ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT REPORT(ESIA)

FOR

THE PROPOSED REHABILITATION AND EXPANSION OF HALAKHE YAYA WATER PAN IN QILTA-KORMA LOCATION, SAGANTE WARD, MARSABIT COUNTY.

CLIENT:

KENYA CLIMATE SMART AGRICULTURE PROJECT

P. O. BOX 384-60500-MARSABIT

PROPONENT:

HALAKE-YAYA PROJECT MANAGEMENT COMMITTEE

P.O BOX 10, 60500-MARSABIT

REPORT PREPARED AND SUBMITTED BY:

MUGUN HOLDINGS LIMITED

Registered, Licensed & Practising Consultants & Firm of Experts

Email: mugunkip@gmail.com, Office Tel No. 0727364245

DECEMBER 2018

CERTIFICATION

Project cordinator,

Kenya Climate Smart Agriculture project

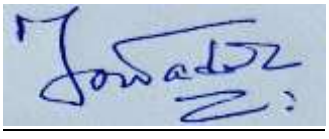
This Environmental Impact Assessment (EIA) report was prepared in accordance with the Environmental Management and Coordination Act (EMCA) 1999 and the Environmental Impact Assessment and Audit Regulations 2003 in order to meet the statutory requirements for implementation of projects under schedule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

I, the undersigned, confirm that the contents of this report are a true representation of the EIA process for the proposed rehabilitation and expansion in Qilta-Korma location of Sagante Ward ,Marsabit County .

Firm Of Experts

NEMA Registration Number: 8332

MUGUN HOLDINGS LIMITED, a Firm of Experts in Environmental Impact Assessments and Audits **REG NO: 8332.** Has prepared this ESIA project study report. It has been done with reasonable skill, care and due diligence in accordance with the Environmental (Impact Assessment and Audit) Regulations 2003 and within the study limitations, resources and literature reviewed.

Name	Signature	Date	Stamp
MUGUN HOLDINGS LIMITED.		25/12/2018	
WATO DENGE		25/12/2018	

ACRONYMS

ASAL	Arid and Semi arid Lands
KCSAP	Kenya Climate Smart Agriculture Project
ESIA	Environmental and Social Impact assessment
WSB	Water Service Board
NEMA	National Environment Management Authority
EMCA	Environmental Management Coordination Act
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment Studies
MM	Millimeters
MoALF	Ministry of Agriculture Livestock and Fisheries
WHO	World Health Organization
WRMA	Water Resources Management Authority
GoK	Government of Kenya
AIDS	Acquired Immune Deficiency Syndrome
NEMA	National Environmental Management Authority
MGDs	Millennium Development Goals
PDO	Project Development Objective
PVC	Polyvinyl Chloride
TIMPS	Technology, Innovation Management practices
TDS	Total Dissolved Solids
TOR	Terms of Reference

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EXECUTIVE SUMMARY

In the commitment to protect the environment and also recognizing the requirements of the government of Kenya on the fulfillment of environmental and social impact assessment regulations. The Kenya Climate Smart Agriculture Project and The World Bank funded Project engaged in carrying out an environmental and social impact assessment report for proposed rehabiliation of Halakhe Yaya water pan in Qilta-Korma location of Sagante ward ,Marsabit County .

The report presents the assessment findings in accordance with the environmental management and coordination act (EMCA) 1999, Environmental and Social (Impact Assessment and Audit) regulations and the EIA and audit guidelines.The ESIA Assessed the existing environmental conditions and predicated the possible negative impacts and mitigation measures and an environmental management plan for the proposed rehabilitation of the the water pan.

Further it has highlighted the relevant legislation for the project and documented evidence based baseline data on the project. The measures proposed herein in the report need to be implemented to enhance sustainable utilization of our environment. It is hereafter reinforced that Project specifications, guidelines, licenses and permits must be in possession of the contractor and the proponent prior to commencement of rehabilitation process. Through regular safety meetings, all waterpan rehabiltation employees and contractors working in the project will have to be made aware of these documents and their contents.

This rehabilitation of the project will lead to increased water accessability to the project beneficiaries, improved soil erosion control , safety of the pan in addition to improving the sanitation conditions and facilities of the water pan. Being an existing water pan , very minimal negative are expected a part from health and safety concerns of which mitigation measures have been suggested .

CHAPTER ONE

1 INTRODUCTION

This Environmental and Social Impact Assessment was carried out on behalf of Kenya Climate Smart Agriculture project (KCSAP) under Department of Agriculture,Livestock and Fisheries (DoALF) funded by The World Bank in Bilateral agreement with GoK for Qilta-Korma community on the proposed rehabilitation and expansion of Halakhe-Yaya water pan which is found 8 Km on the outskirts of Marsabit town.

The Kenya Climate-Smart Agriculture Project (KCSAP) is implemented by the Government of Kenya (GoK) through the Ministry of Agriculture, Livestock and Fisheries (MoALF), State Department of Agriculture, with funding from the World Bank. Implementation of KCSAP involves a three-tiered institutional arrangement (national, county, and community). The first tier is at the national level where the National Treasury (NT) represents the Government of the Republic of Kenya and the MoALF is the main implementing agency. The project is anchored in the State Department of Agriculture (SDA) within the MoALF. The second tier is at the County level, with the County Governments as the executing agencies of the project. The third tier is at the community level, where beneficiaries implement community-led interventions.

The project is part of Multinational programe that covers 24 counties in which top priority is assigned to counties with higher: (i) vulnerability to climate change and
Extreme weather events (ASAL counties being the most adversely impacted by droughts); (ii) Volatility in agricultural production and presence of fragile ecosystems (natural resources are Highly degraded in ASALs); and (iii) poverty indices (poverty incidence and poverty rates—ASALs have the highest poverty rates.

	Arid Counties		**Semi-Arid Counties**		**Non-ASAL Counties**
1	Marsabit	1	West Pokot	1	Busia
2	Isiolo	2	Baringo	2	Siaya
3	Tana River	3	Laikipia	3	Nyandarua
4	Garissa	4	Nyeri	4	Bomet
5	Wajir	5	TharakaNithi	5	Kericho
6	Mandera	6	Lamu	6	Kakamega
		7	TaitaTaveta	7	UasinGishu
		8	Kajiado	8	ElgeyoMarakwet
		9	Machakos	9	Kisumu

The waterpan site is about 8 kilometers from Marsabit town and accessed through an about 3 kilometers earth road from the tarmacked Marsabit-Moyale road. The water pan has been serving 12 manyattas in tne surrounding area. The pan lacks proper water sanitation facilities , drawoff sytem , and over the years the pan embankment has detoriated with siltation being a major challenge .

Siltation has led to the reduction of storage capacity of the pan a non desired condition especially during prolonged drought conditions.

1.1 Project rationale

Marsabit County is the second largest of Kenya's counties. It is part of the approximately 80% of the land (ASAL), where the primary livelihood system is either pastoralism or agro-pastoralism. The need for this project emanates from the necessity to address the damages and losses sustained by the population, especially the poor and vulnerable communities of the arid and semi-arid lands (ASALs), during the 2008-2011 droughts in order to restore a sense of normalcy and resumption of economic and social activities. Rain fed agriculture suffered most of the losses. In rural areas, individual family water systems sustained partial damage due to the lowering of the groundwater table and rural inhabitants were forced to collect water from far away sources.

The project has five components as summarized below:

Component 1: Up scaling Climate-Smart Agricultural Practices that focuses on interventions that promote and facilitate the adoption of TIMPs to achieve the CSA triple-wins: increased productivity; enhanced resilience (adaptation) and reduced GHG emissions (mitigation) per unit of output, as co-benefits.

Component 2: Strengthening Climate-Smart Agricultural Research and Seed Systems that supports the development, validation and adoption of context-specific CSA TIMPs to target beneficiaries under Components 1 and 3; and also develop sustainable seed production and distribution systems. The component will also strengthen technical and institutional capacity of Kenya Agricultural and Livestock Organization (KALRO) to deliver its mandate and GRIFTU Pastoral Training Institute to deliver training.

Component 3: Supporting Agro-weather, Market, Climate and Advisory Services, supports development of agro-weather forecasting and marketing information system and their dissemination tools.

Component 4: Project Coordination and Management, supports activities related to national and county-level project coordination and management, including annual work planning and budgeting (AWP&B); fiduciary aspects (financial management and procurement); human resource (HR) management; safeguards compliance monitoring; development and implementation of Management Information System (MIS) and information, communication technology (ICT)-based platforms; monitoring and evaluation (M&E) and impact evaluation (IE) studies; and communication strategy and citizen engagement.

Component 5: Contingency Emergency Response, will finance eligible expenditures related to emergency response mechanisms in case of natural or man-made, crises or disasters, severe economic shocks or other crises and emergencies.

The proposed project would go along way in increasing access to the surrounding community in addition to improving sanitation conditions and safety of the water pan.

1.2 Project Objective

The Project Development Objective (PDO) is "*to increase agricultural productivity and build resilience to climate change risks in the targeted smallholder farming and pastoral communities in Kenya, and in the event of an Eligible Crisis or Emergency, to provide immediate and effective response."*

The objective of water pan rehabilitation and expansion is to harvest runoff water to increase accessability for domestic,livestock and agricultural use through rehabiltating and improving infrastructure of the existing water pan.

1.3 Scope

The environmental impact assessment covered the proposed project site and to larger extent the catchment area for the earth dam, it focused on the following;

- *Describing nature of the project, location and rationale*
- *Describing the pertinent policies, legislation regulation*
- *Identification of both positive and negative environmental and social impacts of the project*
- *Propose environmental mitigation plan to minimize the negative impacts*
- *Conduct a public participation exercise during the process*
- *Develop Environmental Management Plan (EMP)*

1.4 Terms of Reference for EIA

The EIA was undertaken in accordance with the requirements of the Government of Kenya in conformity with the National Environment Management Authority (NEMA) guidelines following the requirements of the Environmental Management And Coordination Act (EMCA), 1999 which makes it mandatory for such projects to undergo EIA process.

1.5 Methodology

The EIA process adopted the following approaches: -

- Site observations and transect walk across the proposed project area
- Focused group discussion and brainstorming

- Collection of baseline data from both primary and secondary sources
- Use of semi-structured questionnaire and interviews
- Community Public Barazas and awareness campaigns
- Use of key informants and opinion leaders
- Analysis of collected data
- Recording by use of photographs

CHAPTER TWO

2 ESIA BACKGROUND, OBJECTIVES, TERMS OF REFERENCE AND CONSULTANCY TEAM

2.1 ESIA Background

Environmental and Social Impact Assessment is a systematic analysis of projects to determine their potential environmental impacts, the significance of such impacts and to propose measures to mitigate the negative ones. EIA is both a planning and a decision making tool. As a planning tool, EIA presents methodologies and techniques for identification, prediction and evaluation of potential environmental impacts of projects as per the project cycle (planning, implementation and decommissioning phases).

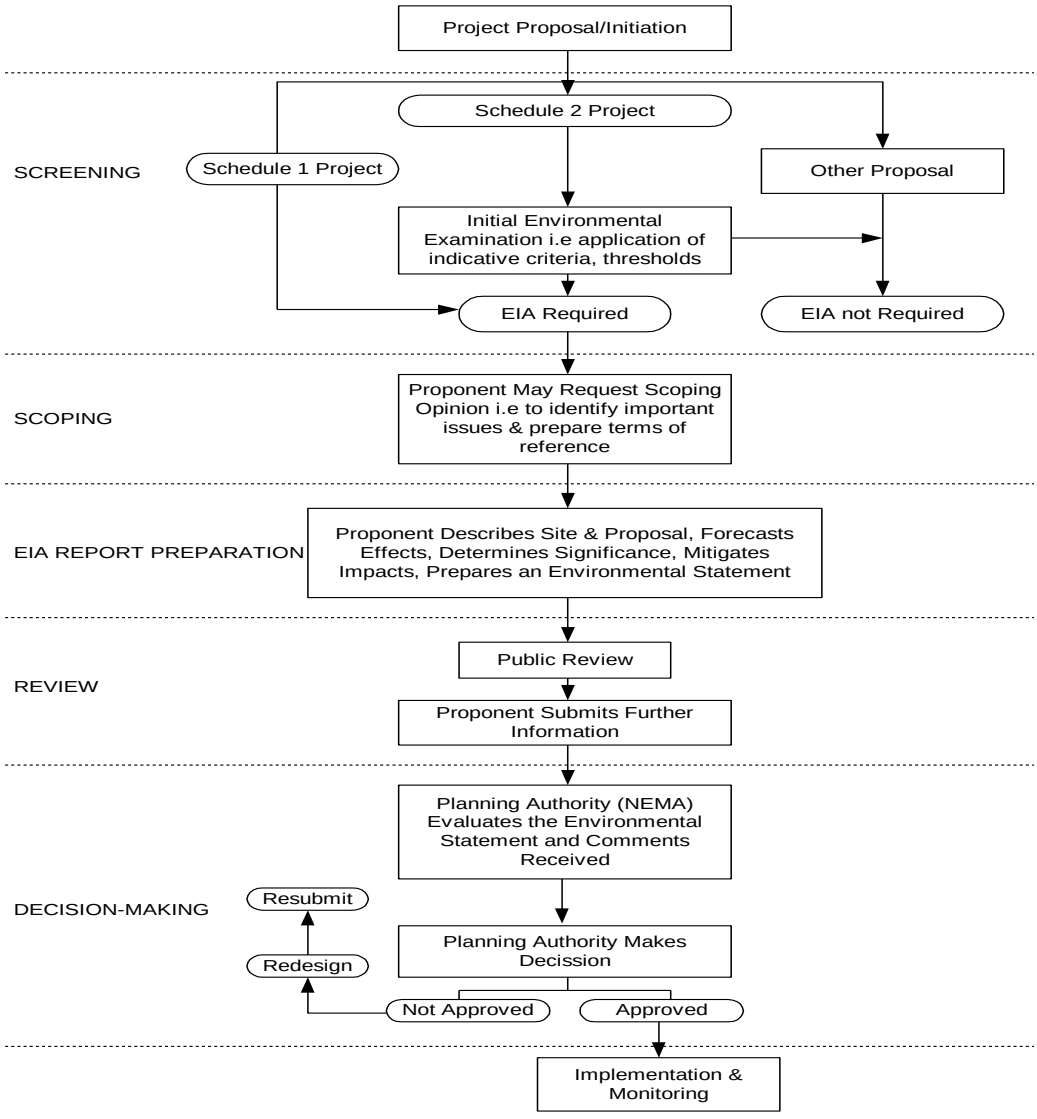


Figure *1: Illustrates general ESIA process steps in assessing projects.*

The need to conduct an ESIA report for rehabilitation of **Halakhe Yaya** water pan Project was commissioned by **Kenya Climate Smart Agriculture project** in order to comply with the **NEMA ESIA/EA** requirements for projects. An Environmental and Social Impact Assessment study is to be carried out in accordance with NEMA's Environmental Impact / Audit Regulations of 503 and be in consonance with Environmental Assessment Guidelines of the World Bank, European Commission and United Nations Environment Program. Also reference will be made to the Kenya's Environmental Management and Coordination Act (EMCA) of 1999.

This Environmental and Social Impact Assessment **(ESIA**) was primarily aimed at establishing the impacts of rehabilitation, Project's development plan on the environment , bio-diversity, sustainability of resource utilization, resource use conflicts arising from human interactions; and the socio-economic, socio-cultural and socio-political well-being of the beneficiaries, to meet requirements

2.2 Objectives of ESIA Study

The specific objectives of the ESIA study were to:

a) To review existing policy, legal and institutional framework on environmental management on borehole drilling projects

b) To collect and collate baseline information of Halakhe Yaye water pan,

c) To conduct interviews through the community participatory process.

d) To identify and assess positive and negative impacts of the rehabilitation of Halakhe Yaya water pan

f) To develop mitigation measures and cost estimates from all the negative impacts of project.

g) To design an Environmental Management Plan (including cost estimates) and a monitoring framework for the environmental impacts of the project.

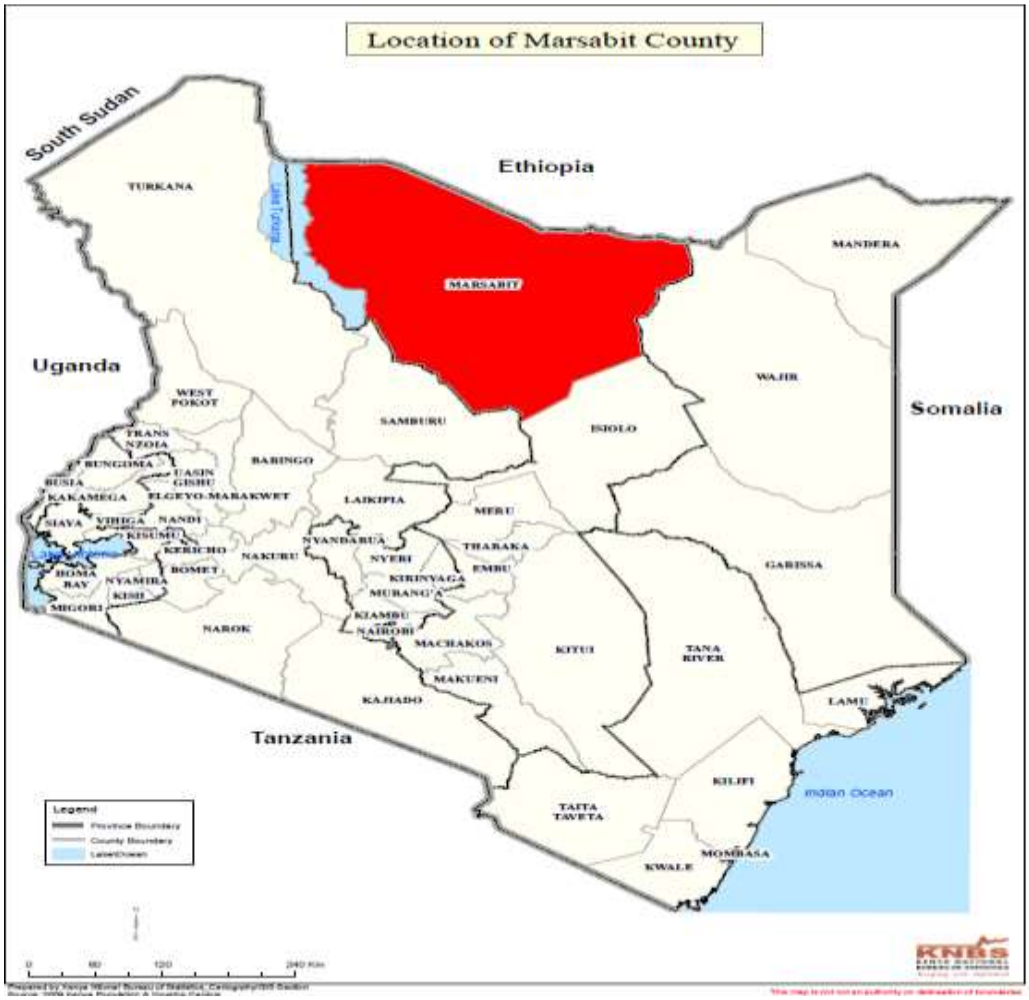
2.3 Terms of Reference of ESIA Study

The ESIA was undertaken in accordance with the requirements of the Government of Kenya in conformity with the National Environment Management Authority (NEMA) guidelines following the requirements of the Environmental Management And Coordination Act (EMCA), 1999 which makes it mandatory for such projects to undergo EIA process.

- The terms of reference to be observed were in conformity with the environmental (impact and audit) regulations Legal Notice 101 (2003)
- To collect baseline socio economic data of the project area and potential impact expected from the project planning, construction, operation and decommissioning phases of the project.
- To review existing policy, legal and institutional framework and environmental management as relates to the project
- To identify and contact stakeholders, plan and undertake participatory stakeholders and public consultation as may be appropriate.
- To develop mitigation measures and possibly cost estimates for all the identified negative impacts of the project
- To gather and provide any other data and information that will be useful or may be required for EIA by NEMA

CHAPTER THREE

3 BASELINE CONDITIONS & INFORMATION



3.1 Location

The project is located in Qilta-Korma location , Sagante ward, Saku Sub-County, Marsabit County at GPS Coordinates of **37 N 0391368 UTM 0265117** at an elevation of **1156m.**

3.2 Physical and Topographic Features

Most of the county constitutes an extensive plain lying between 300m and 900m above the sea level, sloping gently towards the south east. The plain is bordered to the west and north by hills and mountain ranges and is broken by volcanic cones and calderas. The most notable topographical features of the county are: Ol Donyo Ranges (2066m above sea level) in the South West, Mt. Marsabit (1865m above sea level) in the Central part of the county, Hurri Hills (1685m above sea level) in the North Eastern part of the county, Mt. Kulal (2235m above sea level) in North West and the mountains around Sololo-Moyale escarpment (up to 1400m above sea level) in the North East.

3.3 Climatic Conditions

Most parts of the county are arid, with the exception of high potential areas around Mt. Marsabit such as Kulal, Hurri Hills and the Moyale-Sololo escarpment. The county experiences extreme temperatures ranging from a minimum of 10.1^0 C to a maximum of 30.2^o C, with an annual average of 20.1^0 C. Rainfall ranges between 200mm and 1,000mm per annum and its duration, amount and reliability increases with increase in altitude. North Horr (550m) has a mean annual rainfall of 150mm; Mt. Marsabit and Mt. Kulal 800mm while Moyale receives a mean annual rainfall of 700mm.

3.4 Forest Vegetation

The county has 2 indigenous forests — Mt Marsabit and Mt Kulal — with a size of 152.8 km2 and167.3 km2 respectively. The only gazetted forest in the county is Mt Marsabit forest, also a national park. Mt Kulal forest is not gazetted. Mt Marsabit forest has various tree species such as Olea spp, Croton spp, Stombosia spp, Cassia spp, Cordia spp, Jacaranda spp, Acacia spp and Moringa spp. The forest also acts as fall-back grazing area during the dry season for livestock and has potential for tourism.

3.5 Marsabit livelihood zones

The pastoral production system forms the bulk of the main livelihood zones in the county and includes about 80% of the population. The other type is agro pastoral livelihood system which accounts for about 16% of the population. Other minor livelihood zones include formal employment and fish folk found around in Lake Turkana. Qilta-Korma area falls under the agro pastoral livelihood zone, though there is quarrying activities near Halakhe Yaya water pan thus acting an alternative source of income.

3.6 Administrative and political units

Administrative Sub-Divisions

Administratively, the county is divided into four administrative sub counties: Laisamis, Saku, North-Horr and Moyale sub-counties. The project is located in Saku Sub-County and in Sagante ward , Qilta-Korma location.

3.7 Infrastructure And Access

3.7.1 Road, Rail network, Ports, Airstrips and Jetties

The total road network in the county is 2,431 Km which consist of 397 Km gravel surface and 2,034 Km earth surface. Most of the roads are however impassable during rainy seasons. The county has single tarmac road from isiolo - Moyale which is in progress. Haro Botha is about 8km from Marsabit town on Marsabit –Moyale tarmac road .

3.7.2 Posts and Telecommunication

The county has two post offices located in Marsabit and Moyale towns. The area has good coverage of mobile network

3.7.3 Financial Institutions

There are four banks in the county and one Micro Finance Institutions (MFI). The banks are based in Marsabit a

These are Kenya Commercial Bank, Equity Bank, Co-operative Bank and First Community Bank while Kenya Women Finance Trust is the only MFI. The county has only one SACCO situated at Marsabit which only serves teachers.

3.7.4 Energy Access

Main source of energy is fire wood while the electricity coverage is only found in urban centres of Marsabit and Moyale towns .The project area has no access to electricity.

3.7.5 Markets and Urban Centres

Main traded goods in the urban centres and local markets are: livestock, fruits, vegetables, maize, beans, wheat, teff and millets. Majority of maize and beans come from other counties whereas some fruits and vegetables come from Ethiopia through Moyale, which is the border town.

3.7.6 Housing

The proportion of household living in mud/wood walled houses stand at 34.2 per cent.
Majority of the houses are permanent

3.8 Environment And Climate Change

Major Contributors to Environmental Degradation in the County

Environmental degradation in the county is mainly as a result of deforestation and forest encroachment due to dependency on firewood and overgrazing. Inadequate solid waste collection and its disposal coupled with lack of sewerage system and unsustainable management practices of ecosystems and their inherent biodiversity are major contributors to environmental degradation in the county. Other contributors to environmental degradation include non-compliance of law due to weak enforcement of the environmental provisions, inadequate disposal of non-biodegradable materials like plastics and polythene and low levels of environmental awareness, low social responsibility at individual and community levels on environmental matters.

CHAPTER FOUR

4 INSTITUTIONAL, POLICY AND LEGAL FRAMEWORK

This chapter describes the existing institutional and legal frameworks in Kenya that are directly related and influence the implementation of projects in regard to the environment in ASALs. Policies and legal statutes in Kenya play a significant role in ensuring the ultimate protection and sustainable development in Kenya and the focus of this chapter is to highlight the relevant policies and Acts and point out how it relates to the project.

4.1 Environment Management and Coordination Act 1999

The Environmental Management and Coordination Act (EMCA) 1999 is an Act of parliament that was enacted to ensure sound environmental management of our environment. This Act makes regulations that have lead to the establishment of the National Environmental Management Authority (NEMA) Kenya.

Every Kenyan according to the environmental management and coordination act EMCA 1999 is entitled to a clean and healthy environment and has the duty to safe guard and en hance the environment. The project falls in the 4th category of second schedule (s.58(1), (4)) of projects which require environmental impact assessment to be done .further section 58 of EMCA gives general guidelines in relation to the process which are

(1) Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carried out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee.

(2) The proponent of a project shall undertake or cause to be undertaken at his own expense and environmental impact assessment study and prepare a report thereof where the Authority, being satisfied, after studying the project report submitted under subsection (1), that the intended project may or is likely to have or will have a significant impact on the environment, so directs.

(3) The environmental impact assessment study report prepared under this subsection shall be submitted to the Authority in the prescribed form, giving the prescribed information and shall be accompanied by the prescribed fee.

(4) The Minister may, on the advice of the Authority given after consultation with the relevant lead agencies, amend the Second Schedule to this Act by notice in the Gazette.

(5) Environmental Impact Assessment studies and reports required under this Act shall be conducted or prepared respectively by individual experts or a firm of experts authorized in that behalf by the Authority. The Authority shall maintain a register of all individual experts or firms of all experts duly authorized by it to conduct or prepare environmental impact assessment studies and reports respectively. The register shall be a public document and may be inspected at reasonable hours by any person on the payment of a prescribed fee.

(6) The Director-General may, in consultation with the Standards Enforcement and Review Committee, approve any application by an expert wishing to be authorized to undertake Environmental Impact Assessment. Such application shall be made in the prescribed manner and accompanied by any fees that may be required.

(7) Environmental impact assessment shall be conducted in accordance with the environmental impact assessment regulations, guidelines and procedures issued under this Act.

(8) The Director-General shall respond to the applications for environmental impact assessment license within six months.

(9) Any person who upon submitting his application does not receive any communication from the Director-General within the stipulated time may within nine months of such submission start his undertaking.

The act further makes it an offence for anyone any person who –

(a) Fails to submit a project report contrary to the requirements of section 58 of this Act;

(b) Fails to prepare an environmental impact assessment report in accordance with the requirements of this Act or regulations made thereunder;

(c) Fraudulently makes false statements in an environmental impact assessment report submitted under this Act or regulations made thereunder;

Commits an offence and is liable on conviction to imprisonment for a term not exceeding twenty-four months or to a fine of not more than two million shillings or to both such imprisonment and fine.

4.2 The Water Act 2002

The new Water Act (2002) of the laws of Kenya seeks to make better provision for the conservation, control of pollution, apportionment and use of the water resources in Kenya, and for purposes they are incidental thereto and connected therewith. The Act vests ownership and control of water in the government subject to any rights of user. Under this provision the responsibility to regulate access, use and control of water resources is vested in the Water Resources Management Authority (WRMA).

The Water Act protects water bodies and sources from pollution and controls their use by the Company. This Act therefore will govern the activities of the company on terms of water use and disposal to guard against the potential pollution of water from the companies' activities.

The Act also gives provisions for protecting catchments from deforestation. The Minister may designate protected catchment areas, within which activities may be regulated as nearly. However, the water act does not provide for control of other land uses that may degrade the catchment through soil erosion. The Agriculture Act, on the other hand, does provide a framework for dealing with these problems, although these provisions seem rarely to be implemented.

Control of water pollution is covered in a general sense by the Water Act. The legislation is deficient, since it does not lay down water quality and discharge standards or provide powers for these to be defined. It also does not provide for water quality monitoring. The Public Health and Pest Control Products Acts also touch directly or indirectly on water pollution, but there is little institutional capacity to implement their provisions.

4.3 The Agriculture Act

The Agriculture Act Cap 318 of the Laws of Kenya seeks to promote and maintain a stable and sustainable agriculture, to provide for the conservation of the soil and its fertility and to stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry. This Act primarily guides and regulates farming practices especially in relation to the proximity of farming within the riparian section. The Act specifies that no agricultural activity is allowed and or permitted within the riparian area of a wetland, river or Lake. The Agriculture Act is the principal landuse statute covering, *inter-alia*, soil conservation, and agricultural land use in general.

It is, indeed, a crucial piece of legislation insofar as it relates to both small scale and medium-scale farms within the project area and catchment.

4.4 The Forest Act

The Forests Act, Cap 385 of the Laws of Kenya addresses reservation, protection, management,

enforcement and utilisation of forests and forest resources on government land and provides for the establishment, control and regulation of Central Forests, forests and forest areas and on un-alienated Government land in Kenya. The Act, therefore, applies not only to state plantations and land controlled and managed by the Forestry Department for research purposes or for establishment of commercial timber plantations, but also areas which have been set aside for the conservation of fauna and flora, for the management of water catchment area, for the prevention of soil erosion or for the protection and management of indigenous forests on alienated Government land.

4.5 Public Health Act Cap 242

The Act protects human health. Prevent and guard against introduction of infectious diseases into Kenya from outside, to promote public health and the prevention, limitation or suppression of infectious, communicable or preventable diseases within Kenya, to advice and direct local authorities in regard to matters affecting the public health to promote or carry out researches and investigations in connection with the prevention or treatment of human diseases. This Act provides the impetus for a healthy environment and gives regulations to waste management, pollution and human health.

This Act controls the activities of the project with regard to human health and ensures that the health of the surrounding community is not jeopardized by the activities of the project such as water development.

The project can be a public health hazard as well as beneficial to the greater public health. A case example is of a earth dam which can be breeding ground for mosquitoes and other water borne diseases and provision and protection of domestic water

4.6 The Land Planning Act

The Land Planning Act Cap 303 of 1968 of the Laws of Kenya makes provision for planning the use and development of land. Sec 6 (1) of the subsidiary legislation provides that "a local authority may, after consultation with, and with the agreement of the Minister, prepare and submit to the Minister for his approval an area plan, as the case may be, for that part of the area under its jurisdiction to which these regulations apply."

4.7 Physical Planning Act

This Act provides for the preparation and implementation of physical development plans for connected purposes. It establishes the responsibility for the physical planning at various levels of Government in order to remove uncertainty regarding the responsibility for regional planning. A key provision of the Act is the requirement for Environmental Impact Assessment (EIA).

It provides for a hierarchy of plans in which guidelines are laid down for the future physical development of areas referred to in a specific plan. The intention is that the three-tier order plans, the national development plan, regional development plan, and the local physical development plan should concentrate on broad policy issues.

The Act also promotes public participation in the preparation of plans and requires that in preparation of plans proper consideration be given to the potential for socio-economic development needs of the population, the existing planning and future transport needs, the physical factors which may influence orderly development in general and urbanization in particular, and the possible influence of future development upon natural environment.

Any change of use of the actual development without authority constitutes an offence. Similarly, anyone who deposits refuse, scrap or waste materials in a designated area without the consent of the planning authority or the relevant local authority shall be guilty of an offence under the regulations. The general sentence under the regulations is a fine of not

exceeding five thousand shillings or Imprisonment not exceeding six months, or to both, such fine and imprisonment.

4.8 Occupational safety and health act (OSHA) 2007

The act also sets minimum standards that are to be maintained in such workplaces to safeguard safe ,safety and welfare of workers.these are aimed at elimiantion of hazerds from workplaces.the act further requires all workplaces to display the abstract of the for all workers to read and remind themselves on how to protect them selves from hazards.the act makes it mandatory for occupiers or employers personal protective equipment and all practible means to prevent injury to health of workers who are exposed to any potentially harmful substances or condtions.the act further requires all workplaces to have first aid boxes under the charge of trained first aid attendants of health and safety.such rules include the following.

- **Building operations and works of engineering implimentaion rules**

  The rules guide health and safety matters in all implimentation activities.the provisions of OSHA 2007 relevant to building operations and engineering implimentaions works are contained in bulding operations and works engineeering construction rules.the rules have general safety measures to be observed in any bulding operations and works of enginnering implimenation.these state “every contarctor shall comply to with the requirements of these rules designed to ensure health ,safety and welfare of all persons engaged in bulding operations or works of engineering implimentation undertaken by him or in any activity incidental to and at the site of the buliding operations or works of engineering implimenation where dust or fumes likely to be injurious to the health of persons employed are given off,all reasonalbly practical measures shall be taken to prevent the inhalation of the dust or fumes by the persons emplyed by ensuring adequate ventilation or providing sitable respirtaors at the workplace.

- **First aid rules**

  These have details on first aid requirements in terms of faclities and capacity building among non medical workers

- **Noise rules**

  The rules have established levels beyond which workers may not be exposed without protection.the noise prevevention and control rules are described in legal notice no 25 of kenya gazette suppliment no 22 of april 2005 and apply to every workplace

,premises place process and operations to which the provisions of the factories and othe palces of work act cap (514 applies).

4.9 Draft National Policy for the Sustainable Development of ASAL of Kenya 2005

This policy allows for a pro-poor growth strategy that emphasizes sustainable poverty reduction and economic growth accompanied with appropriate economic policies and adequate investments in these considerably marginalized and vulnerable regions. Since economic growth, poverty reduction and inequality are inextricably related, the policy document promote changes in resource distribution enhancing equity and access to economic resources while providing viable incentives to pastoralists, agro-pastoralists,smallscale farmers and traders in the ASALs. The strategy underpins the fact that growth policies without effective resource distribution will have limited impact on poverty reduction. The policy framework focuses attention on:

- Improving natural resource management and utilization by strengthening pastoral land tenure Systems
- Reducing ASAL populations relying on livestock through human capital development and Diversification of income sources
- Improving markets and providing social services to ASAL communities
- Providing financial services such as appropriate credit facilities to traders, pastoralists and farmers;
- Reducing and managing risks due to drought, floods, food and human insecurity
- Engaging ASAL communities in policy reform and the enhancement of participatory governance and,
- Encouraging stakeholders and policy makers to undertake participatory policy formulating based on objective analysis and research.

The policy provides a framework to reverse the situation in the ASALs districts from one of despair, poverty and need to one of hope and a bright future. The Government aims at taking measures that facilitate the realignment of public expenditure towards investment. The strategy is to improve public investment in the ASALs by taking advantage of the renewed Government commitment to the development of the ASALs. This public investment will hopefully encourage private investment and human capital development in the ASALs. Public expenditure will be targeted to ASAL priorities in order to improve the quality of expenditure and to ensure that the priorities are achieved in an effective and efficient fashion

1.11 Sessional Paper No. 6 of 1999 on Environment and Development

The relevant sections of the draft Environmental policy of 1999 in relation to the project are in the land degradation, drought and desertification.

4.10 Sessional Paper No. 1 of 1986

Initiatives towards increased investment in the development of Kenya's ASAL started gaining momentum inthe mid-1980s following recognition that there was a lot of potential in the ASAL areas which needed to be developed and linked to the economic main stay of the nation; since 1986 the policy of the government have emphasized the development of the arid and semi-arid land areas. Sessional Paper No. 1 of 1986 on Economic Management for Renewed Growth, and the Sixth National Development Plan (1989-1993) both emphasized the need to develop and implement concrete strategies for ASAL land development

3. Key Institutional Organs

In summary, the key institutional organs of relevance to the proposed project

Institutional Organs of relevance to the proposed Project.

Institution	Parent Ministry	Responsibility
Public Health Department	County Government	Inspection of the project
NEMA	Ministry of Environment water &Natural resources	Approval of ESIA Project Report
Water Catchment Boards(WCBs)	Ministry of Environment water &Natural resources	Catchment conservation and issuance of water permits
KCSAP	Ministry of Agriculture ,livestock & fisheries.	Project implimenation

CHAPTER FIVE

5 PROJECT DESCRIPTION

This chapter describes the project and major activities that will be involved during project implementation, the materials that will be used and the possible alternatives (which are detailed in the next section).

5.1 Overview

The objective of proposed rehabilitation water pan is to increase the capacity for of the existing pan for increased water acess , improved sanitation facilities and control of soil erosion.

5.2 The proposed project

Back ground of the project

The beneficiary community through **Kenya Climate Smart Agriculture** with the support of The **World Bank** identified the need for rehabilitation of **Halakhe-Yaya pan** for increased water access. The pan has been heavily silted over time with some parts of walls almost collapsing. The pan has no sanitation facilities and lack drawoff system .

The project engineers carried survey and design works and procurement activities are on going and there after construction is set to begin immedeately.

.The components will entail

- Desilting works
- Construction of silt trap
- Construction of sanitation facilities
- Repair and expansion of embarkment walls
- Dam ancillary works comprising:-
    i. Planting of 1000 seedlings around the inlet as proposed by the community and being taken of for 3 months.
    ii. Construction of spillway concrete sills
    iii. Construction of cattle trough
    iv. Construction of communal water points.
    v. Fencing of the waterpan as described in the bill of quantities and technical drawings
    vi. Construction of two door pit latrine

vii. Construction of two silt traps with sills

The project will be fully funded by World Bank with minimal contribution from the community .

5.3 Present situation of the project

There is an existing water pan which has been heavily silted and lacks auxillary works like sanitation facilities , cattletroughs and draw system, fencing . The biggest challenge the community faces is siltation of the water pan from in addition the lack of drawoff system.

Vegetation on the existing Halakhe Yaya water pan

5.4 Project concept

The project rehabitation works has been developed through consultation with Engineers and community benefiaciries and experince is drawn from locals .The location has shown to have potential of collecting maximum runoff from the catchment area to serve the large community

5.5 Project Cost

The project will have a total investment cost of Ksh 18 Million kenya shillings.

5.6 Design of earth dam

The siting, design concept and criteria for was developed in accordance with the general guidelines and standards used in the design of water harvesting and water supply projects in Kenya and are in line with international standards for best practice.

5.6.1 Design Concept

The proposed activities are mainly rehabilition works which of the existing pan in addition to construction of auxillarary works aimed at delivering better services and improvement of efficiency.

5.7 Project Construction Phase

5.7.1 Support Infrastructure

Support infrastructure will comprise of silt trapsds up stream to control soil erosion

5.8 Materials and Equipment Needed

Table 1; The materials, tools and equipment that will be used during construction

Materials	**Construction/D Tools & Equipment**
Automotive Diesel fuel, water Soil, ,cement ,and sand a,pipes ballast	Dozer -150 Hp and above Lorry-10 Tonne Pick Up-one tonne Water Boozer (500 litres) Vibrator Foot Sheep Roller Concrete Mixer

5.9 Proposed Project Activities

The activities associated with the proposed project have been categorized under three phases of project implementation viz avi planning, desilting & embankment repair , auxillary works construction, operation, closure/decommissioning as discussed in the following subsection.

5.9.1 Planning Phase Activities

The main activities considered during this phase are:, production of site layout drawing, pan sitting entails reviewing and survey of the project area, identification of suitable auxillary works site, and determination of the repairs works so as to achieve the desired results .

5.9.2 Construction Phase Activities

Construction phase entails the following activities:

I. Equipment mobilization
II. Transportation and delivery of materials to the siting
III. De-silting

IV. Embankment construction repair
V. Construction of Auxiliary works– (fence, water through, toilets community tap)

5.9.3 Operation Phase Activities

After sucessful construction of the repair activities and runoff collection in the pan , the community will continue with access of the water through the community tap access point and livestock through the water troughs .The activities will be managed by a management committe which is alreday in be place.

5.9.4 Decommissioning Phase Activities

Decommissioning of the constructed waterpan will become necessary if or when the waterpan attains its end of life i.e when it they no longer become productive or when the need arises. Once this occurs, the affected pan will be deactivated according to the well closure procedure. Non-reusable pipes will be sold to licensed scrap metal dealers. The closure of the well will involve removing the piping system and backfilling of the depression left behind by as necessary. The affected pan will be back filled, landscaped and replanted with suitable indigenous grass and trees.

5.10 Types of Waste to be generated

Table below indicates the types of waste to be generated during project implementation and proposed options for their management.

Table 2 ; Types of waste to be generated

Type of Waste	**Proposed Waste Management Option**
Used oil filters	• Accumulate safely and dispose-off through licensed hazardous waste handler
Used fuel filters	• Accumulate safely and dispose-off through licensed hazardous waste handler
Used oil	• Accumulate safely and sell to licensed scrap metal dealers
Empty plastic & metal containers	• Issue out to staff for reuse • Issue out to the local community as part of Corporate Social Responsibility (CSR) contribution • Reuse within household e.g. for fabricating solid waste containers • Return to the supplier
Empty gunny bags	• Issue out to the local community • Reuse within household

	• Return to supplier
Polythene papers	• Accumulate safely and sell to licensed recyclers of polythene papers
Noise	• Work during the day

Table 3; SWOT Analysis of Halakhe Yaya Water pan.

The SWOT analysis in the Project to identify the internal factors (strengths and weaknesses) and the external factors (opportunities and threats) are shown in the table below.

A. Strengths

- Government support & donor support
- Ready funding
- Local capacity building
- Hygiene and environmental sanitation improvement.
- Temporary Employment creation.
- Community organization and participation.
- Institutional sustainability of project activities.
- Logical frame approach.
- Economic benefits of project activities.
- Unity of all stakeholders.
- Existing infrastucture
- Increased household incomes.
- Ongoing project activitis
- Cohesive community\
- Suitable soils
- Large catchement

B. Weaknesses

- Stringent donor requirements.
- Limited expansion area
- Inadequate communication and co-ordination of activities (Committees/farmers/Management)

C. Opportunities

- Donor and community support.
- Increased participation by women and girls
- Community cohesiveness in project activities.
- Participatory planning & monitoring at scheme and management levels
- Support of local leadership (Administrative leaders)
- Increased income generating activities.
- Increased participation by women and children.
- Collaboration and networking among institutions.
- Adoption of new agricultural technologies.
- Increased Access to clean water.
- Community mobilization on water management and environmental conservation.

D. Threats

- Persistance drought
- Increase in water borne diseases
- Political interference
- HIV/AIDs
- Soil erosion from road construction activities
- Financial constraints
- Water use conflicts
- Corruption
- Climate change
- Community clashes
- Contamination by municipal waste
- Poor quality of construction materials
- Lowering of ground-water table from adjascent quarryin activities.

5.11 Project Alternatives

5.11.1 Project Site

The existing pan has already proved that the site was suitably selected having in mind that Halakhe Yaya pan has been in existence for many years. The communityc is already used to accesing water from the pan . Despite the cited challenges of municipal waste contamination and increased erosion activities , with the improved road infrstructure the site remains the best option by it having a wide catchment area .

5.11.2 Roof water harvestning

The community has no supply of piped water though if the construction supply of Badassa dam is comleted could go along way into the providing a realliable source for water to entire Marsabit town mean while, The communty can be encouraged to adopt roof harvesting in their homes though the volumes which can be harvested will not run long enough in supporting the large number of livestock the members keep.

5.11.3 No project Alternative

The rehabilitation alternative would imply that the pan site be left in its present state and would continue to detoriate. The present state means the community continues to collect no water and increased quarying activities hence degrading the entire site,which would be unable the serve the community throughout the entire year . The community would be likely to suffer more during prolonged dry period , where they would be required to look for alternative water sources once the water would be exhausted. This decision is unacceptable because it would greatly affect the progressive development in this part of Kenya, as well impart negatively on water, sanitation and livestock security status in the project area . While the "No Project' alternative may ensure non-interference with the current conditions which are likely to detoriate.

This option is not favourable as it would predispose the community to water shortage and the related problems. The community would continue to experience high water stress during prolonged dry period while the project would have eased this problem. The 'No Project' option is the least preferred.

5.11.4 bore hole drilling

The community has the option of drilling a borehole , the community feels that maintainance of boreholes in terms of energy are very high and may the qaulity and quantity is not assured.

CHAPTER SIX

6 PUBLIC CONSULTATIONS AND DISCLOSURE

6.1 Background

The welfare of societies and the quality of life is directly linked to sustainable use of our natural resources. This has been duly recognized in Agenda 21, where it is stated that: "Special attention should be paid to the demand for natural resources generated by unsustainable consumption and to the efficient use of those resources consistent with the goal of minimizing depletion and reducing pollution."

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, 1999 and Environmental (Impact and Audit) Regulations, 2003. Community consultation and participation ensures that communities and stakeholders are part and parcel of the proposed developments and in so doing assures the sustainable use of resources. It has also demonstrated successfully that projects that go through this process will acquire high level of acceptance and accrue benefits to a wider section of the society.

Public consultations form a useful component for gathering, understanding and establishing likely impacts of projects determining community and individual preferences and selecting alternatives. Furthermore, through public participation, it is possible to enhance project designs and ensure sustainability of the projects. The proposed project has incorporated public consultations in order to understand the local impacts, needs and wishes of the community and eventually incorporate them into the final designs and operations of the project.

6.2 Objectives

The main objectives of the public consultation process were to:

- Inform the public of the details of the proposed Project construction;
- Collect views on the positive and negative impacts anticipated by the local residents and how these can be overcome; and
- Build community consensus and acceptance of the proposed project.

Public participation on site with the beneficiary community.

6.3 Methodology

Public participation for the proposed rehabilitation works of Halakhe Yaya water pan project was conducted through questionnaires and a baraza to allow for systematic understanding and interaction of the beneficiary community and the Proponents.

Over ten (10) questionnaires were issued to relevant line beneficiaary community, local administration and individuals, and these questionnaires are attached in the appendices for ease of reference.

A second stage involved holding of a stakeholders public baraza on site. During the baraza, stakeholders had a chance to interact with the proponent and presentation of project scope was outlined, after which an open discussion forum followed during which all pertinient issues were raised and agreed upon with all stakeholders.

6.4 Consultation and Disclosure outputs

The Appendice presents the information on the public consultations undertaken under the environmental impact assessment for the proposed waterpan. This information includes selected responses.

6.5 Salient issues

6.5.1 Opinion on Project implementation

It is clear from the questionnaires received back that water is a key component of the residents of Qilta-Korma community. All the respondents welcomed the reahabitation works more so it would increase the storage capacity of the pan in addition to improving safety and saniation facilities.

CHAPTER SEVEN

7 IMPACT IDENTIFICATION

7.1 Impacts Prediction: Project Location

The following potential impacts were considered and evaluated for their likelyhood of taking place

a) Resettlement and compensation

It is generally recognized that people affected by the construction of dams and reservoirs meant for public benefits are liable for compensation for three basic categories of loss namely:-

- Permanent loss of possessions for example land required for dam site and reservoir and for crops or buildings and trees lost or damaged
- Temporary loss of possessions for example land required and leased for construction
- Partial loss of legal rights

The land on which the pan is constructed including the auxilliary water works was set aside for community use.

B) Encroachment Into Catchments

The constructed facilities have the potential of opening up to 'development' or other forms of exploitation by community and others previously denied access due to the lack of the water. For the case of earth dam the predicted impacts will be increased soil erosion due to diversion of drainage channels and siltation rates due to increased activities near the pan due to heavy traffic of animals with potential of shortening the working life of the reservoir. This impact has been noted to be major and negative and as such adequate mitigation measures have been considered.

c) Impairment of historic and cultural sites

According to information gathered from the community leaders there are no documented cultural sites that could be affected by the reahabiltation works . Consequently no mitigation measures have been considered.

d) Catchment erosion and siltation

The Halakhe Yaya catchment area is noted to be slopy with many construction activites going on the neighbourhood and quarrying activities addjacent to the water pan. This has the potential to accelerate soil erosion and impose severe economic costs to the project if appropriate soil conservation measures are not included in the planning of the project. This is considered to be a major and negative impact.

Quarrying activities near the water pan.

e) Impacts on surface and groundwater hydrology

Impacts on surface and groundwater resources can be severe if the annual evaporation and seepage from the impounded reservoir is higher than total annual discharge. This is proposed for investigation during the design stage where appropriate mesures will be instituted. Overally it is anticipated that gradual ground water recharge, flood control will be improved while encouraging economical utilization of surface water.This is a positive impact which need to be enhanced.

However induced changes in the water quality of the reservoir as can occur during the operations of the reservoir, may have negative impact on groundwater.

f) Inundation of mineral resources

The area to be inundate does not have any identified mineral deposits except quarries which is basic input in construction industry. Thus a silt trap is recommended on the upstream of the reservoir at least 20 m from the throw back upper limit distance.

g) Water use conflicts

During prolonged dry spells the community suffers from water exhaustion and it is force to travel long distances in search for alternative sources and more this has resulted to community conflicts . Since the reservoir will improve water availability related conflictes are likely to be reduced if well managed . The pan manegement committee is advised to come up with water use by laws to ward off possible conflicts in future

h) Health & Safety

Health and safety of the local community and construction workers may be affected in the following ways:-

- Introducing animal wastes and muuicipal waste directly through defecating and urinating in the reservoir
- Accumulation of water in borrow pits pose health risks such as providing conducive habitat for disease vectors like malaria and other direct water borne infections.
- High risk to HIV/AIDS among the community as a result of social interactions with the contractors' workforce and other outsiders.
- Pollution of water sources from point sources as (cattle sprays, pit latrines, lack of sanitation,animal waste)
- Risks of falling or slipping into borrow pits and dam reservoir.

7.2 Impacts Prediction: Construction Phase

7.2.1 Dust and noise pollution

During excavation and transportation of the borrow material there is bound to be emission of dust from the excavation sites and also from the vehicles transporting the borrow material. Similarly the equipment for excavation can generate considerable noise which could negatively affect the construction workers or people living near the excavation sites. These

impacts are considered to be negative, major and temporary. Mitigation measures have been considered.

7.2.2 Workers' safety

Workers safety could be affected in a variety of ways ranging from injury from falling objects, inhalation of dust from construction sites to impairment of hearing due to noise from construction equipment.These impacts are considered to be negative and major and mitigation measures have been considered.

7.2.3 Sanitation of construction camp

The wastes generated by the construction crew can have disastrous effects on the local environment if not disposed appropriately. For example wastewater including excreta, solid waste and used oils can pollute the ground water. These impacts are considered to be major and negative and mitigation measures have been proposed.

7.3 Impacts Prediction: Project Operations

7.3.1 Reduced downstream erosion

Dam construction leads to reduced downstream water course erosion but in case of dam failure, this can lead to considerable erosion of valley bank due to increased velocity of the surface flow. Adequate measures are therefore needed during the design stage to avert this situation.

7.3.2 Changes in water quality of the impounded reservoir

Storage of water in a reservoir alters its quality in proportion to the storage period. Due to photosynthesis water at the surface of such reservoirs will naturally exhibit algal growth whereas water at the bottom of the reservoir will be silt laden and anaerobic. Thus water for domestic use should be drawn from the reservoir at such a level as to avoid such conditions. Additionally the enrichment of water stored in the reservoir with plant nutrients which can come from domestic and agricultural wastes and fertilizers and from decaying vegetation inundated by the reservoir can lead to the reservoir becoming eutrophic, a situation where the reservoir will have excessive aquatic weed growth. This will lead to:-

- Impaired water quality for the downstream users
- Increase water loss via evapo-transpiration
- Provide favorable habitat for disease vector

These are considered major and negative potential impacts and suitable mitigation measures have been suggested.

7.3.3 Introduction of disease vector problems

Standing water bodies such as reservoirs provide habitat for water borne disease causing organisms such as mosquitoes and snails. These are considered to be major and negative impacts especially when it is noted that malaria and water related diseases are already the main ailments affecting the local community as pointed out in the socio-economic survey. In addition high concentarion of livestock in the areas sorrounding the earth dam could easily lead to increased or introduction of disease vectors such as ticks or can lead to increased of diseases.Possible mitigation measures have been suggested.

7.3.4 Overgrazing and loose soils.

A high number of livestock is expected to acess the water at the waterpoint. Its anticipated that during the waiting time the animals will be garzing and this could easily lead to overgarzing which will lead to loosening of the soils near the waterpan making the area susceptable to all types of erosion .The project has considered of planting trees to mitigate against drastic catastrophic.

CHAPTER EIGHT

8 ENVIRONMENTAL MITIGATION MEASURES

Table 4: Impact Classification and Mitigation Measures

Phase	Impact Description	Nature of Impact		Proposed Mitigation Measures
Siting	Reservoir siltation and erosion	Major		• Install silt traps in suitable locations • Integrated land use management involving all stakeholders to ensure catchment protection and watershed management
	Encroachment into reservoir riparian		Minor	• Riparian boundary marking • Sensitize community on protection
	Impacts on surface and groundwater hydrology		Minor	• involve local community in formation of dam management committee with clear mandate of ensuring soil conservation. • Incresed recharge rates
Construction	Dust and noise pollution		Minor	• Ensure that emission levels of machinery are within permissible limits. • Ensure that there is no work at night • Public to be discouged from idling near excavation site
	Risk of accidental drowning. Injuries during dam construction and/or due to vehicular traffic		Minor	• Keep unauthorized persons away from dangerous zones • Put warning signs (written in Kiswahili, and English languages) at strategic sites • Ensure regular monitoring of embankment and spillway.
	(pollution from oil spills and other solid wastes	Major		• Good site management including provision of on site sanitation facilities, disposal sites. Contract specifications to include these requirements

	Alterations in the flow of water and changes in water quality during the construction of the dam embankment	Major		• Adequately divert the runoff away from construction areas • Ensure good engineering practices
	Enhanced erosion / changes in topography due to excavation.	Major		• Obtain earth fill from flooding zone. • Re-vegetate with native species • Fill borrow sites
	Social pressure on local community		Minor	• Enlighten personnel about STDs (HIV/AIDS) and use of condoms. • Partner with NGOs in campaign to stop the spread of HIV/AIDS. • Strengthen basic facilities • Avoid actions that could cause or escalate tension
	Downstream erosion		Minor	• Provide stilling basin to check velocity of released water
	Changes in water quality of the impounded reservoir	Major		• Check upstream sanitation practices • Partner in enlightenment for increased environmental awareness in surrounding communities. • clear vegetation and remove it from area to be impounded
	Overgrazing	Major	Major	• Introduce agroforestry • Fence the waterpan area
	Introduction of disease vector problems	Major		• Monitor the presence of disease vectors • Contribute to strengthening of local health facilities through public enlightenment • Contribute to public health programmes to eradicate / protect against malaria, schistosomiasis • Enhance community animal sprying and immunization programmes
De co				

	Loss of scenery due to dumping of excavated material		Minor	Liaise with local community so that excavated and often fertile material can be put to good use

8.1 Environmental Monitoring & Management Plans

Environmental monitoring is a key aspect of environmental management as it ensures a continuous or periodic follow-up on the identifiable environmental parameters both in quantity and or quality. To achieve the foregoing, a clear tabulation of all impacts, mitigations measures, those responsible and respective timeframes have been proposed in the table below:

Table 5: **Environmental and Social Management and Monitoring Plan(ESMMP)**

Environmental Management and Monitoring Plan: Design & Construction Phase						
Activity	**Potential negative impact**	**Mitigation Measures**	**Responsibility**	**Frequency/Timing**	**Cost**	**Verifiable Indicators**
1.Project Design Phase						
Planning, Surveying, EIA study,	Trampling on vegetation, lack of consensus towards the project between Stakeholders	Avoid unneccessary vegetation destruction, , intensify consultations	Kenya Climate Smart Project and the design/EIA team	Throughout project design stage, throughout the project cycle	As provided in the contract	Vegetation destroyed, project acceptability
2. Site Preparation Phase						
Clearing	Loss of Biodiversity, Soil erosion,	Selective and careful de-vegetation, have minimum interference with vegetation	Kenya Climate Smart Agriculture/Communities/ stakeholders	All through construction period	As per the project cost	Incidences of haphazard vegetation clearing, lack of backfilling in excavated areas
Transportation of materials	Noise, trampling of vegetation	Maintain modicum of silence, use designated tracks, avoid	Construction supervising Engineer/communities	Construction period	Included in the BoQs	Number of vegetation destroyed, increase in people stress

		using noise prone vehicles such as old tractors, tighten machine parts				
Excavation, trenching works and desiltinng works	Soil erosion, solid wastes	Backfilling of excavated areas, solid waste put in bins are transported outside the project area propor disposal of desilted soils	Kenya Climate Smart Agriculture/community	Construction period	As per project budget	Evidence of exposed soil, and solid waste in the project area
Project operartion	Loss of life due to animal attacks, injuries due cuts, snake bites, falling, accidents	Adherence to safety requirements and standards, awareness creation on possible accidents, training of technicians, installing warning signs	Resident engineer /contractor	Throughtout the project cycle	As per budget	Number of accidents/incidences recorded, number of technicians trained, number of warning signs installed and their intervals

Table 6: ESMP During preliminary and construction phase

Environmental Management and Monitoring Plan Matrix for Civil Works: Construction Phase						
Project Activities	**Potential Impact** **Description**	**Mitigation/Enhancement** **Measures**	**Cost of Mitigation** **/Enhancement**	**Responsibility**	**Frequency**	**Verifiable Monitoring Indicators**
1. Construction Phase						
Procurement of various goods and services	Non-incorporation of environmental considerations resulting to negative environmental impacts	Undertaking Annual Audits	As per budget	Proponent	Once	EA project report; comments from NEMA;environmental audit reports
Clearing and fencing of project site	Destruction of vegetation	Leaving all green areas intact, planting of trees, shrubs and grass sods;	Perimeter fence Chainlink round the dam areas.	Resident engineer	Project cost	Trees left intact after construction, number of trees planted.Number of surviving trees and other plants

Excavation of site	Increased soil erosion, and loss of top-soil, dust increase	Minimization of excavation area; provision of dust masks, watering site	Ksh 200,000	Resident engineer	Initial planting, thereafter replacement of dead trees; improvement of surroundings	Number of masks bought, area of excavated site from design reports.
Sourcing of materials	Off-site impacts	Procurement from known sustainable sources	5% more on construction material costs	Resident engineer	First month of construction	Receipts of sourced materials
Construction works	Employment creation	Giving priority to locals and disadvantaged groups	As the project cost	Resident engineer	1 month	Number of employed persons and wages received.
Substandard works	Poor dam retentain ,high water losses, dam collapsing and endangeraring person downstrip	Close supervision by qaulified personel during construction works	500,000	Project cordinator	Throughout Project period	Number of supervision visits and instruction records

Table 7: ESMP Framework: Operation Phase

	Major environmmental issue	Recommended Environmental Monitoring & Management Plan				
		Mitigation/Enhancement Measures	Frequency	Cost (Ksh)	Responsibility	Verification indicators
1.	Control of vector borne diseases and infections	Routine water quality & vector surveillance	Semi annually	30,000	Chairman – dam management committtee	Water test results
		Installation of perimeter fence around the dam.	1 month	Project cost		Visual observation of the fence
		Review the ecological capacity of the dam to carry the mud fish or any other biological mosquito control.	3 months	15,000		Feasibility study report and action taken
		Enhance community spraying and immunization and training on disease control	3 months	100,000		Spraying & immunization frequencies
		Building of a pit latrine	3 months	Project cost		Visual observation of the pit latrine

2.	Control of operator and dam user injures				Chairman – dam management committtee	
		Installation of the safety signs	1 month	20,000		Visual observation of the safety signs
3	Tree planting and environmental conservation	Initiate tree planting	2 months	150,000	Chairman – dam management committtee	Visual observation of tree nurseries and trees
4..	Structural suitability and maintenance	Repair and maintenance of dam structures	Seasonnally	50,000	Chairman – dam management committee	Quarterly Inspection report
		Development of proper silt screening mechanism around the dam	3 months	20,000	Chairman – dam management committtee	Twice a year
5	Soil erosion & siltation	Construction of silt traps at various points upstream	3months	Project cost	Kenya Climate Smart Agriculture Project	Visual

CHAPTER NINE

9 CONCLUSIONS AND RECOMMENDATIONS

The pan provides great water access opportunity to the beneficiary communities . Rehabilitation works would provide maximum benefits to the community, From an environmental point of view, the project poses minimal negative impacts especially due to its its existence except for the normal impacts usually associated with any excavation works. The negative impacts were found to be of low magnitude and can be easily mitigated at minimal costs. On the other hand, the positive impacts of the project are mainly socio-economic and would contribute immensely towards the achievement of vision 2030 objectives of wealth creation, income generation and poverty reduction within the respective rural communities of Kenya.

10 CONCLUSION

The importance of the proposed project to national development and improving of community resilience to the local community cannot be overemphasized. In addition to the following laid down guidelines for rehabilitation has also considered sound environmental management practices during its implementation. Having considered all the information collected and analyzed during the study, it is the experts considered opinion that:

- The rehabilitation works would improve environmental conditions of the project and greatly contributes to its sustainability, minor scale negative impacts that accompany most development activities are expected
- The positive environmental impacts outweigh the negative ones, which can be contained by following the prescribed EMP
- The proposed project will not compromise the well-being of the community, ecology or any other prevailing conditions
- The rehabilitation works should be allowed to commerce and activities being managed within the provisions outlined in the EMP.
- The proponent has taken the necessary steps to adhere to the appropriate laws and procedures that govern implementation of projects in the country by commissioning the EIA and embracing public participation.

8.2 Recommendations

- The work force of the borrow pit should be oriented away from sensitive wildlife areas, recreation areas and temporary and permanent settlements. This practice will direct noise away from environmentally sensitive areas and minimize potentially negative aesthetic impacts. Garbage, debris, or refuse shall not be discarded into the excavated areas.

- All materials from the demolished existing bond to be reused maximumly and if unusable the materials to be disposed according to the existing rules and regulations

- The dam project will lead to improved water accessability security at community level, the few negative impacts identified have been adequately mitigated through diverse measures proposed in the EMP and thus we recommend that the project be considered for an EIA clearance and subsequent implementation.

- In summary the potential negative impacts of the project are low, easy to mitigate, and the benefits to the community are very significant. In addition, if the proponent and the beneficiaries undertake the necessary measures to mitigate the negative impacts as identified and recommended in the EMP, then there should be no reason to prevent the project from proceeding on as planned.

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12 ANNEXES

Kenya Discharge Guidelines for Wastewater

Parameter	Discharge in public sewers (mg/1)	Discharge into water bodies (mg/1)- assuming 10% - assuming 10% dilution
PH	6.0-9.0	6.0-9.0
BOD 5 (20 0C)	500	20
COD	1000	50
Suspended solid	500	30
Detergents	30	Nil
Heavy metals (combined)	1	0.1
Oils/Grease	50	Nil
Nitrates (TP)	20	10
Phosphates (TP)	30	5
Conductivity	-	1500 us/cm
4hrs PV Value	No limits	20
Faecal Coliforms	No limits	1000/100ml for big water bodies otherwise< 10/ml)
Sulphates	-	500
Dissolved Oxygen	No limits	2
Phenols	-	2
Cyanides	-	0.1
Chlorides	-	1000
PCB	-	0.003
Color	No limits	5 Hazen units
Odour	No limits	Not objectionable

Sources: Department of Water Development.

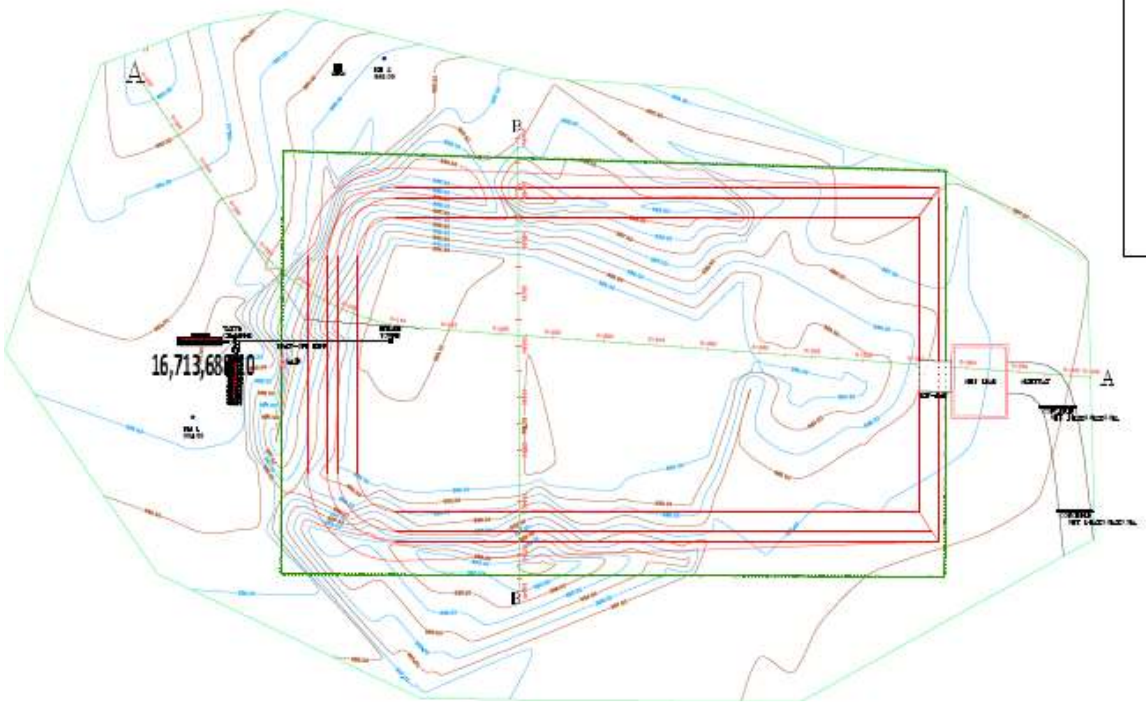
12.1 Pictorial Gallery:

Photo 1: *Area MCA addressing the beneficiary Community on the project site.*

Photo 2: *The degraded inlet for the water pan*

Photo 3: *The earth access road to the project Site.*

Photo 4: *The spillway of the water pan.*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