1.7 ESIA Scope

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

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

## CHAPTER 2: PROJECT DESCRIPTION

### 2.1 Project Location

The proposed Rehabilitation of Gari water Pan project is located at Gari village in Warankara ward, lafey Sub county of Mandera County, at coordinates Zone 37N, 379756.171m Northing, 718322.898 at elevation 589.130 masl and 114km from Mandera Town.

### 2.2 Design Concept

#### 2.2.1 Overview

Water Pan is a small reservoir created by excavation of open flat ground, to collect and store surface runoff from uncultivated grounds from hill side, roads, rocky areas and open range land known as Catchment area. Impounded water is used for domestic, animal watering and irrigation.

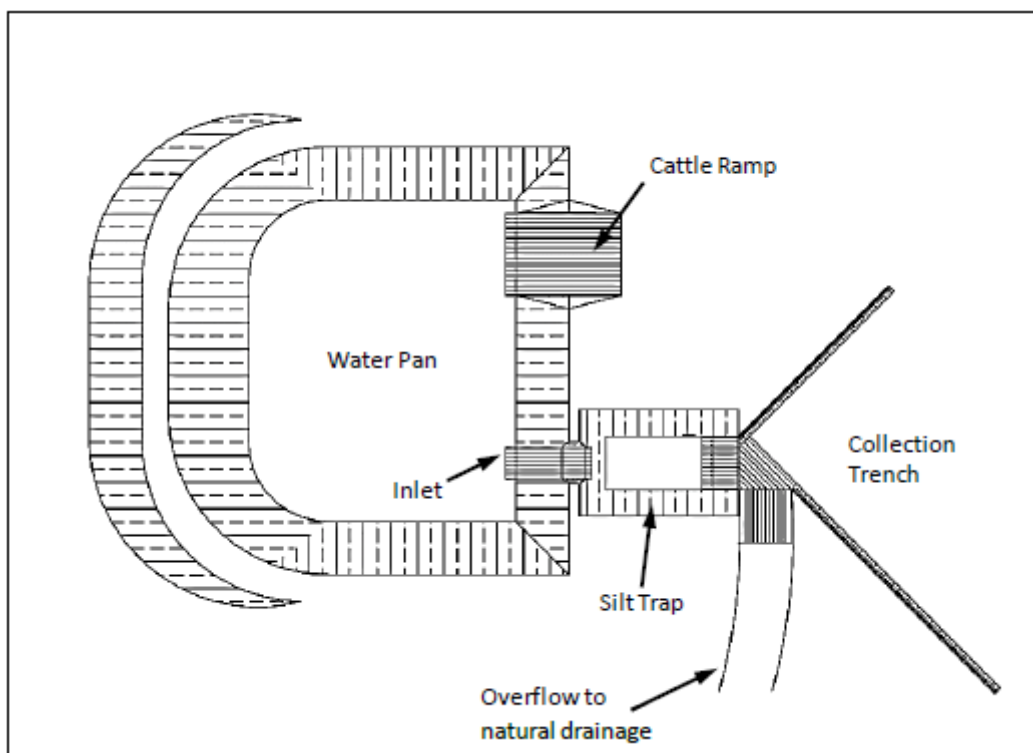


Figure 3: Sketch of complete components of water pan

#### 2.2.2 Inlet

This is a trench that guides or lead water from catchment into the the silt trap of water pan.

#### 2.2.3 Silt trap

Is a structure in front of water pan that filters sediments from entering water pan reservoir size depends on capacity of pan.

#### 2.2.4 Water reservoir

This is excavated on the ground to store water.

## 2.2.5 Filtration chamber

Placed in the water pan to filter water to the draw off system. The filtration chamber is made of graded gravel pack and offtake pipe.

## 2.2.6 Draw off system

Pipe system from filtration chamber that draw water of the pan to either to community tap stand or cattle trough system.

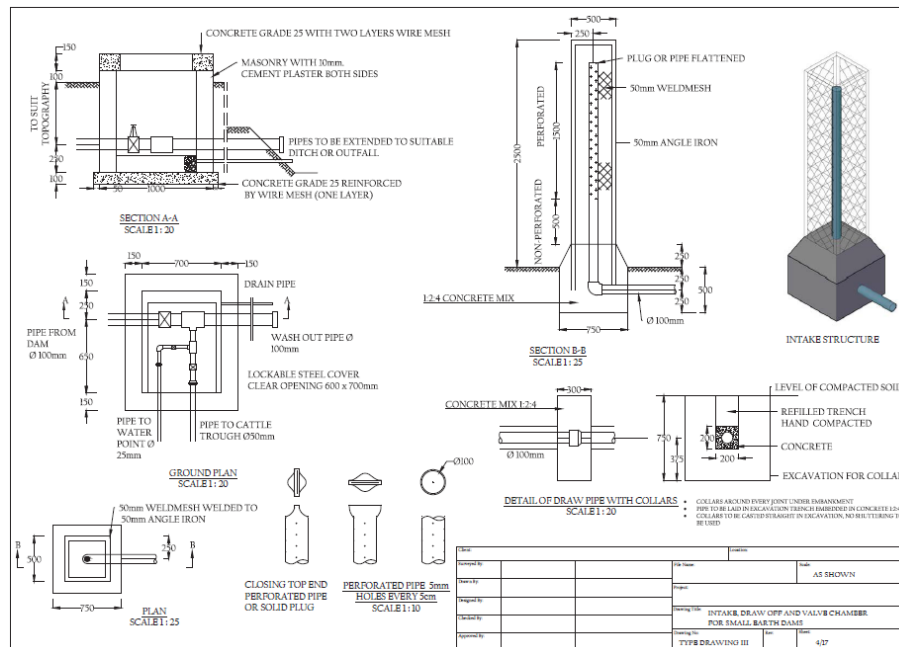


Figure 4: showing standard drawoff system

## 2.2.7 Community tap stand:

Point of water collection by the community. Comprises water pipe network and tap points

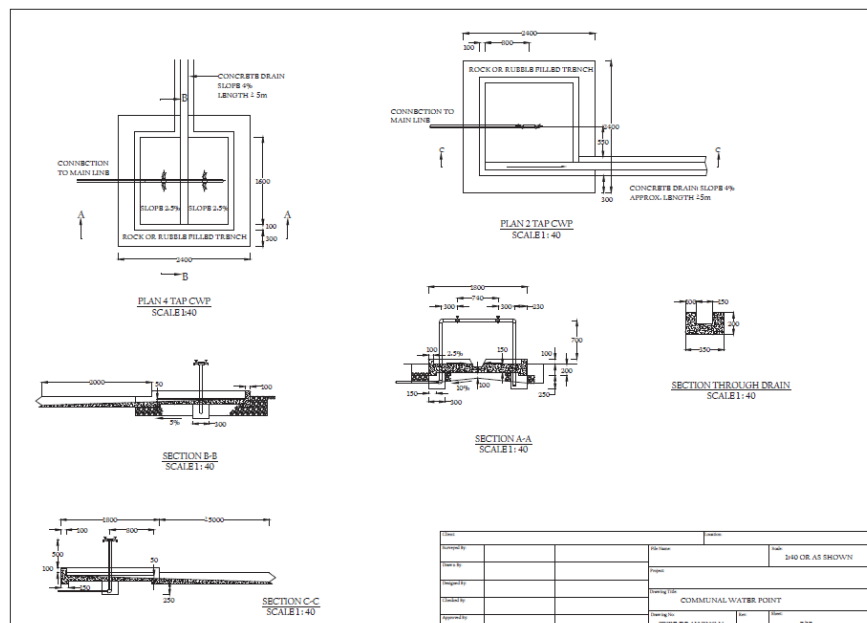


Figure 5: showing community tap stand

## 2.2.8 Cattle trough

Supply system for animal watering point either for shoats or cattle.

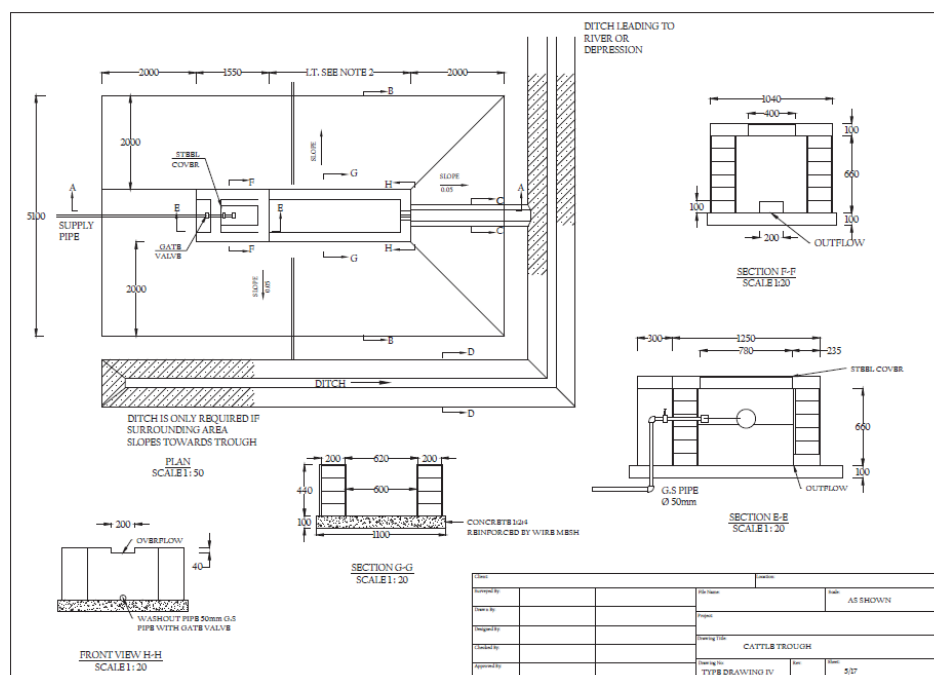


Figure 6: showing stand cattle trough

## 2.3 Project Cost

The constructions costs are established by considering the local conditions, availability and suitability of construction equipment and materials. Costs are divided into Direct Construction and Indirect Costs. Direct Construction Costs include Preparatory Works, Civil Works and Rehabilitation Works. Indirect Construction Costs include Engineering Services and Administration Expenses, and Contingencies. The summary of the project costs is as in the BOQ

## 2.4 Project Activities

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

- ❖ **Mobilization:** The contractor will provide access for the Construction Camp if it is not available. He will be required to clear and level the site by: cutting and clearing existing vegetation; removing stumps; leveling the site by grading and filling; and installing site drainage;
- ❖ **Setting out:** Once the camp, material storage and parking areas are established, the next task will involve setting out the works, marking and pegging for particular activities;
- ❖ Pan excavation works
- ❖ pump and Solar Installations
- ❖ concrete works
- ❖ Fencing works
- ❖ Irrigation infield structures
- ❖ Water supply systems network
- ❖ Water infiltration works
- ❖ Sanitation facilities
- ❖ **Handing Over:** At the completion of the works, all structures and equipment not required for the operation and maintenance are removed from the site and the work areas prepared for re-vegetation.

## 2.5 Project Inputs

### 2.5.1 Land

The area for project activities to be undertaken on.

### 2.5.2 Public and Workers Access

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

### 2.5.3 Sanitary Provision

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

### 2.5.4 Labour Supply

It is estimated that the total number of people will be 10 and will consist of the Contractor's employees both skilled and unskilled

### 2.5.5 Construction material

Construction input material will include gravel, rock, cement, sand, ballast, structural steel, reinforced steel, paint, timber, fuel, PVC tanks and lubricants. Consumable materials will include lubricants, greases, chemicals, reagents, resins and others. The construction of the cattle trough will utilize rock fill materials that are available from the quarry sites within the vicinity of the project site.

## CHAPTER 3: BASELINE CONDITIONS

### 3.1 Bio-Physical Environment Location

The proposed Gari water Pan project is located at Gari village in Warankara ward, lafey Sub county of Mandera County, at coordinates Zone 37N, 379756.171m Northing, 718322.898 at elevation 589.130 masl and 114km from Mandera Town.



Figure 7: Google map picture showing project location

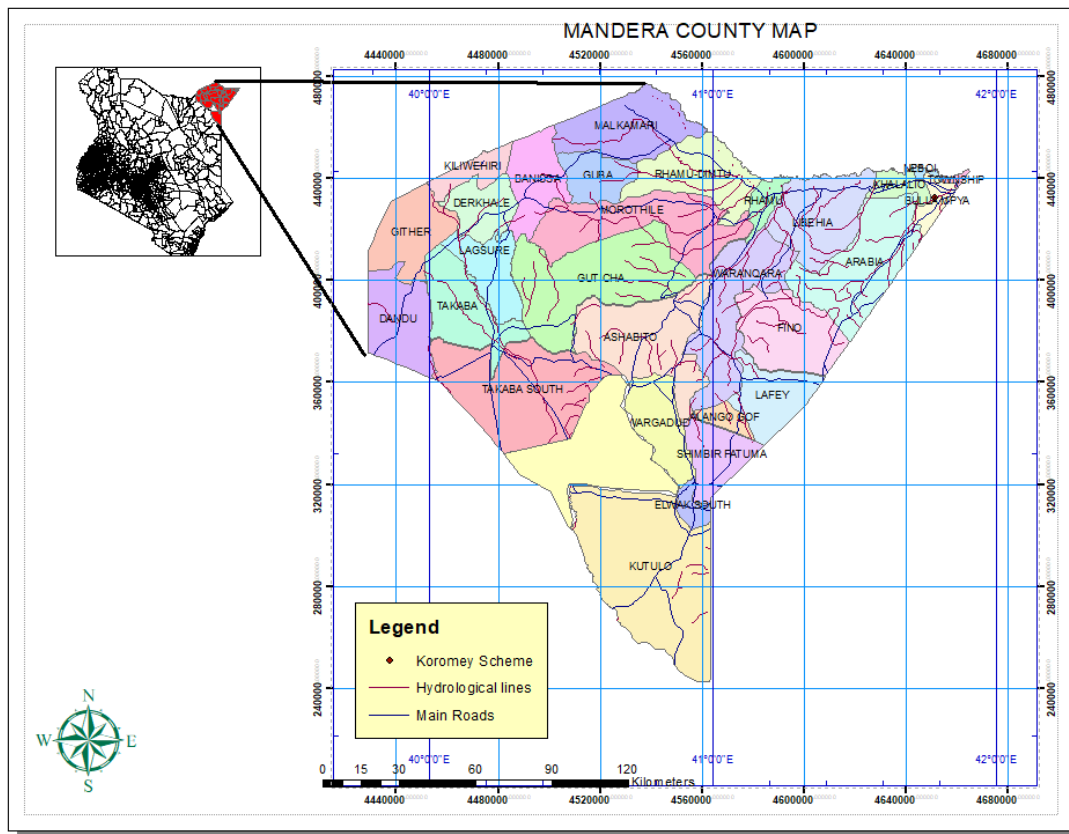
#### 3.1.1 Physiography and Drainage

The project site lies at about 7589 m.a.s.l. The ground landscape is generally flat with slightly elevated ground bisected by wide depositions.

Figure 8: Picture showing Mandera County water ways

#### 3.1.2 Climate

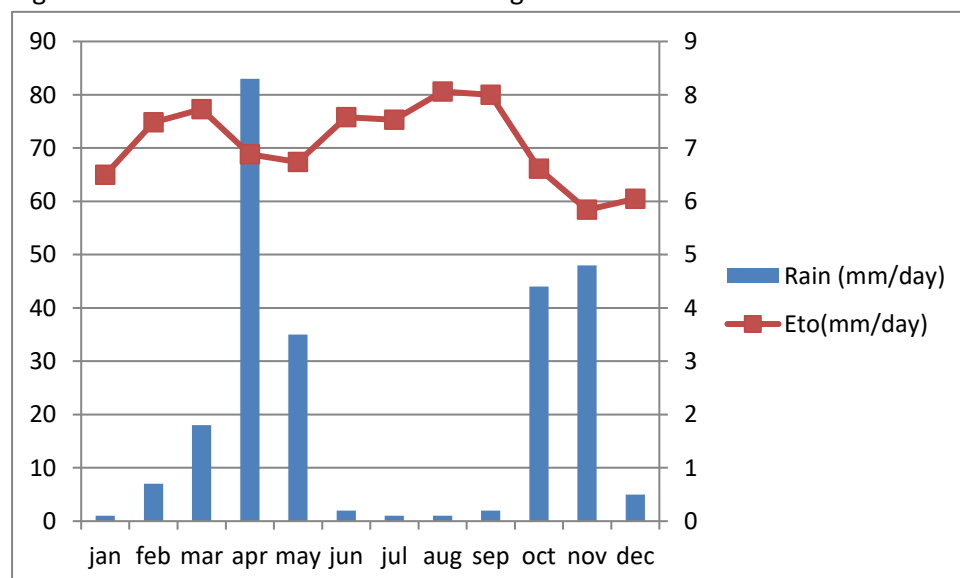
Temperatures are relatively very high with a minimum of 24°C in July and a maximum of 42°C in February. Variation in altitude brings differences in temperatures across the county where places near Banissa constituency experiences low temperatures due to neighbouring highlands in Ethiopia. Rainfall is scanty and unpredictable averaging 255mm. The long rains fall in the months of April and May while the short rains fall in October and November. Most parts of the county experiences long hours (approximately 11 hours) of sunshine in a day. This causes high evaporation rates thus causing withering to most of the vegetation before maturity. The continuous sunshine in the county has a potential for harvesting and utilization of solar energy.



### 3.1.3 Rainfall

The rainfall pattern and distribution is erratic and unreliable both with time and space. There are two rainfall seasons. The long rains usually occur between April and May and the short rains between October and November with annual mean average of 228 mm. The driest periods is January, June, July, August and September. Drought are usual, often resulting to significant loss of livestock to the inhabitants of villages (Bulla)

Figure 9: Mandera rainfall data and average ETo



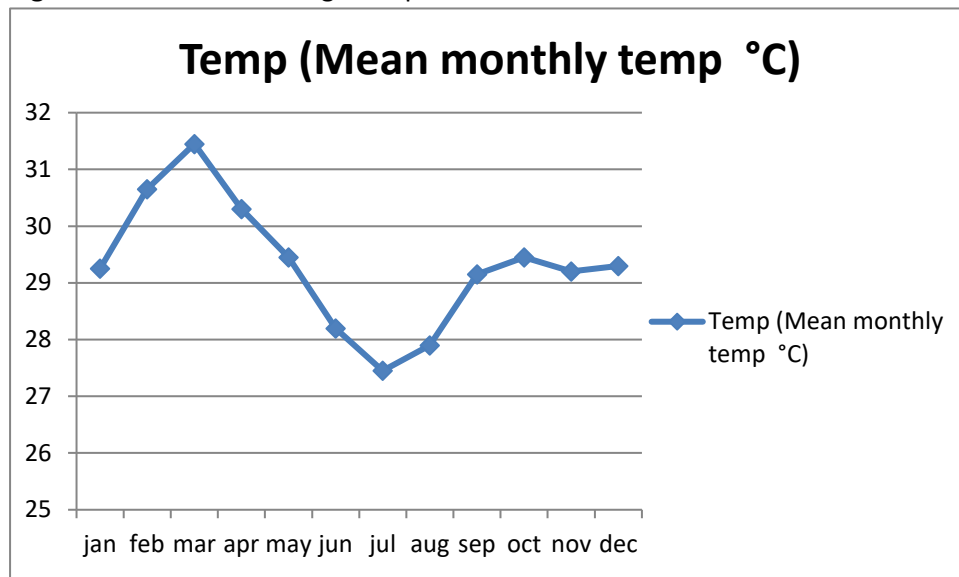
Source: Farmers handbook by T Wood-head (1968)



### 3.1.4 Temperature

The Temperature annual average has maximum temperature of 35.8°C and minimum temperature of 24.3°C throughout the year. Therefore temperature in this region is hot. At average of 28.3°C

**Figure 10:** Mandera average temperature variations



Source: Cropwat: Mandera Station (location 58)

### 3.1.5 Agro-ecological zone

There are two ecological zones in the county namely arid and semi-arid. 95% of the county is semi-arid with dense vegetation mainly thorny shrubs and bushes along foots of isolated hills and *prosopis juliflora* (*mathenge*) trees along river banks and gullies. Lower midland zone 5 (semi-arid) 3%

#### Zone VI

This zone is considered as semi desert and is the driest part of Kenya. Annual rainfall is 200-400 mm and is quite unreliable. The zone is found in Marsabit, Turkana, Mandera and Wajir Districts. Dominant in this zone are *Acacia* and *Commiphora* shrubs with scattered taller trees of *Delonix elata*, *Acacia tortilis* and *Adansonia digitata*. *Balanites egyptica*, *Boscia coriacea*, *Salvadora persica*, *Acacia mellifera* and *Acacia reficiens* are important shrubs or low tree species. The very common and important dwarf shrubs are *Indigofera spinosa* and *Sansevieria* spp. Other important shrubs are *Sericocomopsis*, *Barberia* and *Duosperma eromophyllum*. Being the most delicate zone both annual and perennial grasses are important here. Important grasses include *Aristida adoensis*, *Stipagrostis hirtigluma* are very characteristic and may occur as annuals or perennials. Other grasses also found here are *Aristida mutabilis*, *Chrysopogon aucheri*, *Tetrapogon* spp, *Enneapogon cenchroides*, and *Chloris roxburghiana*.

#### Zone VII

This is represented by Chalbi desert in Marsabit district. The Chalbi is a salt desert with very sparse salt bushes as the only vegetation found. It is vast and of beautiful scenery. Pastoralists use it as a source of mineral lick for livestock, particularly during the rainy season.

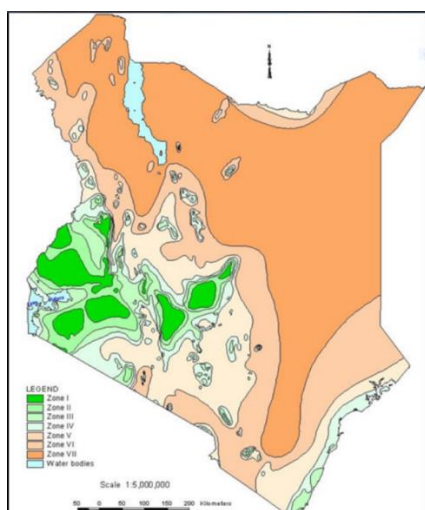


Figure 11: Agro-ecological Zones of Kenya

### 3.2 Topography

The village lies at an altitude of 591m above the mean sea level. The terrain of the area is generally defined by isolated hill outcrops with gentle slopes surrounding gradually undulating plains. The top hill slopes are at about 1:60 while the lower hill slopes are more gentle (1:100). The run-off generated around the area mainly drains south west wards towards the village through seasonal water ways (lagas) running north-southerly through the plains

### 3.3 Soils

Almost 60% of the area on which the village is situated is covered with medium brown sandy clay loam soils with loose broken rock materials continuously lying less than 3,000mm below the ground surface. As is evidenced by gullies already created by erosion, this lower slope zone where the village is located has shallow – moderately deep (3.0 to 3.5m) soils. Soil depth decreases with altitude.

### 3.4 Wind

The winds in the project area also indicate seasonal variation in January and February the winds are predominantly north easterly in the morning. While they are easterly in the afternoon from march to april. The wind patterns changes as from May. From May to September the winds are predominantly southerly and south westerly. From October to November they are variable but generally easterly and north easterly. Strong winds are experienced in the year during the month of June, July and August.

### 3.5 Sunshine

There is daily sunshine hours longest in the months of December, January, February and March. There are 10.5hrs, 10.7hrs, 10.8hrs and 10.0hrs respectively

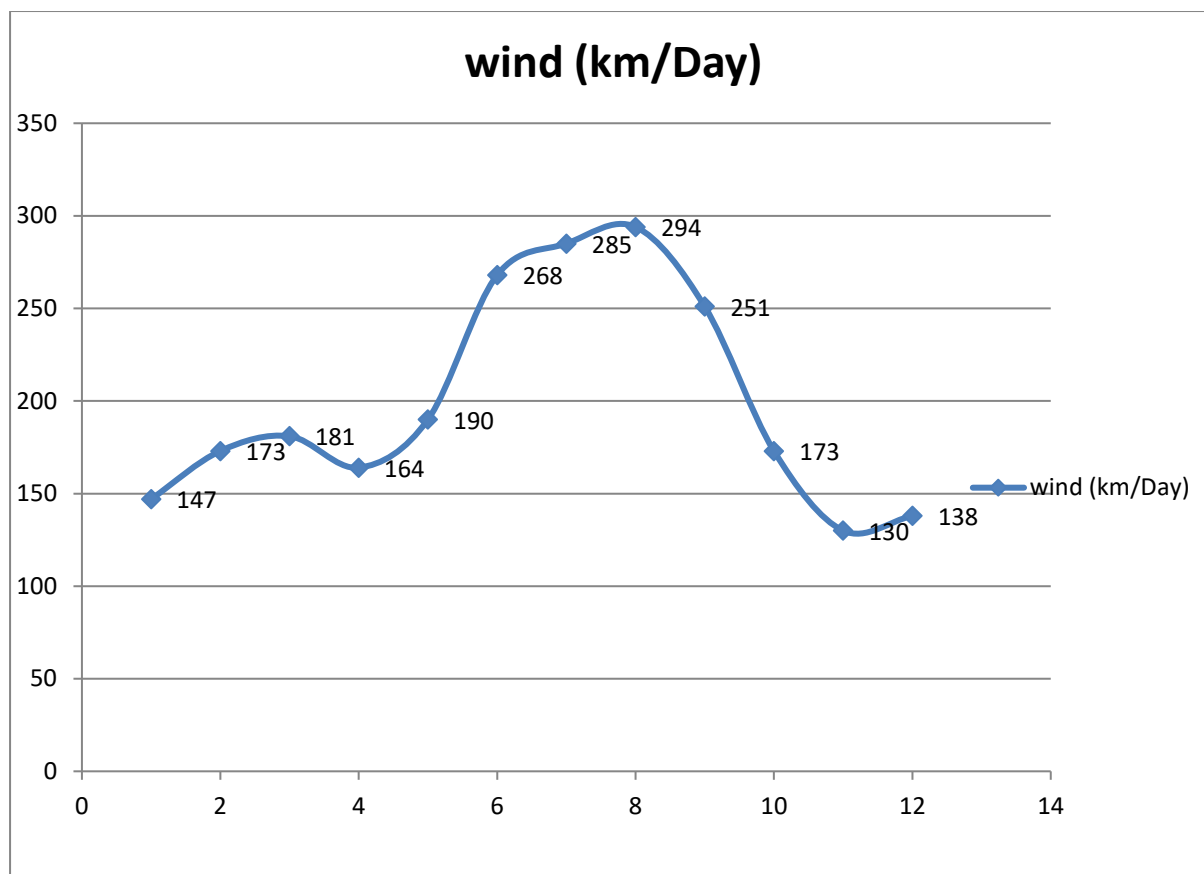


Figure 12: Graph of wind speed

### 3.6 Vegetation

Nearly the proposed project areas is devoid of trees and two thirds support only scattered trees while reliable sources of grass with high productivity are small and widely scattered. The presence of plant biomass is related to altitude except for riverine areas. The two main types of woody vegetation found in the area are riparian and non- riparian. Forests with a canopy cover of over 12% are limited to the mountain ranges. The seasonal rivers' riparian in the area are dominated by *Acacia spp* and Doum palm (*Hyphene compressa*) *Acacia tortilis*, *Acacia reficians*, *Terminalia spinose*, *Terminalia obcularis*, *Commiphora spp*, *Codia spp*, *Dalbagia spp*, *Dombeya spp*, *Blaentus spp* among others. and more recently invaded by *Prosopis juliflora* on some sites. *Prosopis juliflora* is an introduced tree species that is rapidly gaining the status of an invasive weed in a large swathe of the project area. The lack of ground cover is caused by prolonged droughts and leads to excessive moisture deficits in the soils. The drought effect on vegetation is compounded by overstocking of livestock in the area that asserts great pressure on pasture leading to bare land and subsequent soil erosion.

### 3.7 Fauna

Being arid and semi-arid environment coupled by years of nomadism, Mandera in general has relatively low diversity of fauna outside the existing protected areas. Notable are Dikdiks, monkeys, guinea fowls and a wide variety of birds. Other faunal species include reptiles (snakes are quite common).

## 3.8 Social Economic setup

### 3.8.1 Population Size

According to the areas Assistant Chief, Gari presently has 214 Households with a total population of about 760 persons.

### 3.8.2 Land Use

The main economic activity in the project area is livestock rearing with main types of livestock being; camels, goats, sheep and cattle which are grazed in a free range due to the communal land tenure system

### 3.8.3 Total water Demand Estimates

The total water demand estimates for the area at the present, initial, future and ultimate design stages of the proposed project are; **61.30m<sup>3</sup>/day**, **62.10m<sup>3</sup>/day**, **71.95m<sup>3</sup>/day** and **86.70m<sup>3</sup>/day** respectively.

## 3.9 Health Access and Nutrition

### 3.9.1 Health Access (*Health Facilities, Personnel*)

There are six Level IV facilities in the county, nine level III facilities, 24 Level II facilities, six Nursing homes and 60 Private clinics. The doctor/population ratio is 1:114,000 while the nurse/population ratio is 1:25,000.

### 3.9.2 Morbidity

The five most common diseases in order of prevalence are Disease of Upper Respiratory Tract Infection (URTI), Malaria, Pneumonia, Urinary Tract Infection (UTI) and skin disease.

### 3.9.3 Nutritional Status

In terms of height-for-age, 31.8 per cent of children (6-59 months) are chronically undernourished, i.e. short for their age or stunted while 18.6 per cent are severely wasted. In terms of weight-for-height, 32.8 per cent of children (6-59 months) have low weight for their height, or wasted (acute malnutrition) while 14.8 per cent are severely wasted.

In terms of weight-for-age, 41.2 per cent of children (6-59 months) in the county are underweight while 11.0 per cent are severely underweight (KIHBS 2005/06).

### 3.9.4 Immunization Coverage

Immunization coverage in Mandera County is 30percent. This can be attributed to inadequate cold chains for storing the vaccines at the existing health facilities. Long distances to and from the facilities, also contribute to the low immunization coverage. Other reasons why there is low immunization coverage include inadequate staffing, inability for health staff to reach members of the community, culture among others. This has led to rise in prevalence of immunizable diseases like measles and polio.

### *3.9.5 Access to Family Planning Services/Contraceptive Prevalence*

The total fertility in the county has greatly decreased from 7.0 children in 2003 to 5.9 children per woman as per the 2008-09 Kenya Demographic Household Survey (KDHS) which is higher than the country's 4.6. Only four per cent of married women use modern methods of family planning that is going to have a minimal impact on overall population growth rates in the county. Injectable are the most popular type of family planning method used. 2% of married women use injectable while 1% uses implants, which is the second most popular method.

## CHAPTER 4: NATIONAL POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

### 4.1 General Overview

Environmental and Social Impact Assessment is a tool for ensuring new projects and programmes incorporate appropriate measures to mitigate adverse impacts to the environment and peoples' health and safety as well as enhancing sustainable operations with respect to environmental resources and co-existence with other socio-economic activities in their neighbourhood. Necessary policies and legislation that ensures annual environmental audits (EA) are carried out on every running project, activity or programme and a report submitted to National Environmental Management Authority (NEMA) for approval and issuance of relevant certificates.

According to the Kenya National Environment Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from industrial, economic and social development programmes that disregarded environmental sustainability. Following on this, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. The NEAP process introduced environmental assessments in the country with among the key stakeholders being industrialists, business community and local authorities. This culminated into the enactment of the Policy on Environment and Development under the Sessional Paper No. 6 of 1999.

### 4.2 National Policy Framework

- Sessional Paper No 6 of 1999 on Environment and Development presents broad categories of development issues that require sustainable approach. Among the goals of the policy are to:
- Incorporate environmental management and economic development as integral aspects of the process of sustainable development; and
- Encourage sustainable utilization of resources and ecosystems for the benefit of the present generations, while ensuring their potential to meet the needs of the biosphere and future dependants.
- Following on this, the policy outlines the following objectives among others:
- Conservation and management of the natural resources of Kenya including air, water, land, flora and fauna,
- Promotion of environmental conservation through the sustainable use of natural resources to meet the needs of the present generations while preserving their ability to meet the needs of future generations,
- Meeting national goals and international obligations by conserving bio- diversity, arresting desertification, mitigating effects of disasters, protecting the ozone layer and maintaining an ecological balance on earth

### 4.3 National Legal Framework

Application of national statutes and regulations on environmental conservation suggest that the Proponent has a legal duty and social responsibility to ensure that the

proposed development is carried out without compromising the status of the environment, natural resources, public health and safety. This position enhances the importance of this environmental impact assessment for the proposed site to provide a benchmark for its sustainable operation.

Kenya has approximately 77 statutes that relate to environmental concerns. Most of these statutes are sector specific, covering issues such as public health; soil erosion; protected areas; endangered species; water rights and water quality; air quality, noise and vibration; cultural, historical, scientific and archaeological sites; land use; resettlement; etc. Previously, environmental management activities were implemented through a variety of instruments such as policy statements and sectoral laws, and also through permits and licenses. For example, the Physical Planning Act of 1996 empowers local authorities to request existing facilities to conduct environmental assessments, while under the Local Government Act of 1998, it is an offence to emit smoke, fumes or dust which may be a source of danger, discomfort or annoyance.

The key national laws that govern the management of environmental resources in the country have been briefly discussed below, although it is important to note that wherever any of the laws contradict each other, the Environmental Management and Coordination Act 1999 prevails:

#### 4.3.1 The Environmental Management and Coordination Act, 1999

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

Part VIII section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radioactive or any other pollutants into aquatic environment. Section 73 require that operators of projects which discharges effluent or other pollutants to submit to NEMA accurate information about the quantity and quality of the effluent. Section 74 demands that all effluent generated from point sources be discharged only into the existing sewerage system upon issuance of prescribed permit from the local authorities or from the licensee. Finally, section 75 requires that parties operating a sewerage system obtain a discharge license from NEMA to discharge any effluent or pollutant into the environment.

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

90 through 100 outline more regulations on management of hazardous and toxic substances including oils, chemicals and pesticides.

Finally the Environmental and Social Impact Assessment guidelines require that the ESIA study be conducted in accordance with the issues and general guidelines spelt out in the second and third schedules of the regulations. These include coverage of the issues on schedule 2 (ecological, social, landscape, land use and water considerations) and general guidelines on schedule 3 (impacts and their sources, project details, national legislation, mitigation measures, a management plan and environmental auditing schedules and procedures.

#### 4.3.2 The Forest Act

The Forest Act provides for the establishment, development and sustainable management, including conservation and rational utilization of forest resources for the socio-economic development of the country. Under Section 5 of the Act, the relevant functions that are applicable to the project are:

- Development of programmes and facilities in collaboration with other interested parties for tourism, and for the recreational and ceremonial use of forests, collaborate with other organizations and communities in the management and conservation of forests and for the utilization of the biodiversity
- Promote the empowerment of associations and communities in the control and management of forests.
- Enforcement of the conditions and regulations pertaining to logging, charcoal making and other forest utilization activities.

#### 4.3.3 The Public Health Act (Cap. 242)

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

#### 4.3.4 The Occupational Health and Safety Act (2007)

This is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The Act has the following functions among others:

- Secures safety and health for people legally in all workplaces
- Prevents employment of children in workplaces where their safety and health is at risk.
- Encourages entrepreneurs to set achievable safety targets for their enterprises.



- Promotes reporting of work-place accidents, dangerous occurrences and ill health with a view to finding out their causes and preventing of similar occurrences in future.
- Promotes creation of a safety culture at workplaces through education and training in occupational safety and health.

#### 4.3.5 Water Act (2002)

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

Section 25 of the Act requires a permit to be obtained for among others any use of water from a water resources, discharge of a pollutant into any water resource. According to section 29 of the same Act, application for such a permit shall be subject to public consultation as well as an Environmental and Social Impact Assessment as per the Environmental Management and Coordination Act, 1999. The conditions of the permit may also be varied if the authority feels that the water so used is causing deterioration of water quality or causing shortage of water for other purposes that the authority may consider has priority. This is provided for under section 35 of the Act.

Section 73 of the Act allows a person with a license to supply water (licensee) to make regulations for purposes of protecting against degradation of sources of water which he is authorised to take. Under the Act, the licensee could be a local authority, a private Trust or an individual and the law will apply accordingly under the supervision of the Regulatory Board.

Section 75 and sub-section 1 allows a licensee for water supply to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing water belonging to the licensee or which he is authorised to take for supply from being polluted. However, if the proposed works will affect or is likely to affect any body of water in the catchment, the licensee shall obtain consent from the Water Resources Management Authority.

#### 4.3.6 Water Resource Management Rules (2007)

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

- Technical design report in respect of the water use permit;

- Operational information to be lodged with WRMA;
- Pan safety measures and requirements for inspections;

Other sections within the rules imply that WRMA can impose water quality sampling requirements on MANDERA COUNTY GOVERNMENT in respect of the releases from the Pan and impacts to the hydrology, water chemistry and river morphology from the proposed Pan.

Section 16 of the Water Rules requires approval from the Water Resources Management Authority (WRMA) for a variety of activities that affect the water resources, including the storage of water in Pans and pans. Approval by WRMA is conferred through a Water Permit. A permit is valid for five years and must be renewed.

Section 104 of the Water Resource Management Rules requires certain water permit holders to pay water use charges. The intention of the water use charges was to:

- Raise revenue for water resource management;
- Raise revenue for catchment conservation activities;
- Improve efficiency of water resource abstraction;
- Provide a system of data collection on water resource usage.

Catchment conservation is an activity that involves many stakeholders. The most important stakeholders are the land owners and users. These are the mainly small scale farmers. Catchment conservation efforts within the farming zones have been spearheaded by the Ministry of Agriculture, Soil and Water Conservation Branch. Earlier approaches and interventions at a small catchment level have been replaced by a livelihood improvement approach that seeks to empower farmers to improve production through improved soil fertility, better cropping practices, appropriate varieties, etc. However, catchment conservation efforts have frequently lacked a coordinated approach to deal with road drainage, forest management, agricultural and irrigation practices, etc. WRMA has been given the mandate with the Water Act to undertake catchment conservation and the strategy adopted by WRMA, as expressed within the Catchment Management Strategy (CMS) is twofold:

Improved coordination of stakeholders;

Multi-sector interventions related to catchment conservation to be channeled through local stakeholder groups known as Water Resource User Associations (WRUAs). To support the WRUAs, WRMA and the Water Services Trust Fund have established a transparent framework to provide financial and technical support to WRUAs. This mechanism has been able to attract donor funds but has substantially failed to attract GOK funds and WRMA itself has only been able to make small payments into this system because of the lack of compliance by MANDERA COUNTY GOVERNMENT and other water users in respect of payment of water use charges.

The payment of water use charges is a mechanism to support water and catchment management. The water use charges can also be considered as a system of payment for environmental services (PES) if the revenues are ploughed back into the WRUAs and into catchment conservation activities.

#### 4.3.7 Water Quality Regulations (2006)

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No 68, Legal Notice No 120. Of immediate relevance to the proposed facility for the purposes of this Project Report is Part II, Sections 4 - 5, as well as Part V Section 24.

Part II Section 4 states that “Every person shall refrain from any act which directly Or indirectly causes, or may cause immediate or subsequent water pollution”

Part V 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 or discharge any such matter into water meant for fisheries, wildlife, recreational purposes of any other uses”.

#### 4.3.8 Local Government Act (Cap 265)

Part XI section 168 provides that every municipal council, town council or urban council may establish and maintain sewerage and drainage works within or without its area of jurisdiction. For purposes of the land required for such development, section 144 states in part “A local authority may, subject to the approval of the Minister, apply to the government or any other authority having power to acquire land required for purposes of any of its functions, to be acquired compulsorily for and on behalf of, and at the expense of the local authority”. The Act, however, does not indicate the repercussions of impacts on landowners.

Section 160 helps local authorities ensure effective utilization of the sewerage systems. It states in part that municipal authorities have powers to establish and maintain sanitary services for the removal and destruction of, or otherwise deal with all kinds of refuse and effluent and where such service is established, compel its use by persons to whom the service is available. However, to protect against illegal connections, section 173 states that any person who, without prior consent in writing from the council, erects a building on: excavate or opens-up: or injures or destroys sewers, drains or pipes shall be guilty of an offence. Any demolitions and repairs thereof shall be carried out at the expense of the offender.

Section 165 allows the local authority to refuse to grant or renew any license which is empowered in this act or any other written law on the grounds that the activity does not conform to the requirements of any by-laws in force in the area of such local authority the granting of the license would be contrary to the public interest.

For maintenance of such sewerage systems, the following relevant clauses have been drawn from section 169 of the Act that reads in part “A municipal council may for purposes of carrying out any drainage or sewerage works-----”:

“-----cause such sewers, drains and pipes to be made, altered, deepened, covered, laid and maintained either within or without as may be necessary for effectively disposing of the sewage and draining of its area -----”

“-----carry such sewers, drains and pipes through, across, or under any public road, street, square or open place laid out for public road, street, square or open space without paying compensation and after giving 30 days notices in writing to the owner or occupier of the intention to do so -----“

“-----from time to time alter, enlarge, divert, discontinue, close-up or destroy any sewers, drains, or pipes under its control -----“

Section 170, allows the right of access to private property at all times by local authorities, its officers and servants for purposes of inspection, maintenance and alteration or repairs. In addition, the municipal Council may establish and maintain sewage farms or disposal works, and dispose of the effluent therefrom, but shall not be liable for any nuisance or Blockage as a consequence of proper and ordinary conduct of the sewage farms or disposal works (section 171). To ensure sustainability in this regard, the local authority is empowered to make by-laws in respect of all such matters as are necessary or desirable for the maintenance of health, safety and wellbeing of the inhabitants of its area as provided for under section 201 of the Act.

The Act under section 176 gives power to the local authority to regulate sewerage and drainage, fix charges for use of sewers and drains and require connecting premises to meet the related costs. According to section 174, any charges so collected shall be deemed to be charges for sanitary services and will be recoverable from the premise owner connected to the facility. Section 264 also requires that all charges due for sewerage, sanitary and refuse removal shall be recovered jointly and severally from the owner and occupier of the premises in respect of which the services were rendered. This in part allows for application of the “polluter-pays-principle”.

#### 4.3.9 The Land Planning Act (Cap 303)

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

#### 4.3.10 Building Code By-Laws

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

#### 4.3.11 Waste Management Regulations (2006)

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

Section 4 (1) states that 'No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle'

Sections 4 (2) and 6 explain that the waste generator must collect, segregate (hazardous waste from non-hazardous) and dispose waste in such a facility that shall be provided by the relevant local authority.

Section 5 provides methods of cleaner production (so as to minimize waste generation) which includes the improvement of production processes through: conserving raw materials and energy.

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

Part II section 3 (I) of these Regulations states that: no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment and section 3 (2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered-

- time of the day;
- proximity to residential area;
- whether the noise is recurrent, intermittent or constant; (d) the level and intensity of the noise;
- whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
- whether the noise can be controlled without much effort or expense to the person making the noise.

Part II Section 4 states that: except as otherwise provided in these Regulations, no person Shall:

- make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or
- cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source.

Part III, Section 11 (1) states that any person wishing to

- operate or repair any machinery, motor vehicle, construction equipment or other equipment, pump, fan, air-conditioning apparatus or similar mechanical device; or
- engage in any commercial or industrial activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels prescribed in the First Schedule to these Regulations. Any person who contravenes this Regulation commits an offence.

Section 13 (1) states that except for the purposes specified in sub-Regulation (2) hereunder, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations. These purposes include emergencies, those of a domestic nature and /or public utility construction.

Section 14 relates to noise, excessive vibrations from construction, demolition, mining or quarrying sites, and states that: where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose requirements on how the work is to be carried out including but not limited to requirements regarding

- machinery that may be used, and
- the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations.

It further states that the relevant lead agency shall ensure that mines and quarries where explosives and machinery used are located in designated areas and not less than two kilometers away from human settlements and any person carrying out construction, demolition, mining or quarrying work shall ensure that the vibration levels do not exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source.

#### 4.3.13 Irrigation Act (CAP 347)

Irrigation Act (CAP 347) was enacted in 1967 and applies only to public irrigation schemes managed by the National Irrigation Board. It is widely recognized that lack of a comprehensive irrigation policy and legal framework has constrained irrigation development in Kenya. Under the proposed new irrigation policy, the management of the proposed irrigation project will be required to operate under a legally recognized Irrigation Water User Associations whose duties will involve management of irrigation water, collection of operation and maintenance fees and conflict resolution.

#### 4.3.14 Wildlife Conservation and Management Act (CAP 376)

This Act provides for the protection, conservation and management of wildlife in Kenya. This Act was introduced in 1976 and empowered the Director of Wildlife to protect animals and vegetation, both inside and adjacent to national parks and reserves. An amendment of the 1976 Act was enacted in 1989 establishing the Kenya Wildlife Services with the principal objective of managing the protected areas in arid and semi-arid lands (ASALs), to ensure conservation of the flora and fauna; and utilization of wildlife resources on a sustainable basis.

### 4.4 National Administrative Framework

#### 4.4.1 The National Environment Council

The National Environmental Council (the Council) is responsible for policy formulation and directions for the purposes of the Act. The Council also sets national goals and objectives,

and determines policies and priorities for the protection of the environment.

#### 4.4.2 The National Environment Management Authority

The responsibility of the National Environmental Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of government in the implementation of all policies relating to the environment.

#### 4.4.3 The Standards and Enforcement Review Committee

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

#### 4.4.4 Energy Regulatory commission

Energy Regulatory Commission (ERC) was established as an Energy Sector Regulator under the Energy Act, 2006 in July 2007. ERC is a single sector regulatory agency, with responsibility for economic and technical regulation of electric power, renewable energy, and downstream petroleum sub-sectors, including tariff setting and review, licensing, enforcement, dispute settlement and approval of power purchase and network service contracts.

#### 4.4.5 Key Institutional Organs

In summary, the key institutional organs of relevance to the proposed project are presented in 7:

**Table 7: Institutional Organs of relevance to the proposed HGF Pan**

Institution	Parent Ministry	Responsibility
Pest Control Products Board	Agriculture, Livestock and Fisheries	Approval of any pest control products to be used.
Department of Crop Production	Agriculture, Livestock and Fisheries	Implementation of Agriculture Act
Directorate of Occupational Health	Labour, Social Security and Services	Inspection of the health and safety of the project
NEMA	Environment, Water and Natural Resource	Approval of EIA Study Report
WRMA	Ministry of Water and Irrigation	Catchment conservation and issuance of water abstraction permits

**Table 2: Institutional Organs of relevance to the proposed Pan rehabilitation**

### 4.5 World bank safeguards policies



#### 4.5.1 Policy OP/BP 4.01 Environmental assessment

This policy ensures that the proposed project is environmentally sound and sustainable. This is triggered since the project is likely to have potential adverse environmental risks and impacts on air, land, human health and safety. The project components will trigger EA policy and is a Category B which implies ESIA has to be carried out to ensure that there are mitigation measures of any potential impacts.

#### 4.5.2 Policy OP/BP 4.04 Natural habitat

The policy recognizes the conservation of natural habitat as essential in safeguarding their unique biodiversity. The objective of this policy is to avoid or mitigate adverse impacts on physical cultural resources from development projects. This policy is meant to assist in preserving physical cultural resources including the movable or immovable (above or below ground, or under water) objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance including sites and unique natural values. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices.

There is no notable natural habitats therefore unlikely interaction with the natural habitat within the project area

#### 4.5.3 OP/BP 4.36 Forests

The policy on forest safeguards seeks to realize the potential of forests to reduce poverty in sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Among the principles is to screen as early as possible for potential impacts on forest health and quality and on the rights and welfare of the people who depend on them.

There are no significant forested areas around the project area.

#### 4.5.4 OP/BP 4.10 Indigenous people

This policy is to ensure that the proposed project fosters full respect for the dignity , human rights and cultural uniqueness of IP and ensure that adverse effects during the development of the earth pan are avoided, minimized or mitigated and that they receive culturally appropriate and gender and inter-generationally inclusive social and economic benefits. This policy contributes to the Bank's mission of poverty and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies and cultures of indigenous peoples. All the community members in the area are categorized as vulnerable and marginalized groups according to the Constitution of Kenya (COK) 2010.



#### 4.5.5 OP/BP 4.11 Physical Cultural Resources

The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. This policy applies to all projects requiring a Category B Environmental Assessment under OP 4.0. The project is designed to support the management or conservation of physical cultural resources.

There are no physical cultural resources which might be adversely affected by the project

#### 4.5.6 OP/BP 4.12 Involuntary Resettlement

The objective of this policy is to (i) avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; (ii) assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them; (iii) encourage community participation in planning and implementing resettlement; and (iv) provide assistance to affected people regardless of the legality of land tenure.

This policy covers not only physical relocation, but any loss of land or other assets resulting in: (i) relocation or loss of shelter; (ii) loss of assets or access to assets; (iii) loss of income sources or means of livelihood, whether or not the affected people must move to another location.

The policy is triggered when there is potential of future grievances arising from the local communities on land ownership.

The project will not displace local communities because the land tenure in the project area is communal and there are no structures or activities being undertaken by the local communities on the proposed site hence a Resettlement Action Plan will not be prepared for the project.

#### 4.5.7 OP/BP 4.09 (Pests Management)

The policy is meant to minimize and manage the environmental and health risks associated with pesticides use and promote and support safe, effective and environmentally sound pest management. This project will not use pesticides hence this policy is not triggered.

#### 4.5.8 OP/BP 4.37 (Safety of Dams)

The objectives of this policy ensures that for new dams, experienced and competent professionals design and supervise construction; the borrower adopts and implements dam safety measures for the dam and associated works. This policy is triggered when the Bank finances: (i) a project involving construction of a large dam (15 m or higher) or a high hazard dam; and (ii) a project which is dependent on an existing dam. For small dams, generic dam safety measures designed by qualified engineers are usually adequate. This is not triggered because this is not a dam development project

### 5.14 Introduction

The consideration of alternatives is one of the more proactive sides of environmental assessment - enhancing the project design through examining options instead of only focusing on the more defensive task of reducing adverse impacts of a single design.

This calls for the comparison of feasible alternatives for the proposed Pan project, technology, and/or operational alternatives. Alternatives may be compared in terms of their potential environmental impacts, capital and recurrent costs, suitability under local conditions, and acceptability by neighbouring land users.

### 5.15 Significance of Alternatives

This Environmental Impact Assessment (EIA) Study Report for the rehabilitation of Gari water pan has identified positive and negative impacts and proposed mitigating measures. However, the study is not complete without the identification and analysis of alternatives that could be considered as viable options for the water pan development, design and implementation.

### 5.16 The 'No Project' Alternative

From a socio- economic perspective the “no project” alternative may not be the best alternative since the project is cost effective compared to other water sources such as bore hole drilling which is costly in terms of initial cost of construction. The targeted beneficiary will also have the burden of meeting costs of operating the borehole.

The ‘Nil Project Option’ is the least preferred from the socio-economic and partly environmental perspective since if the project is not done: -

The economic benefits especially during construction i.e. provision of jobs for skilled and non- skilled workers will not be realized.

The social-economic status of the local people would remain unchanged.

The local skills would remain under- utilized.

From the analysis above, it becomes apparent that the ‘No Project Alternative’ is not the appropriate alternative to the local people. This alternative describes a situation where the proposed development fails to be implemented. In case this happens, positive impacts associated with the proposed development will not accrue to the stakeholders including the residents, the development consultants, contractors and suppliers of materials. However, from an environmental conservation perspective, this alternative will be beneficial in the sense that any potential negative impacts associated with the project will be avoided. The “No project Alternative” should not be adopted, as we need to encourage development so long as it is undertaken on a sustainable basis as per the environmental management plan developed in this study report. In addition, adopting the no action alternative will mean that the existing shortfall in access to water will continue to prevail unabated. This is not viable since the proponent had already committed finances and land to a development project that suits development objectives. Construction of the earth pan will create employment to most of the youths in the area. If the project is stopped then the trickle-down of financial resources will not be felt in this area. In this respect, the “No project alternative” is not deemed appropriate in the environmental and socio-economic point of view. maintains the status quo where the community remains with no

option for clean water for their domestic, animal and irrigation use. Therefore living standards will deter further.

#### 5.17 Alternatives in Project Design(s) Technology

The technology used to implement the proposed project is considered to be feasible with simple technology in implementation and is the suitable for the community as a source of water. Other water sources such as bore hole require complex technology to implement.

#### 5.18 6.4 Alternatives for construction process

The construction process for the proposed earth pan is expected to be carried out during day time minimizing noise pollution that could affect residents at night.

#### 5.19 6.5 Alternatives for Site

The proposed earth pan excavation site had already been identified by the water consultants based on detailed survey that determined the seepage rate that is a factor to be considered in water retention. Looking for a suitable site with required attributes to accommodate the project and completing all processes may take a long period. In addition, it is not a guarantee that such suitable site would be available. The project design and planning before the stage of implementation would call for cost; already incurred in the proposed development i.e. whatever has been done and paid to date would be counted as a loss to the proponent.

Assuming the project will be given a positive response after (say relocation) by the relevant

Authorities including NEMA, it (project) would have been delayed for a long period before its commencement.

### 6.1 Overview

The Kenya government has enshrined the need for human societies' involvement in project development in the Constitution. This has been set out in the *EMCA Act, 1999* and *Environmental (Impact and Audit) Regulations, 2003*. As an important part of this exercise, consultations were undertaken as part of the Environmental and Social Impact Assessment (ESIA) exercise process in order to obtain the views of members of the immediate community and interested and affected groups within the project site's immediate area of influence.

Public consultations for the proposed Pan development were carried out in three phases designed to capture the key concerns of the communities as well as other stakeholders.

**Phase 1:** of the consultations involved in-depth interviews with the local administration.

**Phase 2:** comprised of consultative public consultations (CPCs) which were arranged and conducted on selected locations at the project area with participation drawn from the community leaders, administration, and local community



**Figure 13: View of focus group discussion meeting held at the proposed project site meeting held at Gari village**



**Figure 14: View of members of the women group pose at the proposed earth pan desilting and expansion project site at Gari village conducted by EIA team and community members**

## 6.2 Outcome of stakeholder's consultative meetings

There is a general acceptance of the project by the all of the communities living in the area and the major issues raised by the participants during these social interactions was they need more water pan development as water shall never be enough.

### 6.2.1 Socio-economic concerns

The local communities were keen to talk to the EIA field team on the proposed project and they were appreciative of the fact that the field team involved them in responding to the discussions and field observations in a consultative manner. The people encountered participated actively in raising their concerns and they expressed their hope that lawful procedures will be taken into consideration during the project implementation. In addition, below are the various social economic aspects that the community members raised:

**Water:** Generally, there is a problem of accessing clean and reliable water in the proposed project area. There is no piped water within the project site and communities' access water from seasonal small individual owned water pans and streams. All the people interviewed expressed confident and optimistic that the proposed project will lead to reliable availability of clean water accessible to the local community.

**Population:** The respondent noted that the proposed project will lead to an increase in human population in the project areas. However, they were positive that there is adequate land to accommodate the anticipated population increase.

**Employment:** All respondents were in agreement that the proposed project will provide the much needed employment in the general project area, during the construction and operation phases of the project.

### 6.2.2 Environmental Concerns

**Solid waste management:** Waste disposal was highlighted by the local communities as one component from the project activities that will pollute the environment if not properly handled. The community however agreed that this will be short term only during construction phase

**Air Quality:** The community members were of the opinion that the proposed project will not affect level of air quality in the area. They were of the opinion that the project will have slight effect on air quality of the project area in terms of dust generation during construction phase.

Support for the proposed project

A hundred percent of the total community members in the process of public participation were in support of the project. They argued that the proposed development was good and recommendable for general development and opening up of the project area and its neighborhood.

## 6.3 Summary of comments during public participation

The following were summary of comments by those who participated in the meeting;

- There were no objections to the proposed project by any members of the community.



- The community embraced the development and said they would want the project implemented as soon as possible so that they can enjoy the benefits associated with project of this nature.
- They welcomed the move by the proponent to seek their views, concerns and fears in the entire process of project implementation and confirmed their unreserved support for the project.
- They however reiterated that more emphasis should be put towards ensuring that the proposed project and its infrastructure would facilitate sustainable use of environmental resources.

On the sustainability of the project, it was observed that the ability of the community to successfully manage the project upon completion, commissioning and handing over is a prerequisite factor for project implementation.

Other key issues raised by the community included;

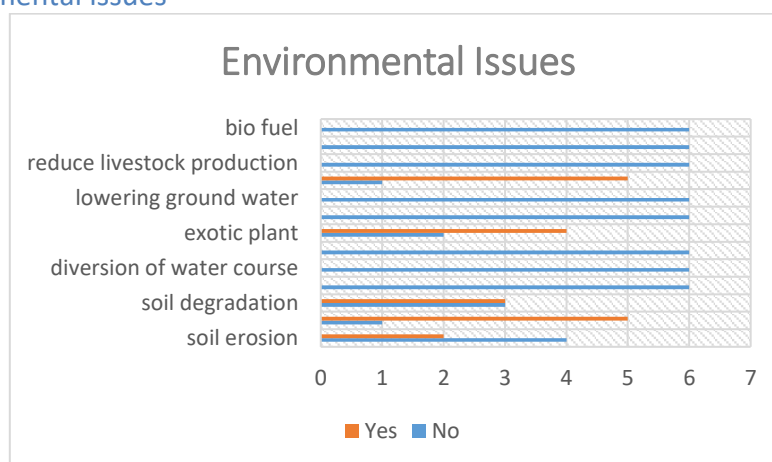
- There is inadequate water in Gari village
- Water inadequacy has made some people to migrate to other nearby settlements.
- School drop outs are more during dry season.
- Water shortage is one of their major problems.
- Availability of water will improve livestock production being their main livelihood.

#### 6.4 Administration of questionnaires

Direct interviews were used to get responses from the community members whose comments were sought through engaging them about their views and concerns about the proposed project and other related issues.

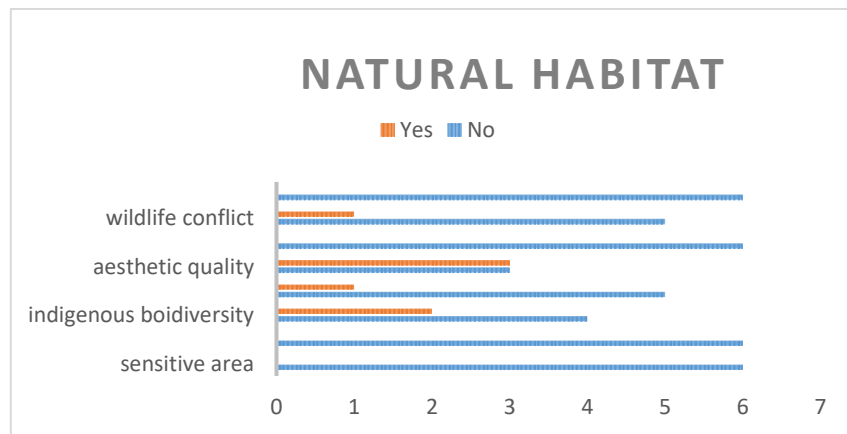
##### 6.4.1 Summary of questionnaires responded

##### 6.4.2 Environmental issues

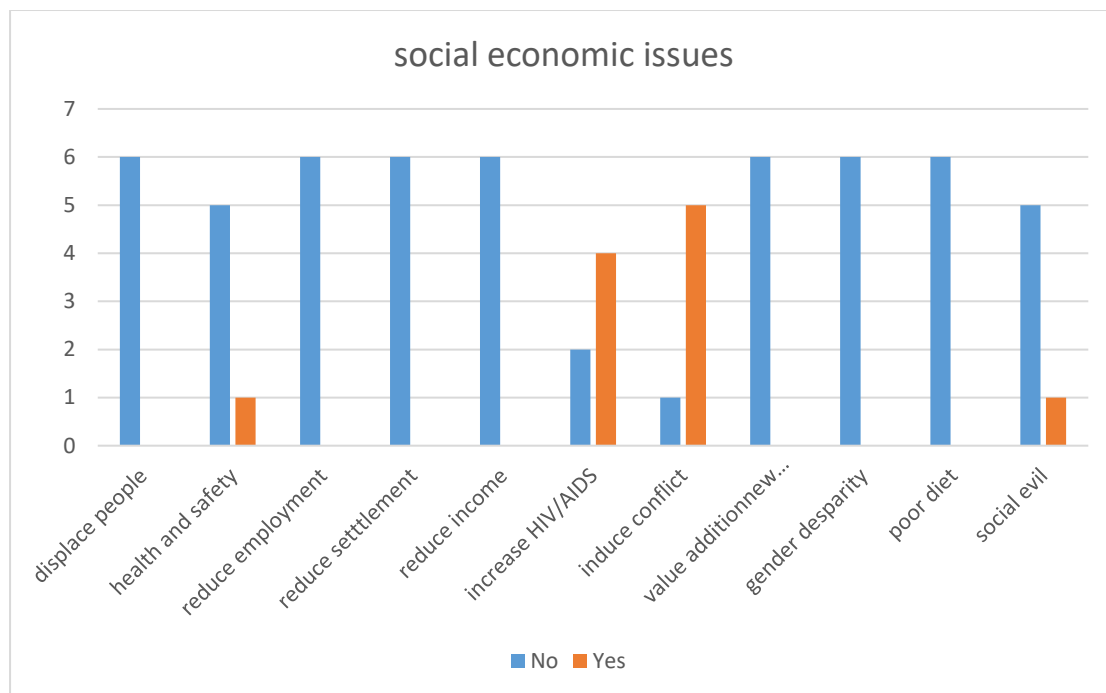


**Figure 15: Environmental Concern**

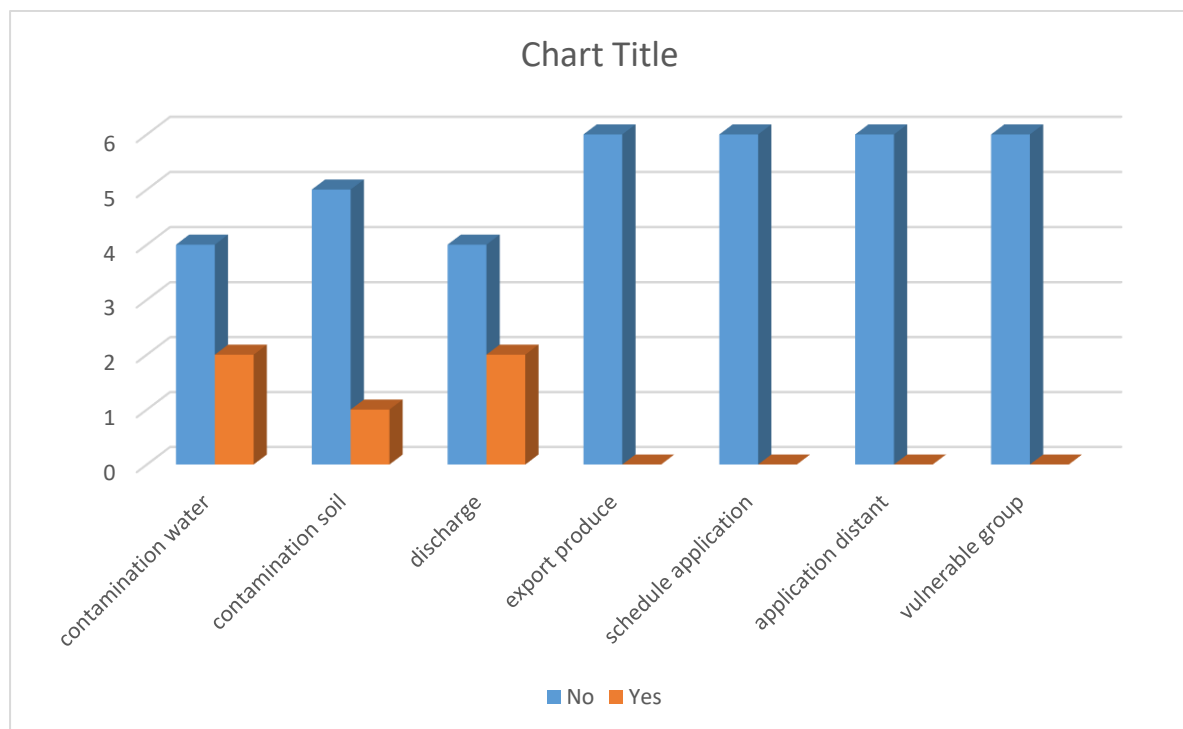
#### 6.4.3 Natural habitat concerns



#### 6.4.4 Social Economic Concerns



**Figure 16: Summary of economic concern**



**Figure 17: environmental issues concerns**

N.B: For *Vulnerable and marginalized groups meeting requirement for OP 4.10 and Land acquisition and access to resources no concerns reported*



### 7.1 Introduction

Development of a water pan provides ecological as well as social challenges even though the ultimate facility is generally beneficial to the stakeholders and the county. There is possible shifting of ecosystem boundaries as a result of changes in environmental and social regimes. At the water pan site and the inundated areas, implication ranges from displacement of social and economic features and land use changes for the community. The above concept guides the identification of the impacts associated with the proposed water pan development as to focus on the following aspects;

- ❖ Hydrological patterns,
- ❖ Water quality issues,
- ❖ Geological trends,
- ❖ land use trends and natural features,
- ❖ Social trends (settlements, economic activities, cultural values, etc.).
- ❖ Social trends including population and settlement dynamics, social integration and kinship relations, cultural values, displacement and relocation, gender equity and disease notably HIV/AIDS prevalence
- ❖ Economic factors namely economic activities, poverty levels and livelihood changes

Impacts to the social and environmental aspects vary from one area to another around the project affected areas depending on specific settings. General impacts associated with pan development are discussed below:

### 7.2 Impacts during Construction

#### 7.2.1 Positive Impacts

The following potential impacts have been identified during the construction phase:

- ✓ Employment generation and income opportunities for the contractor, construction staff, and other professional service providers; and
- ✓ Provision of clean water
- ✓ Introduction of irrigation agriculture
- ✓ Improvement to health standards around the project area
- ✓
- ✓ Improvement to environmental awareness
- ✓ Improvement to economical standards

#### 7.2.2 Loss of Vegetative Cover

The plant species of the study area present a unique plant diversity that is utilized extensively by the local community. Close to 20% of total number of plant species in the study area, including trees, shrubs, herbs, grasses, climbers and lianas are commonly utilized by the local community to supply a wide range of needs.

Actual construction activities will lead to further loss of vegetative cover at the site

of the construction camp for the workers who are likely to be engaged in the actual construction and Rehabilitation activities. This impact is however not expected to be significant. While no endangered or threatened species were identified in the area, clearing and subsequent inundation constitutes a loss of biodiversity on flora. The vegetation is also home to many invertebrate and avifauna, who will be rendered dispossessed of their habitats.

### ***Mitigation Measures***

- Controlled Clearance shrubs and trees for Development of Pan
- Undertake enrichment planting for the buffer zone where the vegetative cover is sparse;
- Rehabilitate all sites that are being used for construction activities such as camps, sites for storage materials and any paths, tracks that may be established during the construction phase; and
- Initiate agro-forest programmes in the resettlement area in order to mitigate against the loss of firewood resources.
- Create a buffer zone with minimal human activity round the proposed Pan and replant indigenous trees in order to restore lost bio- diversity

### **7.2.3 Construction Waste Generation**

During the construction/Rehabilitation phase various activities will be carried out and involve the transport of equipment and construction materials. However, waste during the construction period will arise from: spoil during excavation work, deleterious material from aggregate screening; maintenance and repair of machinery; workers domestic waste; as well as waste water.

Therefore, the most appropriate options in waste management are: identification of the waste types; segregation into the various categories; and the establishment of suitable mechanisms for collection, storage, transfer, and final disposal.

#### ***Mitigation Measures for Solid Waste***

- Domestic solid waste to be stored in refuse bins temporarily before being taken away for proper disposal by NEMA licensed waste management firms;
- Construction solid waste generated by activities that are unsuitable for use should be disposed in a landfill in an area that will be identified before commencement of construction activities. These areas should be covered with soil and the area later re-vegetated; and
- Concrete, asphalt and other waste aggregate on site should be stored if there is a need for the material to be used as fill, provided that adjacent water bodies, including ground water supplies will not become impaired as a result of doing so.

#### ***Mitigation Measures for Liquid Waste:***

- All waste water must be directed to a waste water treatment plant designed to meet the waste capacity before being discharged into the river;
- An area for the disposal of spilled or excess concrete should be identified near the mixing site;
- Waste water from concrete batching and aggregate screening should be discharged into nearby sedimentation pools and clean water re- used;
- A specific area for washing of cement trucks should be identified;
- Waste water from maintenance and the repair of machinery should be passed through an oil interceptor until the oil falls down to acceptable levels after which it can be discharged to a nearby river;
- All equipment must be fueled at properly designed fueling stations.

- Oil and fuel extractions from storage areas should be supervised and routine inspections and maintenance be carried; and
- All sewage and waste water from the construction camps and facilities will be disposed of in well designed and constructed septic tanks to meet the maximum population.

#### 7.2.4 Soil erosion and increased sediment loads

Construction activities have the potential to loosen soils, which can then be washed down into the lower areas (streams and valleys) and soil quality degradation is also likely to occur during construction as a result of disposal of construction materials on the adjacent lands.

##### **Mitigation Measures:**

- Excavated earth must as necessary as it shall demand.
- Re-vegetation of exposed areas around the site should be carried out rapidly in order to mitigate erosion of soil through surface water runoff and wind erosion

#### 7.2.5 Water Quality Degradation

The selection and application of improper materials during the period of execution of excavation works and use of improper technology, organization and mechanization for excavation and construction of the structures during the main and final works are direct entry points of pollutants into the water pan. For the purposes of public safety and the environment, the contractor must outsource materials from certified dealers dealing with construction materials already standardized and have passed quality test in accordance to the law. Therefore the developer shall be made to certify the sources of all materials and equipment to ensure their safety on environment and the community.

##### **Mitigation Measures:**

1. Material with the following elements to be avoided at all cost:
  - Asbestos in any form or any man made mineral fiber
  - Lead paint or any other materials containing lead which may be inhaled, ingested or absorbed shall not be used
  - Any timber treated with pentachlorophenol
  - Any other substances regarded as being deleterious, construction materials which are not in accordance with requirements, codes of practice or with current accepted building practice at the time of specification or construction.
1. The prevention of downstream contamination from pollutants resulting from excavation and construction and operation and maintenance activities can be achieved by proper storage and ensuring all storage containers are well closed to prevent accidental leaks and spills; and
2. Proper management of oil spill and diligence on the part of the contractor during construction, refurbishment, fixing, installation and rehabilitation shall reduce the risk of water contamination.

#### 7.2.6 Air Quality

The following emissions will be expected to result from construction activities. This would in turn lead to poor quality of life as well as upper to lower respiratory infections and silicosis condition:

- Dust from excavations and earth moving vehicles as well as materials delivery);
- Particulate matter from dry materials, more specifically sand, cement) and

- Emissions such as smoke, hydrocarbons and nitrogenous gases among others from machinery exhausts

#### ***Mitigation Measures***

- Personal protective equipment (PPE) such as dust masks must be worn in the immediate vicinity of the operations during excavation and handling of cement. Additional protective masks should be worn at the vicinity of excavation sites;
- All machinery and equipment should be maintained in good working order to ensure minimum emissions including carbon monoxide, oxides of Nitrogen and Sulphur, as well as suspended particulate matter;
- Drivers of construction vehicles and delivery trucks should be cautioned to drive slowly near the site to avoid creating dusty conditions;
- Construction trucks delivering sand and cement to the site should be covered to minimize dust blowing into the surrounding neighbourhood;
- No burning of any materials whatsoever should be permitted at the site; and
- Drivers of construction vehicles and delivery trucks must be supervised so that they do not leave vehicles idling and limit their speeds so that dust levels are lowered.

#### **7.2.7 Risk of leaks and spills**

Petroleum hydrocarbons present both an environmental and fire risk. The storage of petroleum hydrocarbons on site presents a hazard source and the release of hydrocarbons into the environment could result in significant impacts on a variety of receptors. The pathway for pollution is soil or water, and the primary receptors include the sub-soil and groundwater. Other receptors include air (from fuel vapours) and people (through dermal contact, inhalation or ingestion). It is however worth noting that the risks of a major oil spillages occurring are minimal.

#### ***Mitigation Measures:***

- Regular maintenance of site equipment and machinery should be carried out to ensure any leakages are detected and controlled. The motor vehicles and heavy equipment should be serviced according to manufacturer's requirements to limit the exhaust emissions.
- Investigate the possibility of fitting catalytic converters especially for the heavy equipment to convert harmful substance in the exhaust fumes to less harmful substances;
- Safety procedures for fuel storage and re-fueling should be well understood and implemented by site staff; and
- Oil residuals including waste oil, lubricants, used filters, should be carefully collected and stored for safe disposal, in order to prevent migration of contaminant hydrocarbons into storm water or groundwater resources.

#### **7.2.8 Occupational Health and Safety Issues**

Potential impacts during construction include: exposure to physical hazards from the use of heavy equipment; trips and fall hazards; and exposure to dust and noise. The uncontrolled proximity to high vehicular traffic during transportation of construction materials and equipment may lead to injuries or fatalities due to traffic accidents. Other injuries or fatalities may result from workers operating equipment without adequate training or with a lack of personal protective equipment or extended exposure to outdoor weather resulting in heat-related lethargy.

**Mitigation Measures:**

- Ensure all equipment is inspected before use for appropriate safe guards and that the machine operators are trained on machine safety;
- Ensure the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay; and
- Ensure the blasting and other high risk activities are carried out under access restriction. Only authorized persons are to access the blasting areas. Train first aid personnel and provide a fully stocked first aid box to respond to any injuries due to the activities

Other disease and public health problems may also arise during the construction phase from the contamination of water used for domestic purposes by project staff as well as neighboring communities by domestic waste (sewer and solid waste). The consumption of contaminated water as a resulting from construction activities (equipment cleaning, use of biocides to kill bacteria in equipment) and extensive breeding of vectors in the impounded water may also contribute to disease and other public health concerns.

**Mitigation Measure**

- biocides and domestic wastes) is contained, treated, tested and released after confirmation for fitness for consumption or disposed of appropriately by exhaustion to other municipal treatment site; and
- Monitoring the quality of water and treating is the only mitigation for leachate.
- During the construction phase, several manual tasks will be carried out by the project workers. Repetitive tasks have the effect of imparting ergonomic disorders especially when they are carried out over long periods of time

**Mitigation Measures:**

- (i) Provide adequate manual labor to suffice the tasks; and
- (ii) Eliminate repetitive task by semi-automation where possible

**7.2.9 Noise and Vibration**

There will be noise and vibrations generated during the construction phase but it will be no different from that on any other typical construction site. The noise impact during construction is expected to be negative and short-term.

Major sources of noises and vibration will come from: excavation of water pan from the Dozer as well as noise from the work force itself. The major receptors are expected to be the construction workers as well as any immediate neighbouring premises.

Excessive vibrational forces from excavation of rocks may impair functions of the chest, abdominal organs and musculoskeletal system as well as contribute to fatigue and decrease in concentration.

Excessive production of high noise by the machines and vehicular traffic and machinery operations may result in poor quality of life and potential loss (or reduction) in hearing.

**Mitigations Measures:**

- Conduct noise measuring to determine levels and extent of harmful noise and provide PPE (hearing protection) to persons who must
- operate within or visit the identified high noise areas;
- Investigate the possibility of investing in silencers to reduce the
- quantity of noise produced;
- Create a barrier well beyond the perimeter of the high noise level area
- to protect the unsuspecting public who may approach the project site; (iv) Ensure that the works are distant from the settlement areas, and

- vibration is not expected to have impacts beyond its site boundaries;
- In order to meet noise level requirements, the works will be equipped with standard noise attenuation features. Machines that exceed acceptable noise limits will be equipped with silencers or lagging materials or specially designed acoustic enclosures; and
- Inform local residents of any abnormal noise generating construction activities to minimize disruption to local residents

#### 7.2.10 HIV/AIDS

During the construction phase of the project, there may be an increase in the interaction of persons of both genders. This interaction may at times result in sexual relations with potential subsequent increase in HIV/AIDS infection rates.

##### **Mitigation Measures:**

The objective of the HIV/AIDS initiatives would be to reduce the risks of exposure to and spread of the HIV virus in the project area. Major targets would be construction workers, institutional communities and the general members of the community, particularly the youth. Recommended measures are as follows:

- Review the activities of the Pan rehabilitation to integrate with the HIV/AIDS campaigns;
- Develop appropriate training and awareness materials for information, education and communication (IEC) on HIV/AIDS;
- Identify other players (local CBOs, NGOs, and government organizations) on HIV/AIDS for enhanced collaboration;
- Develop an intervention strategy compatible with the Pan rehabilitation programme to address success of the HIV/AIDS prevention and provide peer educators for sustainability in collaboration with other stakeholders; and
- Integrate monitoring of HIV/AIDS preventive activities as part of the Pan rehabilitation supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs.

#### 7.2.11 Loss of Grazing Grounds

The area around the water pan is currently being used as grazing grounds by the Community. Upon inundation, these grazing grounds will no longer be available to the livestock. Livestock rearing is expected not to reduce as excavation doesn't take large area.

##### **Mitigation measures:**

*Discuss with the local communities about alternative sites for grazing and advise them on ways and means to develop such alternatives*

## CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

### 8.1 General

Along with the potential impacts presented in this chapter, proposed mitigation measures have also been highlighted for appropriate action. Some impact mitigation has already been proactively addressed in the design, and legal and regulatory framework, while others would be undertaken through considered incorporation in the implementation of the project and guided by the environmental and social management plan (ESMP) developed under this report. The ESMP provides a general outlay of the activities, associated impacts, mitigation action plans and appropriate monitoring indicators. Implementation timeframes and responsibilities are also defined. It is however recommended that a detailed decommissioning audit be undertaken at the appropriate time.

### 8.2 Management Plan Principles

To realize the project goal, acceptability by a majority of the beneficiaries and minimal effects to the physical environment will require to be integrated in the project through constant consultations throughout the project coverage. It is recommended that management guiding principles specific to this project be developed that will allow integration of environmental management considerations during the construction and operations. Among the basic areas that need to be considered in guiding management of this particular project implementation will include;

- Soil erosion control
- Water logging
- Salinization
- water-borne and water-related diseases
- Integration of environmental, social and economic functions into the project implementation,
- The contractors and other players in the project activities be prevailed upon to implement the EMP through a sustained supervision and continuous consultations.

### 8.3 Specific Management Issues

#### 8.3.1 Management Responsibilities

In order to implement the management plan, it is recommended that an expert is identified to oversee environment and management aspects including the water pan and catchment conservation, soil erosion control and re-vegetation whenever appropriate. The expert would also be expected to co-ordinate and monitor environmental management during construction and post monitoring audits of the water pans well as the existing ones). Other responsibilities would go to respective County Environmental Officers, County Water Officers, County Planning Officers and the County governments among others who would oversee compliance in accordance with the law and this management plan.



The responsibility relationship is as follows;

- Mandera County Government and community will be responsible for coordination activities and liaisons, particularly in regard to the water resources resource management, construction, quality control and social issues during the project implementation,
- The County agriculture office in the project area will ensure that the contractor is observing all measures for protection of water resources,
- Mandera County Government will liaise with the County Environment Officers on matters of environmental and social nature. The stakeholder and catchment communities will be responsible of overseeing that the implementation of the environmental management plan established under this report and that there are no adverse impacts,
- It would be recommended that the Community Liaison Officer at Mandera County Government directly interact with the local communities on social, economic and cultural matters for long-term sustainability of the Pan and associated components. In this regard, the Contractor will also be asked to establish a liaison person for ease of communication on concerns to the project management,
- The National Environmental Management Authority (NEMA) through the County Environment Offices in the project shall be responsible of surveillance of environmental and social aspects of the project implementation,
- Water Resources Management Authority (WRMA), responsible of water resources management, will be responsible of streamlining water abstraction and use in the project area,

### 8.3.2 Environmental Management Guidelines

Upon completion and commissioning of the Pan, it will be necessary to establish appropriate operational guidelines on environmental conservation and social linkages to enable Mandera County Government identify critical environmental and social issues to institute appropriate actions towards minimizing associated conflicts. The guidelines should cover among other areas environmental management programmes, standard operation procedures, compliance monitoring schedule and environmental audit schedules as required by law. Social harmony of the Pan and associated components will be achieved through collaboration with the stakeholders or community management committees introduce along administrative zone.

### 8.3.3 Environmental and Social Management Plan

The scope of this environmental management plan (ESMP) document is to give guidelines to all parties involved in construction, maintenance and utilization of the Pan in fulfillment of environmental and social requirements. The management plan has a long-term objective to ensure that:

Environmental management conditions and requirements are implemented from the start of the project and post construction period, and ESMP as in table below:



Table 3: showing the ESMP

Environmental Impacts	Mitigation Measures	Responsible Org.	Time frame	Cost (KSHS)
Occupation injuries and accidents	<ul style="list-style-type: none"> <li>The contractor should provide his construction staff with adequate personal protective equipment during construction work in order to protect against occupational related injuries.</li> <li>Train workers on occupational health and safety</li> <li>Provide workers with first aid kits.</li> </ul>	Contractor/Community	During construction	50,000
Impacts on flora and Fauna	<ul style="list-style-type: none"> <li>Vegetate the area after construction</li> <li>Support local community groups in tree planting in appropriate locations by providing tree seedlings</li> <li>Initiate on-farm tree planting activities in the area.</li> </ul>	Contractor/Community	During construction	20,000
Soil erosion	<ul style="list-style-type: none"> <li>Minimize vegetation disturbance</li> <li>Reinstate sites immediately after construction</li> <li>Train farmers on appropriate soil conservation techniques.</li> <li>proper rehabilitation procedures</li> </ul>	Contractor/Community	At the start of construction	150,000
Socio-cultural impacts	<ul style="list-style-type: none"> <li>Contractor should try to employ local people as staff for unskilled labour.</li> <li>Train workers on HIV/AIDS</li> </ul>	Contractor/Community	During construction	25,000
Water Source	<ul style="list-style-type: none"> <li>Avoid leaving any foreign object into the Pan.</li> </ul>	Contractor/proponent	Construction stage	2000
Approval of project	<ul style="list-style-type: none"> <li>acquisition of rehabilitation permits from Water Resources Management Authority (WRMA)</li> <li>Ensure NEMA approval.</li> </ul>	Proponent	Inspection	3000
Noise and Vibration	<ul style="list-style-type: none"> <li>The workers should be provided for ear plugs to protect them from hearing problems in case of noise.</li> <li>When conducting flushing residents should be informed in advance so as to vacate the area.</li> <li>Working hours should be minimized to only 8 hours a day and work will be restricted to day time only.</li> </ul>	Contractor	During construction	40,000
Air pollution -Dust and Emission	<ul style="list-style-type: none"> <li>Dust generated during rehabilitation and delivery of construction inputs can be managed through sprinkling of the site with water before commencement of construction works</li> <li>Ensure that transport of materials and wastes is done in covered trucks to contain any dust.</li> </ul>	Contractor/Community	During construction	65,000

Environmental Impacts	Mitigation Measures	Responsible Org.	Time frame	Cost (KSHS)
Water pollution/water resource degradation	<ul style="list-style-type: none"> <li>• Train farmers on proper agrochemical use, handling and disposal.</li> <li>• Encourage farmers to use manure instead of fertilizer.</li> <li>• Each farmer should leave 50m buffer to the river as required by NEMA, WRMA and they should plant trees not crops for daily consumption.</li> <li>• Water quality monitoring should be carried out on quarterly basis.</li> </ul>	Community	During operational phases	70,000
Water use conflicts among the community	<ul style="list-style-type: none"> <li>• The project area residents should construct a separate water pan for livestock.</li> <li>• Develop water distribution schedule that ensures equal water utilization by all users and domestic use</li> </ul>	community	During operation	30, 000
Risk of Over pumping	<ul style="list-style-type: none"> <li>• Use of a master meter to ensure only necessary water is pumped as per the test pumping results and proper pump sizing.</li> <li>• Supplementing irrigation water with other sources e.g. rain water harvesting</li> <li>• Efficiency in water use i.e. farmer uses only water required.</li> <li>• Train farmers on correct water application rates.</li> <li>• Adhering to WRMA guidelines on use of flood water only.</li> <li>• Farmers should have 90days reservoir for flood waters to be used during dry season for animals watering.</li> </ul>	WRMA Community	During operational phase	50,000
Public health/Water borne diseases	<ul style="list-style-type: none"> <li>• The contractor shall provide adequate sanitation facilities to the workers.</li> <li>• Construction site should be in clean and safe condition and provide and maintain appropriate facilities for temporary storage of all wastes before transportation and disposal.</li> <li>• Training to farmer on disease prevention and control.</li> </ul>	Contractor/ Community	During construction and operation	20,000
Oil and Grease	<ul style="list-style-type: none"> <li>• Proper storage of oil.</li> <li>• Good disposal of used oil</li> <li>• Servicing of vehicles in the garage.</li> </ul>	Contractor	Throughout rehabilitation period.	5000

## CHAPTER 9: ENVIRONMENTAL AND SOCIAL MONITORING PLAN

### 9.1 Monitoring Parameters

The environmental and social monitoring will involve a continuous surveillance, of Performance of specific activities, during the construction and operation phases of the project. Among the aspects to be monitored will include the following;

#### 9.1.1 Construction

- ✓ Health and Safety particularly of the construction workers and the neighbouring communities,
- ✓ Social linkages and interactions with the construction works,
- ✓ Interaction with key sensitive environmental features including hydrology, soil erosion, vegetation loss, air quality, etc.,

#### 9.1.2 Operations

- ✓ Safety aspects of the water conveyance and handling
- ✓ Environmental hydrology
- ✓ Biodiversity development
- ✓ Land use trends
- ✓ Economic features

#### 4.6 9.2 Monitoring Schedule

**Table 11: Monitoring Plan**

Significant Negative Impacts	Proposed EMoP		Frequency	Agency in Charge
	Parameter	Point of Measurement		
Loss of Fauna, Flora (Biodiversity)	<ul style="list-style-type: none"> <li>Vegetation cover</li> <li>No. of tree nurseries established</li> </ul>	In settlement On-farm tree planting	<ul style="list-style-type: none"> <li>Once after construction and during the operational phases</li> </ul>	Community /Contractor
Occupational injuries and accidents	<ul style="list-style-type: none"> <li>Number of reported cases of injuries</li> <li>Occupational health and safety audits</li> </ul>	Monitor use of personal protective clothing by the construction workers	<ul style="list-style-type: none"> <li>during construction</li> </ul>	Contractor
Water quality	<ul style="list-style-type: none"> <li>Water quality analysis</li> </ul>	Water quality samples must be tested before use	<ul style="list-style-type: none"> <li>Semi-annually</li> </ul>	Contractor/Community
Water use conflicts	<ul style="list-style-type: none"> <li>Number of reports cases of conflicts</li> </ul>	Project area	<ul style="list-style-type: none"> <li>Throughout the project cycle</li> </ul>	Community
Human-Wildlife conflicts	<ul style="list-style-type: none"> <li>Number of reported cases</li> </ul>	Project area	<ul style="list-style-type: none"> <li>Semi-annually</li> </ul>	Community
Chemical poisoning	<ul style="list-style-type: none"> <li>Number of reported cases</li> </ul>	Project area	<ul style="list-style-type: none"> <li>Annually</li> </ul>	Community
Soil Erosion	<ul style="list-style-type: none"> <li>Site visits, observation and photography</li> </ul>	Project area	<ul style="list-style-type: none"> <li>Annually</li> </ul>	Community /DAO/DIO
Reduced water flow wastage	<ul style="list-style-type: none"> <li>Water flow rate metering</li> <li>System to use waste water</li> <li>introduction moisten garden, oasis farming, sunken beds, hydroponics</li> </ul>	project site	<ul style="list-style-type: none"> <li>throughout project cycle</li> </ul>	Community /WRMA
Hazards (Risk), infectious Diseases such as HIV/AIDS	<ul style="list-style-type: none"> <li>Assessing the no. of reported cases of water-borne ailments</li> </ul>	Project are and downstream	<ul style="list-style-type: none"> <li>Semi-annually</li> </ul>	community

## CHAPTER 10: CONCLUSIONS AND RECOMMENDATIONS

### 8.4 Conclusion

The proposed project will provide clean and safe water for domestic use, in institutions and livestock watering therefore addressing the current water demand in Gari village. The activities for which the proposed development is intended are compatible with the neighborhood. The project has been planned in full cognizance and in conformity to the requirements of the government. The project is an environmentally low risk project and thus poses no significant threat to the environmental aspects of the area. The negative and positive environmental impacts from the implementation of the proposed project have been identified. Appropriate mitigation measures have been designed to address the identified negative impacts during construction, operation and decommissioning phases.

### 8.5 Recommendations

The proponent and contractor are advised to implement the Environmental and Social Management and Mitigation Plan (ESMMP) so as to reduce adverse impacts and boost good environmental practices. Guidelines on environment, health and safety must also be followed in order to reduce incidences of accidents, health problems and compromise to environmental wellbeing.

Recommendations for the prevention and mitigation of adverse impacts are as follows: -

- i. The proponent should provide signage in the proposed project site to inform neighbors and the local community of the activities taking place.
- ii. Ensure that worker's occupational health and safety standards are maintained through capacity building, proper training and providing protective clothing
- iii. The proponent/contractor should ensure that the proposed management plan is fully implemented.
- iv. Heavy construction activities especially excavation of water pan during desilting tank should be limited (or avoided) during the rainy season to minimize the chances of soil degradation (soil erosion). Maintenance activities on plant equipment used must be carried out in specified areas as service bays before being taken to the project site to reduce chances of oils or grease or other maintenance materials, from coming into contact with environment (water or soil).
- v. All activities concerning construction and maintenance such as, work execution, site inspection, and material testing, shall be strictly monitored by a qualified engineer and/or project manager. This is important to ensure quality of maintenance works. Engineers and/or project manager shall be trained and experienced enough to judge the appropriateness of the work executed in order to carry out the monitoring.
- vi. Construction activities must be undertaken only during the day i.e. between 08:00 hours to 17:00hours. This will minimize disturbance to the general public within the proximity of the project site.
- vii. All solid waste materials and debris resulting from construction activities must be disposed offsite to the approved dumpsites. Some excavation waste such as stone

materials should be used for ancillary works such as silt trap rip rap protection and spillway.

- viii. There is need for community and workers' awareness creation on the environmental management issues.

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## Annexures

### Annexures 1: Lead Expert practicing license

FORM 5

(r.14(4))




**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)**  
**THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT**  
**CERTIFICATE OF REGISTRATION AS AN ENVIRONMENTAL IMPACT ASSESSMENT/  
AUDIT EXPERT**


Certificate No: NEMA/EIA/RC/3149  
Application Reference No: NEMA/EIA/ER/6618

This is to certify M/s **Eng. Chenge Yahya Kunguru** of  
P.O. Box 3461-20100, Nakuru (Address) has been registered as an Environmental  
Impact Assessment Expert in accordance with the provisions of the Environmental Management and  
Coordination Act Cap 387 and is authorized to practice in the capacity of a Lead Expert/Associate  
Expert/Firm of Experts (Type) **Lead Expert**

Expert Registration No: **8679**  
Issued Date : **2/5/2018**

Signature 

(Seal)

  
Director-General  
The National Environmental Management Authority

P.T.O.  
  
ISO 9001: 2008 Certified





**Environmental and Social Screening Checklist**

Name of County.....
Name of CPCU/Monitoring Officer/Researcher .....
Sub-project location.....
Name of CBO/Institution.....
Postal Address:.....
Contact Person.....Cell phone:.....
Sub-project name.....
Estimated cost (KShs.).....
Approximate size of land area available for the sub-project.....
Objectives of the sub project.....
.....
.....
.....
Activities/enterprises undertaken.....
How was the sub-project chosen?.....
Expected sub project duration:.....

## Section B: Environmental Issues

YES	NO	Will the sub-project:
<input type="checkbox"/>	<input type="checkbox"/>	Create a risk of increased soil erosion?
<input type="checkbox"/>	<input type="checkbox"/>	Create a risk of increased deforestation?
<input type="checkbox"/>	<input type="checkbox"/>	Create a risk of increasing any other soil degradation
<input type="checkbox"/>	<input type="checkbox"/>	Affect soil salinity and alkalinity?
<input type="checkbox"/>	<input type="checkbox"/>	Divert the water resource from its natural course/location?
<input type="checkbox"/>	<input type="checkbox"/>	Cause pollution of aquatic ecosystems by sedimentation and agro-chemicals, oil spillage, effluents, etc.?
<input type="checkbox"/>	<input type="checkbox"/>	Introduce exotic plants or animals?
<input type="checkbox"/>	<input type="checkbox"/>	Involve drainage of wetlands or other permanently flooded areas?
<input type="checkbox"/>	<input type="checkbox"/>	Cause poor water drainage and increase the risk of water-related diseases such as malaria?
<input type="checkbox"/>	<input type="checkbox"/>	Reduce the quantity of water for the downstream users?
<input type="checkbox"/>	<input type="checkbox"/>	Result in the lowering of groundwater level or depletion of groundwater?
<input type="checkbox"/>	<input type="checkbox"/>	Create waste that could adversely affect local soils, vegetation, rivers and streams or groundwater?
<input type="checkbox"/>	<input type="checkbox"/>	Reduce various types of livestock production?
<input type="checkbox"/>	<input type="checkbox"/>	Affect any watershed?
<input type="checkbox"/>	<input type="checkbox"/>	Focus on biomass/bio-fuel energy generation?

If the answers to any of the above is ‘yes’, please include an ESMP with sub-project application.

## Section C: Socio-economic Issues

YES	NO	Will the sub-project:
<input type="checkbox"/>	<input type="checkbox"/>	Displace people from their current settlement?
<input type="checkbox"/>	<input type="checkbox"/>	Interfere with the normal health and safety of the worker/employee?
<input type="checkbox"/>	<input type="checkbox"/>	Reduce the employment opportunities for the surrounding communities?
<input type="checkbox"/>	<input type="checkbox"/>	Reduce settlement (no further area allocated to settlements)?
<input type="checkbox"/>	<input type="checkbox"/>	Reduce income for the local communities?
<input type="checkbox"/>	<input type="checkbox"/>	Increase insecurity due to introduction of the project?
<input type="checkbox"/>	<input type="checkbox"/>	Increase exposure of the community to communicable diseases such as HIV/AIDS?
<input type="checkbox"/>	<input type="checkbox"/>	Induce conflict?
<input type="checkbox"/>	<input type="checkbox"/>	Have machinery and/or equipment installed for value addition?
<input type="checkbox"/>	<input type="checkbox"/>	Introduce new practices and habits?
<input type="checkbox"/>	<input type="checkbox"/>	Lead to child delinquency (school drop-outs, child abuse, child labour, etc.)?
<input type="checkbox"/>	<input type="checkbox"/>	Lead to gender disparity?
<input type="checkbox"/>	<input type="checkbox"/>	Lead to poor diets?
<input type="checkbox"/>	<input type="checkbox"/>	Lead to social evils (drug abuse, excessive alcohol consumption, crime, etc.)?

#### Section D: Natural Habitats

		Will the sub-project:
<input type="checkbox"/>	<input type="checkbox"/>	Be located within or near environmentally sensitive areas (e.g. intact natural forests, mangroves, wetlands) or threatened species?
<input type="checkbox"/>	<input type="checkbox"/>	Adversely affect environmentally sensitive areas or critical habitats – wetlands, woodlots, natural forests, rivers, protected areas including national parks, reserves or local sanctuaries, etc.)?
<input type="checkbox"/>	<input type="checkbox"/>	Affect the indigenous biodiversity (flora and fauna)?
<input type="checkbox"/>	<input type="checkbox"/>	Cause any loss or degradation of any natural habitats, either directly (through project works) or indirectly?
<input type="checkbox"/>	<input type="checkbox"/>	Affect the aesthetic quality of the landscape?
<input type="checkbox"/>	<input type="checkbox"/>	Reduce people's access to the pasture, water, public services or other resources that they depend on?
<input type="checkbox"/>	<input type="checkbox"/>	Increase human-wildlife conflicts?
<input type="checkbox"/>	<input type="checkbox"/>	Use irrigation system in its implementation?

NB: If the answers to any of the above is 'yes', please include an ESMP with sub-project application

#### SECTION E: Pesticides and Agriculture Chemicals

		Will the sub-project:
<input type="checkbox"/>	<input type="checkbox"/>	Involve the use of pesticides or other agricultural chemicals, or increase existing use?
<input type="checkbox"/>	<input type="checkbox"/>	Cause contamination of watercourses by chemicals and pesticides?
<input type="checkbox"/>	<input type="checkbox"/>	Cause contamination of soil by agrochemicals and pesticides?
<input type="checkbox"/>	<input type="checkbox"/>	Experience effluent and/or emissions discharge?
<input type="checkbox"/>	<input type="checkbox"/>	Export produce? Involve annual inspections of the producers and unannounced

		inspections?
<input type="checkbox"/>	<input type="checkbox"/>	Require scheduled chemical applications?
<input type="checkbox"/>	<input type="checkbox"/>	Require chemical application even to areas distant away from the focus?
<input type="checkbox"/>	<input type="checkbox"/>	Require chemical application to be done by vulnerable group (pregnant mothers, chemically allergic persons, elderly, etc.)?

If the answer to the above is ‘yes’, please consult the IPM that has been prepared for the project.

#### Section F: Vulnerable and Marginalized Groups meeting requirements for OP 4.10

		Are there:
<input type="checkbox"/>	<input type="checkbox"/>	People who meet requirements for OP 4.10 living within the boundaries of, or near the project?
<input type="checkbox"/>	<input type="checkbox"/>	Members of these VMGs in the area who could benefit from the project?
<input type="checkbox"/>	<input type="checkbox"/>	VMGs livelihoods to be affected by the sub project?

If the answer to any of the above is 'yes', please consult the VMGF that has been prepared for the project.

#### Section G: Land Acquisition and Access to Resources

YES	NO	Will the sub-project:
<input type="checkbox"/>	<input type="checkbox"/>	Require that land (public or private) be acquired (temporarily or permanently) for its development?
<input type="checkbox"/>	<input type="checkbox"/>	Use land that is currently occupied or regularly used for productive purposes (e.g. gardening, farming, pasture, fishing locations, forests)
<input type="checkbox"/>	<input type="checkbox"/>	Displace individuals, families or businesses?
<input type="checkbox"/>	<input type="checkbox"/>	Result in temporary or permanent loss of crops, fruit trees and pasture land?
<input type="checkbox"/>	<input type="checkbox"/>	Adversely affect small communal cultural property such as funeral and burial sites, or sacred groves?
<input type="checkbox"/>	<input type="checkbox"/>	Result in involuntary restriction of access by people to legally designated parks and protected areas?
<input type="checkbox"/>	<input type="checkbox"/>	Be on monoculture cropping?

If the answer to any of the above is 'yes', please consult the mitigation measures in the ESMF, and if needed prepare a (Resettlement Action Plan) RAP.

#### Section H: Proposed action

(ii) Guidance	(i) Summarize the above:
If all the above answers are 'No', there is no need for further action;	<input type="checkbox"/> All the above answers are 'No'
If there is at least one 'Yes', please describe your recommended course of action.	<input type="checkbox"/> There is at least one 'Yes'