

**ENVIRONMENTAL IMPACT ASSESSMENT COMPREHENSIVE
PROJECT REPORT (CPR)**

FOR

**PROPOSED CONSTRUCTION OF ASAKO SMALL-SCALE
IRRIGATION SCHEME AND INFRASTRUCTURE WORKS IN
ASAKO VILLAGE, MADOGO WARD, TANA NORTH SUB
COUNTY, Tana River COUNTY**

GPS COORDINATES: 0° 5.443' S 39° 1.729' E



SUBMITTED BY:

FREDRICK O. ALOO

EIA/EA LEAD EXPERT REG.NO 9049, 0726589117 fredrick.aloo@gmail.com

P. O. BOX 45963-00100, NAIROBI, KENYA

SUBMITTED TO:

THE COUNTY DIRECTOR,

NATIONAL ENVIRONMENTAL AUTHORITY, TANA RIVER COUNTY

JUNE

DOCUMENT AUTHENTICATION

Certification by Proponent (client)

This report was prepared for and on behalf of:

THE COUNTY PROJECT COORDINATOR (CPC) KCSAP- TANA RIVER

Ministry of Agriculture, Livestock and Fisheries,

P.O. Box 10-70101

TANA RIVER

The County Project Coordinator, Kenya Climate Smart Agriculture Project (KCSAP), hereby confirm that the contents of this ESIA are true to the best of my knowledge and that I shall implement the mitigation measures proposed in this report and undertake to implement further instructions as **NEMA** may deem appropriate in relation to the findings of this project report and from time to time as inspections may inform

Signed by:- Peter Munyoki

Institution:- County Project Coordinator (CPC)

Date: - 14th June, 2021

Certification by EIA & EA Lead Expert

Fredrick Onyango Aloo ESIA lead expert registered and licensed by the National Environment Management Authority (License No. 9049) and also are members of Environmental Institute of Kenya (**EIK**) confirms that the contents of this report are a true representation of the Comprehensive Project Report for the proposed construction of Asako Small-Scale Irrigation Scheme and Infrastructure works in Asako village, Madogo Ward, Tana North Sub County, Tana River County The study of the report was done under my supervision and that the assessment criteria, methodology and content reporting conforms to the requirements of the Environmental Management and Coordination Act (EMCA, 1999), Environmental (Impact Assessment and Audit) Regulations.2.

Signed by the EIA/EA LEAD EXPERT.9049

Name:- Fredrick Onyango Aloo

Signature:- 

Date:- 14th June , 2021

EXECUTIVE SUMMARY

Project Description

The project promulgates to ensure that the agriculture sector is climate-proofed, and that sustainable development is achieved through the promotion of a low-carbon pathway. One of the strategies is to increase irrigation investments and the promotion of appropriate irrigation technologies suitable for different agro-ecological regions. In particular, this project aims at putting an additional 20 Ha of land under irrigation by 2022. The project Proponent through Kenya Climate Smart Agriculture Project (KCSAP), Tana River County, consulted environmental experts licensed by the Authority to conduct an Environmental and Social Impact Assessment (ESIA) study for the proposed project and prepare a Comprehensive Project Report for submission to the Authority, the National Environment Management Authority (NEMA) for review and licensing or for further guidance. Relevant legislation reviewed included The Constitution of Kenya, 2010; the Environmental Management and Coordination Act, 1999 (Revised 2015) and its subsidiary legislations; the Irrigation Act 2019, Water Act 2016, Physical Planning Act. Chapter 286. Revised Edition 2012, Public Health (Prevention, Control and Suppression of COVID-19) Rules, 2020; and Sexual Offenses Act, 2006 among others

The methodology used to undertake the Environmental Social Impact Assessment to arrive at the report was as follows: ground surveys; review of the project-related documents; stakeholders' participation forums and interviews with the beneficiaries, and project management, as well as other stakeholders within the project site and the neighborhood. Public participation was done through a meeting with the community and members of Asako Irrigation committee Community-Based Organization (CBO) at the site where about 40 people. Among them were the proposed project beneficiaries especially members of Asako Community-Based Organization (CBO), key stakeholders from government departments of Agriculture, Water, Ward Administration and the area residents. The other persons who the team interviewed were immediate neighbors of the proposed site; and Vulnerable and Marginalized Groups (VMGs) especially women, youths and people living with disabilities attended, and administration of questionnaires to 20 randomly selected area residents.

From the public consultation process, it was evident that the people have no objection with the proposed project at the proposed site. The Proponent promised to take all necessary precautions to ensure that the project staff, workers and visitors will not be predisposed to risks of contracting corona virus disease (COVID-19). The people were happy that the

proposed project would create employment opportunities. The Proponent promised to ensure that the contractor(s) give priority to the community members when recruiting the site workers..

Construction of an irrigation Scheme in the area will significantly enhance household food availability, promote appropriate land use, and reduce conflicts over land use. Among the main challenges in the areas are food insecurity, unplanned land use systems resulting in severe land degradation.

The objectives of the ESIA are to identify and evaluate the environmental and social effects, which could arise from the proposed construction and operation of the project's activities. This is a World Bank supported project and triggers OP 4.01 (Environmental Assessment), which requires preparation of Environmental Impact Assessment or Environmental and Social Management Plan.

Discussions were held with twenty seven (27) community members and key stakeholders from government departments. Site visits to the project areas was done and, (1) public baraza meeting of about 40 persons was held with affected community was conducted on 8th June 2021. questionnaires were administered to fifteen (15) households and all the questionnaires filled and returned. Against the benefits mentioned in the report, there will be some negative impacts emanating from construction, operation and decommissioning activities of the proposed project. The proposed project triggers Bank safeguards policies on Environmental Assessment (OP 4.01).

The following negative impacts are likely to occur during various stages of the project: de-vegetation cutting of trees and excavating the sites for irrigation canals and water collection leading to increased runoff and soil erosion. Noise levels are likely to increase during construction. Pollution through air emissions and dust that emanate from construction activities especially from exhaust pipes for vehicles and machinery used. Social impacts as gender based violence and child labor, HIV/AIDs prevalence is likely to increase. During construction phase there will be increased generation of solid waste and due to increased interaction of people there will be high risks of contracting the dreaded Covid 19 virus. Some of the proposed mitigation measures to the impacts are use of manual labour for backfilling and digging of trenches, the contractor should use machines with less vibrations and encourage workers to wear ear masks to control noise pollution. On Occupational Health and Safety the proponent shall provide personal protective equipment's such as suitable gloves,

footwear, goggles and head coverings. The proponent shall provide solid waste collection facilities and sensitization of construction workers on proper disposal of solid wastes. Temporary latrines will be provided on site to be used by construction workers. Oils and greases emanating from repair and maintenance activities will be collected in containers to avoid entry into local drainage channels. On Covid 19 the proponent shall ensure adherence to health guidelines provided like wearing of face masks, social distance, hand washing, use of sanitizers. Water use conflicts are likely to occur, therefore farmers will be trained on water use. There will be enforcement of Water Act 2016. The proponent shall encourage establishment of an irrigation Water Use Committee Manual and mechanical removal of the invasive species

The overall responsibility for the implementation of the ESMP lies with the project management committee.

In Conclusion the community felt that the proposed project will go a long way in solving their chronic food insecurity that have haunted them for years. They however requested cooperation between the proponent and their leaders so as to ensure smooth implementation.

The entire project is estimated at a cost of approximately **KES 30,000,000**

It is therefore evident that construction and operations of the proposed irrigation project will result in overall economic growth and development as a result of improvement in the availability of water for agricultural use within the project area.

The resulting report is submitted to NEMA for approval. The scope of the work involved examining all the proposed activities for the study entity and the surrounding environment. The expected output of the assignment was a Comprehensive Project Report , complete with an environmental and social management plan (ESMMP) KES 1,450,000, for the purposes of applying for an approval.

ACRONYMS / ABBREVIATIONS

ASALS	Arid and Semi-Arid Lands
A.S.L	Altitude above sea level
CBD	Convention on Biological Diversity
CDIP	County Development Integrated Plan
Covid 19	Corona Virus Disease 19
C-ESMP	Construction Environmental and Social Management Plan
EA	Environnemental Audit.
ESIA	Environnemental Social Impact Assissent.
EMCA	Environmental Management Coordination Authority.
EMP	Environmental Management Plan.
ESMMP	Environmental and Social Management & Monitoring Plan
FGD	Focused Group Discussion
GBV	Gender Based Violence
AIDS	Acquired Immune Deficiency Syndrome
KFS	Kenya Forest Services
KWS	Kenya Wild services
NEMA	National Environmental Management Authority.
NEAP	National Environmental Action Plan.
NPEP	National Poverty Eradication Plan
PAPs	Project Affected Persons (PAPs)
PLWD	People Living with Disabilities
PPE	Personal Protective Equipment
PVC	Polyvinyl chloride
KCSAP	Kenya Climate Smart Agriculture Project
OSH	Occupational, Safety and Health
ASALs	Arid and Semi-Arid Lands
ToR	Terms of Reference.
VMGs	Vulnerable Marginalized Groups
WB	World Bank

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CHAPTER ONE: INTRODUCTION

1.0 Introduction

The Kenya Climate Smart Agriculture Project (KCSAP) office in Tana River County in collaboration with the County Government of Tana River wishes to support the promotion of high value horticultural crops at Asako Small-Scale irrigation Scheme lies along the River Tana in Madogo Division within the Tana Basin. The main source of water for the project is from River Tana. The proposed project will be implemented by the community through Asako Community Based Organization (CBO) and will benefit both the group members and the entire community of about 500 people translating to 350 men and 150 women. Other beneficiaries include VMGs such as youths, poor, widows/widowers, orphans, PLWD and HIV/AIDS affected/infected i.e male 3 female 7. Project will basically consist of a solar powered pump, a pontoon system, a conveyance system, and infield distribution chambers. The water will be conveyed to the irrigation plots through a pumped supply and distribution system designed to respond to the farmers' expectations. A high lift surface pumps will be used. The proposed pumps will be solar driven to reduce of the cost and complexity of operation and maintenance (O&M).

The project is anticipated to cost a total of Kshs **30,000,000**.

1.1 EIA Expert Assignments and Terms of Reference

The key instructions to the ESIA expert/ consultant were as follows:

- ✓ Describe the proposed project activities with a focus on potential adverse impacts of inputs during construction, waste generation and disposal
- ✓ Elicit community and stakeholder views for effective decision making in line with World Bank ESS guidelines, EMCA and County government Act
- ✓ Establish Environmental baseline while identifying areas likely to be impacted by the project as per the laid down legislation and guidelines on the Environment
- ✓ Produce a Report that identify key environmental and social aspects impacted on by the proposed project while recommending appropriate mitigation measures in accordance with Environmental Impact and Audit regulations, 2003 policies and

relevant legal framework and World bank operation procedures, policies and safeguards OPs.

- ✓ Develop an Environmental & Social Management Plan (ESMP) outlining measures for minimizing, eliminating or mitigating the adverse impacts on the environment and ensuring the health and safety of the workers and community
- ✓ Recommend mitigation and action plans as reference for performance on Environmental management for internal and external stakeholders

1.2 Justification

The proposed site in Asako is vargin and fairly flatland area. It has a high agricultural potential, restricted primarily by limited and erratic rainfall. In the absence of irrigation, some subsistence agriculture is taking place and livestock such as goats are kept. Communal land ownership does result in over grazing, exacerbated by the absence of a fence.

The Irrigation Scheme shall provide food crops for consumption and sale to the nearby Garissa County markets. Cash income will be available to the local community hence enhancing their purchasing power and strengthening the food security status. The community is categorized as among the indigenous marginalized, their social status will also be improved through creation of employment and self-dependence.

1.2.1 Objective of EIA

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

The specific objectives are to :-

- Evaluate social- economic conditions and human health. This would include but not limited to issues such as archeology, cultural heritage, landscape aspects, recreational, social, economic aspects, land ownership, land use, infrastructure, agricultural development, and human health.
- Propose appropriate mitigation measures for any negative impacts envisaged and promote measures for positive impacts resulting from implementing the project

-
- Prepare Environmental Management Plan for the three stages of the project which will also be used for subsequent yearly audits
 - Prepare an ESIA study report in accordance with the environmental legislation guidelines and submit to NEMA for further instructions and / or approval.
 - To highlight environmental issues with a view to guide policy makers, planners, project clients, stakeholders and government agencies to help them understand the implications of the ESIA Reports and make the necessary decisions concerning the proposed project and future planning scenarios.

1.2.2 Target group for the ESIA study

This EIA Study Report has been prepared for use by different stakeholders to be involved in the project. The report contains useful information on policies and procedures to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various stages of the project activities. The information will be useful in planning, implementation, management and maintenance of the proposed small scale irrigation project infrastructure after decommissioning.

The ESIA study report will be useful to the following stakeholders/partners: -

- **NEMA** monitoring and compliance section;
- Contractor engaged in the construction works for the irrigation project Funding agencies and donors for the proposed project; (Kenya Climate Smart Project (**KCSAP**))
- The potential project affected persons (**PAPs**) living within the project community area; and beneficiaries of the project both at local and the County Government.

1.3 Study Methodology and Field Findings

Screening was done to find out the possible impacts and a screening checklist was developed and used as shown in Annex VI

The following methods were used:

- Site reconnaissance and visual survey to determine baseline information on the project
- Comparative study of the project with existing land uses in the locality
- Analysis of the project documents
- Discussion with proponent

-
- Assessment of the site to detail the various existing and likely impacts of the project environment
 - Photographs within the project indicate some aspects of site captured during site investigation
 - Assessment of health safety issues and conservation concerns
 - Extrapolating and inferring environmental conditions and responses from baseline information or from other similar cases where actual data is lacking
 - Public consultation to allow for public participation in planning and development and
 - Preparation and submission of reports to NEMA

1.4 Data Collection Process

1.4.1 Primary data

Primary data was collected using the following methods:

- Direct field observation through site walks, to identify land uses, topography, soil types the state of environment and other key environmental issues
- Administration of questionnaire (15 questionnaires were administered and filled)
Sample Annex IV
- Focused Group discussion with members of the community and Asako (CBO) on the proposed project and general life Sample checklist Annex III
- Interviews with key informants from the various sectors, the provincial administration and institutions near proposed site of the project
- Discussion with field officers and their experiences in the proposed area as this is their working area; Among the officers were from, Kenya Wildlife Service (KWS), Kenya Forest Service (KFS), County Environment Officers, Department of Agriculture, Department of livestock , National Museums of Kenya (NMS), Governor office/ Ward office, WRA (Water Resources Authority), Water Department, Department of Irrigation, Fisheries Department Chief- Asako Location

1.4.2 Secondary data

Secondary data was obtained from public documents, government documents (sub county reports) and design documents. This was necessary to help fill gaps the existed in the already gathered information

Detailed desktop studies were conducted on reports from all the specialized sectors integrated with the project. The information were obtained from the following partners: Department of Social services, Department of Public Health, Departments of Agriculture and

Irrigation Livestock, Kenya Wildlife Services in Tana River county, County NEMA office also provided the needed information coupled with the County Government who provided the detailed County Integrated Development Plan (CIDP). Also had a meeting with the client (proponent) the County Project Coordinator (CPC) to obtain more and relevant literature on the project operation in the county.

1.4.3 ESIA field visit

The EIA field studies, desk data collection, community participatory meeting and analysis were undertaken from 4th June,2021 to 14th June , 2021. The purpose was to generally evaluate the types, mode of action, dynamics and magnitude of the specific projected effects and impacts, both favorable and detrimental to the environment and natural resources at the project site

1.5 Data analysis

All data and information collected during the process of assessment was processed and analyzed to extract useful information. It involved extraction of relevant information from the filled questionnaire, interviews with people on site and the prevailing conditions on the state of the environment.

1.6 Data presentation

After data analysis, presentation of data was undertaken. This entailed the tabulation of data showing the findings of the study, description of the gathered data and coming up with an environment management plan to address the negative impacts identified for the proposed project.

1.7 Structure of the report

The report has an executive summary and is organized into ten substantive chapters. Following this introductory chapter 1, Chapter 2 gives a highlight on policy legal and regulatory framework, A description of the existing environmental and social baseline is in chapter 3. Chapter 4 describes the project design, project construction and operation The project alternatives are elaborated Chapter 5. Public participation, consultation process and views of the stakeholders presented in Chapter 6. The Chapter 7 identifies and discusses the Potential environmental and social impacts and mitigations while chapter 8 provides Environmental Social Management and Monitoring Plan. Chapter 9 is the conclusions and recommendation. This is followed by some of the literature sources consulted (References) and Annexes to the report.

CHAPTER TWO: POLICY, LEGAL AND REGULATORY FRAMEWORK

2.0 Introduction

Kenya has a policy, legal and administrative framework for environmental management. Under the framework, the Environmental Management Authority (NEMA) is responsible for ensuring that environmental impact assessments (EIAs) are carried out for new projects and environmental audits on existing facilities as per the Environmental Management and Coordination Act (Cap 387)

EIAs are carried out in order to identify potential positive and negative impacts associated with the proposed project with view to taking advantage of the positive impacts and developing mitigation measures for the negative ones.

2.1 Policy Framework

The Kenya Government has in place an environmental policy for harmonizing conservation with its development plans. Using this combination, it becomes easy to sustainably use available natural resources to better quality of life.

2.1.1 National Water Policy

The National Policy of Water which was promulgated in April 1999 as Sessional Paper No. 1 of 1999 calls for decentralization of operational activities from the central government to other sectors, including local authorities, the private sector and increased involvement of communities in order to improve efficiency in service delivery. It also tackles issues pertaining to water supply and sanitation facilities development, institutional framework and financing of the sector.

Relevance

The policy lays the foundation for the rational and efficient framework for meeting the water needs for national economic development, poverty alleviation, environmental protection and social wellbeing of the people through sustainable water resource management at the Asako irrigation scheme .

2.1.2 Policy on Environment and development

In the Sessional Paper No. 6 of 1999 on Environment and Development, the overall goal is to integrate environmental concerns into the national planning and management process and provide guidelines for environmentally sustainable development. The key objective is to ensure all development policies, programs and projects take environmental considerations into accounts, and to enhance, review regularly, harmonize, implement and enforce laws for the management, sustainable utilization and conservation of natural resources.

Under this policy, broad categories of development issues have been covered that require sustainable approach which encompasses the use of Sustainable Land Management. The

policy enhances participation of stakeholders in the management of natural resources within their respective localities at the proposed irrigation scheme .

2.1.3 Kenya ASAL Policy-Sessional Paper No. 8 of 2012

The national policy titled ‘Releasing our full potential’, has five key elements among them affirmative action that equitable development needs the support of all Kenyans; an enabling environment for accelerated investment in ‘foundations’ to reduce poverty and build resilience & growth; a responsive government to the uniqueness of arid lands which include ecology, mobility, population distribution, economy and social systems.

The policy also focuses on building resilience in order to realize full potential of the Arid and Semi-Arid Lands and it aims at developing measures to manage drought & strengthen livelihoods The proposed irrigation scheme is situated in the ASALs and addresses the policy by promoting food and nutrition security through crop production.

2.1.4 Vision 2030 Development Strategy for Northern Kenya and other Arid Lands

The strategy was developed to complement Vision 2030 by explaining how its goals would be realized in the specific context of Northern Kenya and other ASALs. The main policy challenge is to ensure food and nutrition security in a sustainable manner in environments that are prone to drought, insecure access to and control over livelihood resources such as land, and where climate change increase unpredictability.

The strategy envisions a holistic and sustainable management of land and natural resources across the ASALs to allow for maintenance of their traditional movement arrangements. The proposed interventions include: *The irrigation scheme ensure food and nutritional security by providing a conducive environment for crop and livestock production through a sustainable land management.*

2.1.5 National Land Policy (2009)

The overall objective of the National Land Policy is to secure rights over land and provide for sustainable growth, investment and the reduction of poverty. The key thrust of the policy is to ensure that; citizens have opportunity to access and beneficially occupy and use land; equitable and sustainable use of land; efficient, effective and economical operation of land markets; efficient and effective utilization of land and land-based resources; and efficient and transparent land dispute resolution mechanisms.

The policy adopts a plural approach, in which different systems of tenure coexist and have equal guarantees of tenure security. *Measures to secure livelihoods and tenure of land are proposed which ensures that all land use practices conform to the principles of sustainable resource management. The irrigation scheme project would conform to the principles of sustainable resource management.*

2.1.6 Agricultural Sector Transformation and Growth Strategy 2019-2029

To transform Kenya's agricultural sector and make it a regional powerhouse, the Government has formulated the Agricultural Sector Transformation and Growth Strategy (ASTGS). The Strategy is based on the belief that food security requires a vibrant, commercial and modern agricultural sector that supports Kenya's economic development sustainably and its commitments to regional and global growth

Among the key flagships is support to irrigation infrastructure. Achieving our potential in agriculture will achieve food and nutrition security, improve our farmer and local community incomes, lower the cost of food, increase employment (particularly for women and youth).

2.2 Legal Framework

There are several pieces of legislation and policy documents related to this kind of development in Kenya. These include, but not limited to the Constitution of Kenya 2010, the Environmental Management and Coordination Act (No 8 of 1999), Sessional Paper No 9 of 1999 on Environment and Development, Physical Planning Act (Cap. 286), the Public Health Act (Cap.242) the County Government Act (No 17 of 2012), the Factories and Places of Work Act (Cap.514), the Community Land Act (No 27 of 2016), National Environmental Action Plan(NEAP), Sustainable Development Goals(SDGs), Millennium Declaration and Brundtland Commission Report("Our Common Future") of 1987

2.2.1 Constitution of Kenya 2010

The constitution is the supreme law of the republic and binds all persons and all state organs at all levels of government. In relation to the environment, article 42 of chapter one, The Bill of Rights, confers to every person the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through, legislative measures, particularly those contemplated in Article 69 and have obligations relating to the environment fulfillment under Article 70.

Chapter 5 of the document provides the main pillars on which the 77 environmental statutes are hinged.

Part I of the Chapter dwells on land, outlining the principles informing land policy, land clarification as well as land use and property.

The second part of this chapter directs focus on the environment and natural resources it provides a clear outline of the state's obligations with respect to the environment.

The proposed project conformed to the constitution of Kenya 2010 which lays emphasis on a clean and a healthy environment. Irrigation projects utilize natural resources hence the need to develop an elaborate ESMP so as to contain adverse effects.

2.2.2 Environmental management and coordination ACT (EMCA), Cap 387

Part II of the Environmental Management and Coordination Act entitles every person in Kenya a clean and healthy environment. It seeks to safeguard and enhance sustainability of the environment. The act is a consolidation of the various sectoral laws on the environmental conservation, which had hitherto made it difficult to coordinate environmental protection. In the act are provided guidelines on issues of environment and stipulates offences and penalties for failure to adhere to the act. The proposed project has been researched, compiled and written in accordance with the Environmental Impact Assessment and Audit regulations, 2003, regulation 7(1) and the second schedule. It will be submitted to NEMA which has the overall responsibility of enforcing this act. The Act also lists the type of projects which must be subjected to the ESIA process. *The proponent appoints ESIA experts to conduct the EIA and produce a project report to comply with and meet the requirements of this legislation*

2.2.3 Water Act No. 43 of 2016

The Act provides for the regulation, management, development and use of water resources, and water and sewerage services. It has provisions for formulation of five-year integrated water services strategy with plans, programs for protection, conservation, control and management of water resources; establishment of water sector institutions which include Water Resources Authority (in place of Water Resources Management Authority) to regulate water rights and works; the National Water Harvesting and Storage Authority (in place of National Water Conservation and Pipeline Corporation); the Water Services Regulatory Authority (in place of Water Services Regulatory Board); Water Works Development Agencies (in place of Water Services Boards); the Water Sector Trust Fund (in place of Water Services Trust Fund) to enhance water services; the Water Services Regulatory Authority to control water service providers, and the Water Tribunal (in place of Water Appeals Board) for dispute resolution.

In Kenya water is regarded as a natural resource and is therefore owned by the state for and behalf of the people (Section 3). Thus, the Minister in charge of water is empowered under the Act to control, plan and regulate the use of water. Further the Minister is vested with the duty to promote investigations, conservation and proper use of water.

Part VII Section 35 requires an **acquisition of permit where provision of water for irrigation** exceeds two acres in the extent. Section 36 requires applications for permit made in case of proposed diversion, abstraction, obstruction, storage or use of water from a water body.

The water Act protects water bodies and sources from pollution and controls their use by the project. It ensures that the project require amount of water that can be provided for by the existing water system and that the project design will work to conserve the available water resources both during construction and operation phase.

Relevance to the proposed project

The proposed small scale irrigation scheme will have to adhere to the regulations in the water act. The act addresses issues on conservation of water, water abstraction rights and water harvesting and storage to satisfy crop production, human and livestock needs, and to protect ecosystems to secure ecologically sustainable development, including the responsibilities of county governments and public private partnerships.

2.2.4 Water Quality Regulations, 2006, (Legal Notice No 121)

Water Quality Regulations apply to water used for domestic, industrial, agricultural and recreational purposes; water used for fisheries and wildlife purposes and water used for any other purposes.

No person is allowed to abstract water from a natural water body for irrigation purposes unless such water meets the standard set out in the Ninth Schedule (Annex 3) to these regulations.

These regulations provide for the protection of lakes, rivers, streams, springs, wells and other sources. The overriding objective of the regulations is to protect human health and environment. Proper enforcement of the regulations can lead to marked reduction in water borne diseases. The regulations provide guidelines and standards for the discharge of poisons, toxins, radioactive and other pollutants into the aquatic environment. Standards have also been set for discharge of effluent into the sewer and aquatic environment, The National Environment Management Authority regulates discharge into the aquatic environment.

The regulations provide for creation of a buffer zone for irrigation schemes of at least fifty (50) meters in width between the irrigation scheme and the natural water body. The first and Ninth Schedule of the Regulations stipulates standards for sources of domestic water supply and irrigation water respectively. Persons (real or legal) discharging effluent into the environment are required to submit quarterly discharge monitoring records to NEMA

Relevance

The proponent will ensure that sources of water for Asako Irrigation Scheme meet the specified standards provided in these regulations (see annex 3). The Ministry of Agriculture Livestock and Fisheries will liaise with WRA and NEMA to ensure farmers maintain the minimum 50 meters buffer.

2.2.5 Water Resource Management Rules, 2007

The project will be required to submit authorization to the Water Resource Authority within 12 months of the commencement of the rules as stated in Part II Section 17(1). Failure to submit the documents may be used as basis for revocation, variation or cancellation of the permit or authorization.

Part VII Section 97 of the Rules states that the Authority shall, where applicable require an application to show evidence of compliance with provisions of EMCA, Section 99 states the need for controlling and measuring devices for accurate measurement of the water abstracted.

The WRM Rules 2007, Part VIII Section 104, states that the Authority shall be paid for water abstracted by any person in possession of a valid water permit or supposed to have a valid water permit. Section 107 states that the Authority may with good cause or at the request of the land owner demarcate the riparian boundary of any water course or body on any land at its own cost. Part IX of the WRM Rules, 2007 gives guidance on conservation of riparian land and catchment areas. Riparian area (according to the Rule Part 1) is land in respect of which management obligations are imposed on the owner by the authority due to its proximity to a water body. It does not imply change of ownership but imposes management for preservation of quality (and quantity) of the water resource. In the allocation of water for irrigation, the Authority shall give priority to substance irrigation; and be guided by crop water requirements in the area and the efficiency of water use.

It also provides guidelines for establishment of a WRUA:

- 1) For a WRUA to be considered for registration by the Authority, it should be legally registered, have a constitution conducive to collaborate management of water resources of a particular resource and which promote public participation, conflict mitigation, gender mainstreaming and environmental sustainability.
- 2) Any WRUA that meets the prescribed conditions may seek to register with the Authority, by submitting the prescribed Form WRMA 018 set out in Twelfth Schedule
- 3) The Authority shall respond in writing within thirty days of the receipt of the application by the WRUA
- 4) Upon registration the Authority shall issue the WRUA with a certificate of registration.
- 5) The Authority may enter a Memorandum of Understanding with a WRUA for purpose of collaborative water resource management of the water resources

Relevance

Water availability is the driving force behind any irrigation project. The main source of water in the proposed scheme is River Tana whose exploitation should be regulated to control amount of water used since there are users downstream at the Tana Delta. The proponent will undertake the initiative of promoting conservation of the riparian area along River Tana during project construction and operation

2.3 Irrigation policy and Regulatory framework

2.2.6 National Irrigation and Drainage Development Policy

The policy seeks to stimulate irrigation development through targeted technical support effective co-ordination of the sector, institutional reforms, and the enactment of a comprehensive legal framework for irrigation development. It intends to guide, coordinate and harmonize sustainable sector development. The policy with its corresponding instruments anchors strategic interventions and legal safeguards, which in turn support and fast track policy implementation for the growth and sustainability of irrigation, drainage and water storage in Kenya.

The proponent will endeavors to promote the conservation and rehabilitation of the project area, and seek to improve the socio-economic conditions of the residents.

2.2.7 Irrigation Act (CAP 347)

This Act of parliament provides for the development, control and improvement of irrigation schemes 3(1), part II of the Acts grants legal establishment of the Ministry of Agriculture with the powers to sue and be sued and capable of purchasing or otherwise, acquiring, holding, managing and disposing of any property movable or immovable, entering into contracts and doing all things necessary for the proper performance of its duties and discharge of its functions under this Act and any subsidiary legislation made

The Act gives the Minister powers to designate any area of land as a national irrigation scheme. Apart from irrigation carried out through designated irrigation schemes, private individuals engage in irrigated agriculture are required to apply for, and obtain a permit for water abstraction, following the permit application procedures that apply to abstraction for any other use.

Relevance

The proponent will ensure compliance with the stipulated guidelines as provided for by the act in acquiring the relevant permits in regard to water abstraction.

2.3 Environmental policy and Regulatory framework

National Environment Action Plan Framework, 2009 -2014

The National Environmental Action Plan Framework is the second national policy after the 1994 National Environmental Action Plan (NEAP). The development of NEAP is provided for by EMC (amendment) act 2015 which requires preparation of Environmental Action Plan at different levels; County, and national levels. The framework recognizes the intertwined linkages between economic growth and environment in Kenya. It highlights priority themes and activities for the country towards achieving sustainable environment

Relevance

The proponent shall ensure the proposed rehabilitation and expansion of Asako solar small-scale irrigation scheme promotes sustainable environment.

2.3.1 Environmental Management & Coordination Act Cap 387

This Act of parliament, EMCA 1999 and the subsequent amendments, is the parent Act of parliament that provides for the establishment of appropriate legal and institutional frameworks for the management of the environment and for matters connected therewith and incidental thereto.

EMCA, in its 13 interrelated parts provide regulatory provisions for all levels of environmental conservation and management. The first one part provides legislative guidelines on administrative and planning components of the environmental management. They include; (I); General principles (II); Administration (III); Environmental planning (IV);

Protection and Conservation of the environment. Part five and seven focus on field management of the environment as an integral component of actual or proposed projects. (V), Environmental Impact Assessments (EIA), audits and monitoring (VI); Environmental and Audit Monitoring (VII); Environmental quality standards. The last five parts of the act regulate on enforcement of provisions outlined in the Act and recognition of international agreements along which EMC (amendment) Act 2015 has been established. They are; (VIII); Environmental Restoration orders, Environmental Easements (IX); Inspections analysis and records (IX); International Treaties, Conventions and Agreements (XI) National Environmental Tribunal (XII); Environmental Offences (XIII).

All chapters 1 to 13 apply to the project at one stage or the other and therefore the project proponent is required to understand and conform with the Act accordingly. One such are is environmental and social Impact assessment. This is expressly stated in section 58(2) of the Act.

Relevance

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

2.3.2 The Environmental (Impact Assessment and Audit) Regulations 2003

This is supplementary legislation to the EMC (amendment) Act. It gives additional punch by providing guidelines for conducting Environmental Impact Assessments and Audits. It offers guidance on fundamental aspects n which emphasis must be laid during field study and outlines the nature and structure of Environmental Impact Assessments and Audit reports. The legislation further explains the legal consequences of partial or non-compliance to the provisions of the Act.

Irrigation infrastructure development is one of the activities listed on section 8€ in the second schedule of Environmental Management and coordination (amendment)Act 2015 as among projects that require Environmental Impact Assessment before commencement. The project cannot start before the license is granted upon conducting the ESIA. For this reason, this report provides the legal requirements for the project approval. Impacts of irrigation projects, involves major elements of the environment, including land, water, human health and safety.

2.3.3 Environmental Management and Coordination (Conservation of biological diversity (BD) Regulations 2006

These regulations are described in Legal Notice No 160 of Kenya Gazette Supplement No. 84 of December 2006. These Regulations apply to conservation of biodiversity which includes conservation of threatened species, Inventory and monitoring of biological diversity and protection of environmentally significant areas, access to genetic resources benefit sharing, offences and penalties. This legislation takes cognizance of the need to promote integrity of biodiversity so as to promote their integrity. Most of the biological diversity is highly threatened by development in the current world and there is an apparent need to enhance their integrity. Section IV, prohibits any activity which may have adverse effects on the ecosystem.

Relevance

The rehabilitation and expansion of the irrigation scheme may lead to an introduction of new crops that are not indigenous. There is need to promote these regulations so as to enhance the integrity of these biological diversity. The proponent will therefore seek to ensure and promote the management and conservation of biodiversity in the area by employing environmentally sound mechanisms during and after the establishment of the project.

2.3.4 Environmental Management and Coordination (Wetlands, Riverbanks, Lakes Shoers and Sea Shore Management) Regulations 2009

These regulations provide for the protection and management of wetlands, riverbanks, lakeshores and sea shore management and detail guidelines on the same

Relevance

The irrigation project when in operation will abstract water from River Tana resulting on increase and for water which may degrade the riparian areas. It is important that this legislation be enacted during the planning, construction and operation of the project

2.3.5 Environmental Management and Coordination (Controlled Substances) Regulations 2007

These Regulations aim to regulate the production, trade and use of controlled substances and products, provide for a system of data collection to facilitate compliance with relevant reporting requirements under the Montreal Protocol on Substances that deplete the Ozone Layer; promote the use of ozone friendly substances, products, equipment and technology; and ensure the elimination of substances and products that deplete the ozone layer.

Relevance

The proponent will ensure that the wastes w produced in the irrigation scheme will be safely disposed in a way not to pose a threat to the ozone layer.

2.3.6 Environmental Management and Coordination (Water Quality) Regulations 2006

Described in Legal Notice No 120 of Kenya Gazette Supplement No 68 of September 2006, these regulations apply to drinking water, water used for industrial purposes, agricultural purposes, recreational purposes, fish and wildlife and any other purposes. The Regulations outline various water quality standards in relation to use and discharge.

Regulations 20 of these regulations provide for compliance with water quality standards for irrigation. It states that where the Minister, in exercise of his powers conferred under section 42(3) has issued an order for the management of natural water body, no person shall abstract water from such body for irrigational purposes unless such water meets the standards set out in the Ninth Schedule to these Regulations.

Regulations 21 of these regulations requires the creation of a buffer zone between an irrigation scheme and a natural water body and its states ‘ Any owner or operator of an irrigation scheme shall create a buffer zone of at least 50 meters in width between the irrigation scheme and the natural water body into which scheme discharges its waters’.

The regulations invest in the authority NEMA in consultation with WRMA, the powers to maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as stipulated out in the second schedule to these regulations

Relevance

The propose irrigation project will abstract water from Tana River. It is thus fundamental to conform the buffer zone specifications of atleast 50meters and also regularly analyze water qualities and quantities at the intake points and check to prevent the discharge of toxic waste waters for conformity to stipulated irrigation standards in the supplementary legislation.

2.3.7 Environmental Management and Coordination (Waste Management) Regulations 2006

Regulations guiding waste management are described in Legal Notice No 121 of Kenya Gazette Supplement No 69 of September 2006. They offer legal provisions on handling of a variety of wastes emanating from various projects and activities. The waste categories covered by the regulations include;

- Industrial Waste
- Hazardous and toxic wastes

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- Pesticides and toxic substances
 - Biomedical wastes Environmental Management and Coordination (Controlled Substances) Regulations 2007
 - Radio-active substances

These Regulations outline requirements for handling, storing, transporting and treatment/disposal of all waste categories as provided therein. Part V section 34 requires that pesticides or toxic substances be disposed at designated site or plant approved by the authority

Relevance

The proposed project once operational will involve the use of pesticides and chemical fertilizers. Wastes resulting from the use of these products may contaminate River Tana and there should be strict observations of these regulations in dealing with all these wastes

2.3.8 Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006

These Regulations are described in Legal Notice No 131 of Kenya Gazette Supplement No 74 of October 2006 and will apply to all internal combustion engine emissions standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnership to control fossil fuel emissions

Relevance

The fossil fuels considered are petrol, diesel Kerosene. This will be applicable to equipment and machinery used in the project during constructing and operation phases of the project

2.3.9 Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Regulations 2007

This is covered under the legal notice number 61. These Regulations under part II section 3 prohibit making or causing any loud, unreasonable, unnecessary or unusual noise which annoys disturbs, injures or endangers the comfort, repose, health or safety of others and the environment

Section 4 prohibits excessive vibrations and excessive which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source

Operations of machineries that produce excessive noise are also prohibited under section II including:

Operating or repair of any machinery, motor vehicle, construction equipment or other equipment, pump, fan, air conditioning apparatus or similar mechanical device; or engaging in any commercial or industrial activity, which is likely to emit noise or excessive vibrations that exceed the levels prescribed in the First Schedule (See annex) to these Regulations

The legal notice also prohibit construction at night except for purposes specified in sub-Regulations (2) which include road and other public utilities. Section 15 calls for an EIA to be carried out by any person intending to carryout construction, demolition, mining or quarrying work to do an EIA studies to identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from the construction, demolition mining or quarrying;

Determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction, demolition, mining or quarrying noise or vibrations impacts; and incorporate the needed abatement measures in the plans and specifications

Relevance

Under the regulation the contractor is prohibited from producing excessive noise and vibrations which may annoy, disturb, injure or endanger the comfort, respose, health or safety of others and the environment or excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source. Under the regulations the contractor the will be required to undertake daily monitoring of the noise levels within the project area during construction period to ensure compliance.

2.4 Land Policy and Regulatory Framework

2.4.1 The land Act, 2012 (Legal Notice 6)

This is an act of parliament to give effect to Article 68 of the constitution to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes. The Act applies to all land declared as: (a) public land under Article 62 of the constitution ; (b) private land under Article 64 of the constitution; and (c) community land under article 63 of the constitution and any other written law relating to community land. The utilization of land resources under this category of land provided in the constitution, this act or any other written law is guided by the following values and principals of land management and administration

- a) Equitable access to land

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- b) Security of land rights
 - c) Sustainable and productive management of land resources**
 - d) Transparent and cost effective administration of land
 - e) Conservation and protection of ecologically sensitive areas
 - f) Elimination of gender discrimination in law, customs and practices related to land property inland

The proposed Asako Irrigation project is a central development activity that utilizes sensitive components of the land hence the need to adhere to the values and principals of Sustainable and productive management of land resources. Gender issues will be addressed by ensuring that women are given an opportunity in the management and use of the Irrigation scheme

2.4.2 County Government Act 2012

The act gives effect to Chapter Eleven of the Constitution, which provides the county governments the powers to function and take responsibilities for the delivery of services within their designated counties including management of environment and natural resources among other responsibilities. The functions provided for in Article 186 of the constitution as assigned in the Fourth Schedule of the Constitution.

Relevance

This include management of natural resources, biodiversity, forests and water resources among others. The county government will therefore have responsibility in management of the proposed rehabilitation of the small irrigation scheme

2.4.3 The Community Land Act, 2016

The Act was enacted (pursuant to Article 63 (5) of the Kenya Constitution 2010 to provide for the recognition, protection and registration of community land rights; management and administration of community land; to provide for the role of county governments in relation to unregistered community land and for connected purposes.

The Community Land Act (2016) also provides that the County governments shall hold in trust all unregistered community land on behalf of the communities. This provision does not however give the County Governments any authority to dispose off any Community Land. This part would be contradictory to the provision vesting the land with the Community and needs careful management. The County Government is simply expected to protect the Community Land against annexation while at the same time receiving financial compensation

for any community land that may be taken out for infrastructure development or mining after adequate discussions and agreement by the respective community.

Relevance of the Acts to the proposed project

The proposed small scale irrigation development project, recognizes that for the community members to utilize their land effectively and sustainably, they must have ownership status of the land.

2.5 Health Policy and regulatory framework

2.5.1 Occupational Health and Safety Act, 2007

The Act provides for the safety, health and welfare of workers and all persons lawfully present at work place, as well as the establishment of the National Council for Occupational Safety and Health and for connected purposes. **Section 3(1) and (2)** of the Act explains that it applies in all workplaces where any person is at work, either temporarily or permanently. It expounds on the purpose, which is to secure the safety, health and welfare of persons at work as well as protecting persons other than persons at work against risks resulting from, or connected to, activities at workplace. Further, sections 43 and 44 of part V give regulations on registration of work places

Relevance to the proposed project

The irrigation project will require significant manpower to drive and will thus result in employment of quite a number of people. There will also be need for designated workplace for operation

2.5.2 Public Health Act (Cap 242)

This Act makes provision for securing and maintaining health. Part III and IV of the Act focuses on notification, prevention and suppression of infectious diseases, including inspection, disinfection and provision of medical aid to affected parties in case of outbreaks of infectious diseases. Part IX regulates on sanitation and housing, granting health authorities powers to prevent or remedy any dangers to health arising from poor handling of sanitation issues as well as improper housing and nuisances arising there from. Besides, regulations governing prevention and destruction of mosquitoes, encompassing due maintenance of yards, premises, wells, cesspits and identification and destruction of breeding places are entailed in part XII. Also disposal of wastes.

Relevance to the proposed project

Sanitation and waste disposal, built structures, disease outbreaks and communal resource sharing are obvious issues in project during construction and implementation phase. The Public Health Act provides the necessary legal guidelines regulating measures aimed at effective control and management of the said issues is adhered to avoid break down of communicable and other diseases. During the commissioning phase there may be increased incidences of malaria due to large standing water mass hence the need to undertake capacity building on appropriate hygiene sanitation and provision of mosquito nets.

2.5.3 Work Injury Benefits Act (WIBA), 2007

The **WIBA** Act provides for compensation to employees for work related injuries and diseases contracted in the course of their employment in work places and for connected purposes.

Section 7(a) of the Act, on the obligations of the employer, requires an employer to obtain and maintain an insurance policy with an insurer approved by the State in respect of any liability that the employer may incur under this Act to any of his employees.

Section 10(1) States that an employee who is involved in an accident resulting in the employee disablement or death is subject to the provisions of this Act, and entitled to the benefits provided for under this Act. It also states expressly that an employer is liable to pay compensation in accordance with the provisions of this Act to an employee injured while at work.

On First Aid covered in **section 45(1)**, an employer is supposed to provide and maintain such appliances and services for the rendering of first aid to his employees in case of any accident as may be prescribed in any other written law in respect of the trade or business in which the employer is engaged.

Relevance to the proposed project

As workers are employed by the project contractors during the construction works, they may face myriad of challenges to their health, safety and security, either from the equipment of use or work processes. WIBA offers legal backing on the incidents or accidents at the workplace or while on duty, including First Aid and compensation aspects. It is thus important to integrate the relevant provisions of this Act in the proposed irrigation scheme development project Activities by the contracting agency.

2.5.4 HIV /AIDS Prevention and Control Act 2006 and Gender Mainstreaming:

It creates public awareness on causes, modes of transmission, consequences and means of prevention and control of HIV and AIDS. It protects the rights of the infected and affected and outlaws discrimination in all its forms against persons living with HIV and AIDS or those perceived or suspected to have HIV and AIDS.

Relevance to the project

It addresses the gender issues in sexual and reproductive rights which is the unequal social relations between men and women that give rise to gender inequalities in health. One of the key challenges identified is the inadequate integration of reproductive health and HIV and AIDS services. It proposes to ensure integration of HIV and AIDS information and services into reproductive health services at all levels and ensure adequate capacity for provision of the integration at all levels. The project is anticipated to create awareness on HIV/ AIDs and gender issues in all the stages of implementation.

2.6 Institutional Framework

2.76.1 The National Environmental Council

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

2.6.2 The National Environmental 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 the government in implementation of all policies relating to the environment

2.6.3 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)

2.7 World Bank Environmental safeguards

2.7.1 OP/BP 4.01 (Environmental Assessment)

The World Bank has well-established environmental assessment procedures, which apply to its lending activities and to the projects undertaken by borrowing countries, in order to ensure that development projects are sustainable and environmentally sound. Although its operational policies and requirements vary in certain respects, the World Bank follows a relatively standard procedure for the preparation and approval of an environmental assessment study, which:

- Identifies and assesses potential risks and benefits based on proposed activities, relevant site features, consideration of natural/human environment, social and trans-boundary issues
- Compares environmental pros and cons of feasible alternatives
- Recommends measures to eliminate, offset, or reduce adverse environmental impacts to acceptable levels (siting, design, technology offsets)
- Proposes monitoring indicators to implement mitigation measures
- Describes institutional framework for environmental management and proposes relevant capacity building needs.

The environmental assessment evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The assessment takes into account: the natural environment (air, water, and land); human health and safety) social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and trans-boundary and global environmental aspects. Preventive measures are favored over mitigation or compensatory measures, whenever feasible. This approach is universally applied in many institutional projects.

The World Bank considers environmental impact assessment (EIA) as one among a range of instruments for environmental assessment. Other instruments used by the World Bank include regional or sectoral environmental assessment, strategic environmental and social

assessment (SESA), environmental audit, hazard or risk assessment, environmental management plan (EMP) and environmental and social management framework (ESMF). The Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of environmental assessment. Proposed projects are classified into one of three categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts:

- Category A: The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. For a Category A project, the Proponent is responsible for preparing an EIA report.
- Category B: The proposed project has potential adverse environmental impacts on human populations or environmentally important areas such as wetlands, forests, grasslands, and other natural habitats - but these are less adverse than those of Category A projects. These impacts are site specific; few if any of them are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A projects. Like Category A the environmental assessment examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.
- Category C: The proposed project is likely to have minimal or no adverse environmental impacts. Beyond screening, no further environmental assessment action is required for a Category C project.

Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental associated with Bank lending operations. The purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable and that potentially affected people have been properly consulted.

The magnitude of the proposed project falls under category B.

2.7.2 OP/BP 4.04 (Natural Habitats)

The policy is designed to promote environmentally sustainable development by supporting the protection, conservation, maintenance and rehabilitation of natural habitats and their

functions. The policy seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products, which natural habitats provide to human society. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water area where most of the native plant and animal species are still present).

This project has no notable interaction with notable natural habitat apart from limited opening up of the site by cutting trees to allow for the expansion and rehabilitation of the irrigation project. After construction indigenous trees will be planted around the project area. Wild ungulates coexist with the members of the community and will have to be allowed to access water in the river Tana

2.7.3 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 promote integrated pest management approaches which is mainly biodegradable in order to avert the use of pesticides and hazardous chemicals .*

2.7.4 OP/BP 4.10 (Indigenous Peoples)

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. For all projects that are proposed for Bank financing and affect indigenous peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation. The broad support of the project by the affected Indigenous Peoples such as Bank-financed projects includes;

- Preventive measures to adverse effects to the indigenous cultures and practices,
- Avoid potential adverse effects on the Indigenous Peoples' communities;
- When avoidance is not feasible, minimize, mitigate, or compensate for such effects.

Bank-financed projects are also designed to ensure that the Indigenous peoples receive social and economic benefits that are culturally appropriate and gender and inter-generationally inclusive.

The objective of this policy is to design and implement projects in a way that fosters full respect for Indigenous Peoples' dignity human rights and cultural uniqueness and so that they receive culturally compatible social and economic benefits and do not suffer adverse effects during the development

Process. Space intensive sub-projects such as solid waste dumping sites, wastewater disposal areas and commuter rail stations has a potential for disruption of indigenous people. Improved Social and economic systems across the metropolitan leads to potential intrusion to existing cultures.

The project site is inhabited by the Pokomo community. It is a crop and livestock keeping area and the design takes full consideration of the inhabitants who are indigenous and will actually benefit directly since the irrigation facility will actually provide food crops and pasture water for both livestock and human

2.7.5 OP/BP 4.11 (Physical Cultural Resources)

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.

The objective of this policy is to avoid or mitigate adverse impacts on physical cultural resources from development projects.

- Identify Category A (any project involving significant excavations, demolition, movement of earth, flooding, or other environmental changes) and/or B (any project located in, or in the vicinity of, a physical cultural resources site) projects that fall under this OP policy
- Identify the likely physical cultural resources issues, if any, to be taken into account by the EA and develop the ToRs for the EA.
- If the project is likely to have adverse impacts on physical cultural resources, identify appropriate measures for avoiding or mitigating these impacts as part of the EA process. These measures may range from full site protection to selective mitigation, including salvage and documentation, in cases where a portion or all of the physical cultural resources may be lost.

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- Develop a physical cultural resources management plan that includes measures for avoiding or mitigating any adverse impacts on physical cultural resources and provisions for managing chance find.

2.7.6 OP/BP 4.12 (Involuntary Resettlement)

The policy states that “Where large-scale of population displacement is unavoidable, a detailed resettlement plan, timetable, and budget are required. Resettlement plans should be built around a development strategy and package aimed at improving or at least restoring the economic base for those relocated. Experience indicates that cash compensation alone is normally inadequate. Voluntary settlement may form part of a resettlement plan, provided measures to address the special circumstances of involuntary resettles are included. Preference should be given to land-based resettlement strategies for people dislocated from agricultural settings. If suitable land is unavailable, non-land based strategies built around opportunities for employment or self-employment may be used”.

Involuntary resettlement is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The objective of this policy is to avoid or minimize involuntary resettlement, though participation in resettlement planning and implementation and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

The residents are actually farming within their homesteads and therefore there will be no involuntary resettlements. Construction of the irrigation scheme as a water harvesting structure will actually promote sustainable land management and utilization.

2.7.7 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. *The existing riverine forest in the project area will be maintained. Since the existing vegetation does promote soil protection and the project takes cognizance of the riverine vegetation*

2.7.8 Activities Triggering World Bank Safeguards

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

2.8 International Conventions

2.8.0 Introduction

Kenya is a signatory to a number of conventions on sustainable development and is a member of various bilateral and multilateral organizations. This EIA study is also based on internationally respected procedures recommended by the World Bank in the World Bank Operational directives 4.01 and Environmental Source Book Volume II, which provides the relevant sectoral guidelines. Some of the relevant international treaties and conventions which are related to the project are mentioned in the subsequent items

2.8.1 The World Commission on Environment (the Brundtland Commission of 1987)

The international policy recommends development that produces no lasting damage to the biosphere and to particular ecosystems. Economic sustainable development is the development for which progress towards environmental and social sustainability occurs within available financial resources: Kenya is ratified or acceded to numerous international treaties and conventions. Those that have implications on the project are described below

2.8.2 The Ramsar Convention on Wetlands of International Importance

Kenya ratified in June 1990. The Ramsar Convention on wetlands is primarily concerned with the conservation and management of wetlands. Parties to convention are also required to promote wise use of wetlands in their territories and to take measures for the conservation by establishing nature reserves in the wetlands, whether they are included in the Ramsar list or not. Wetlands are defined in the Ramsar convention as “ areas of marsh, fen, peat or water, whether natural or artificial, permanent or temporary with water that is static or flowing fresh brackish or salty, including areas of marine water depth of which at tide does not exceed 6 meters.

The National wetland standing committee of Kenya's Inter-Ministerial Committee on Environment (IMCE) defines wetlands as "areas of land that are permanently, seasonally or occasionally water logged with fresh saline, brackish or marine water, including both natural and man-made areas that support characteristic biota" while EMCA defines wet as "an area permanently or seasonally flooded by water plants and animals have become adapted.

Relevance

The riverine vegetation along the river is a wildlife habitat area and due to the nature of the soils during rains stagnant water is common in lower areas. For this reason, the proposed irrigation project is expected to strictly observe the Ramsar Convention's principles of wise use of wetlands in the project areas

2.8.3 Convention on Biological Diversity (CBD)

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

2.8.4 Rio Declaration on Environment

The Rio Declaration on Environment and Development often shortened to Rio Declaration, was a short document produced at the 1992 United Nations "Conference on Environment and Development" (UNCED), informally known as the earth summit. The Rio declaration consisted of 27 principles intended to guide sustainable development around the world.

A few of the relevant principles include:

Principle 4: Environmental Protection in the Development Process

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

Principle 10: Public Participation

Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities including information on hazardous materials and activities in their communities and the opportunity to

participate in decision making process, States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

Principle 22: Indigenous Peoples have a Vital Role

Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development

2.8.5 United Nations Framework Convention on Climate Change

The framework sets an ultimate objective of stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (Human Induced) interference with the climate system. *Development projects in Kenya such as the proposed project are expected to take climate change considerations into account, to the extent possible, in their relevant social, economic and environmental policies and actions*

2.8.6 United Nations Convention to Combat Desertification 1994:

The convention addresses the problem of the degradation of the land by desertification and the impact of drought particularly in arid and semi -arid and dry semi-arid humid areas.

This convention is domesticated in EMCA 1999 via Section 46 where Sub county Environmental committees are required to identify areas that require re-forestation or afforestation as well as to mobilize locals to carry these activities.

Relevance

The project area is in the lowlands zone under agro-climatic zone 5 and sub county environmental committees will mobilize the locals to undertake afforestation programmes along the river Tana along the catchment areas both upstream and downstream.

2.8.7 Sustainable Development Goals

On September 25th 2015, countries adopted a set of goals to **end poverty, protect the planet, and ensure prosperity for all** as part of a new sustainable development agenda. Each of the 17 goals has specific targets to be achieved over the next 15 years. *The proposed irrigation project is aligned to the goals of SDGs 1, 2, 5,12,13,14 ending poverty, zero hunger, gender equality, clean water and sanitation, responsible consumption and production, climate action, life below water and life on land*

CHAPTER THREE: DESCRIPTION OF THE EXISTING ENVIRONMENT (BASE LINE)

This section describes the project area's physical, biological and socio-economic environments. The project needs to put into consideration various environmental aspects as it shall make utility of environmental resources.

3.1 Location and size

The proposed Asako Irrigation Project is located in Asako Village $0^{\circ} 5.443' S$ $39^{\circ} 1.729' E$ Bua Sub Location, Mbalambala Location of Madogo ward in Tana River Sub-County. Asako Small-Scale Irrigation Scheme is located 184 km from Bura town. It is accessible by land with travel time of two and half hours passing through Madogo junction. Asako is approximately 84km from Madogo junction, where, about 80km of the road is rough and passes through laghas.

In Asako village, the average distance to the chief offices is 2km, to the nearest small market it is 5km, to the nearest school is 500m, to the nearest health center it is 500m, to the nearest tarmac road it is 80km, and to the nearest Agricultural Office it is 90km



Figure 1 Location of Asako Irrigation Scheme courtesy of google earth

3.2 Physical and Topographic Features

The topographic feature of the command is dominated by gentle slopes. The slope gradient class is from 0.10% (fairly flat). The slope gradient indicates that the proposed command area is moderately suitable for surface irrigation. Hence, to use the proposed command area for irrigation development, it needs to make furrows along the contours of the command area.

3.3 Soils

The soils in the areas are imperfectly drained, moderately deep, brown, extremely firm, moderately calcareous, non-saline but moderately sodic clay loam (hard pan) with a thin top soil of sealing sandy loam (luvo-orthic SOLONETZ).

3.4 Ecological and Climatic Conditions

Annual rainfall averages in Madogo varies from about 300 mm to 500 mm. An average of 450 mm is estimated for the project site. Average annual temperature is about 32°C, with dry season temperatures reaching a high of 34°C. Temperatures during the wet season are not much lower, ranging from 30 to 33°C in January and never falling below 32°C.

3.5 Vegetation Conditions

The area occupies Agricultural Ecological Zone V and VI. The area is also influenced by riverine vegetation. The proposed project area is dominated by complex ecosystem of high canopy riverine, open wooded bush land and thickets as well as the grasslands. The species that are dominant in high canopy area along the riverine include *Manilkara zambianensis*, *Brachilina brichantha*, *Terminalia spp*. In the dry lands dominant species are *Dobera glabra*, *Salvadora persica* and the invasive *Prosopis spp*

Wooded bush is dominated by *Hyphaene coriacea*, *Terminalia spinosa*, *Digitaria milinjiana*, *Salvadora persica*. Grassland is dominated by *Echinochloa spp*, *Sporobolus halvolus*, *Panicum spp*, *Cynodo dactylon*.

3.6 Demographic attributes

Asako village is in Madogo ward in Tana North Sub County, Bua is one of the sub-locations in Madogo Division. The location has a population of about 2,541 people of whom 1,271 are males and 1,270 are females distributed in 180 households with approximately 7 people per household as per projections of 2019 KNBS census.

3.7 Infrastructural access

The entire location has no electricity supply and there is low utilization of other sources of energy like solar and wind. The telephone communication network is good. Housing and shelter largely is traditional. A high percentage of the population live in Grass thatched mud houses, few in semi-permanent houses that seldom have access to essential basic services and infrastructure thereby leading to insecure and unsafe living environment. The most or notable infrastructure included Asako primary school, Asako dispensary a solar powered borehole constructed by world vision and a Mosque.

3.8 Land Use

Land ownership is under communal land and is managed by communities. Land is not registered.. The main land use practices is crop and livestock production. The mean crop production holding land size is about 1ha with irrigation schemes targeted to have have between 0.6 ha and 3 ha.

3.8.1 Crop production

Irrigation is also practiced at small scale level by individual small holders, growing vegetables, tomatoes, watermelons and onions in nearby villages like mbalambala. This critically emphasizes the need for expansion and construction of an irrigation scheme and management strategies to boost crop production.

3.8.3 Climate change effects

Rainfall periods have become shorter and unpredictable in areas which previously received adequate rainfall, prolonged droughts that are more frequent and severe leading to crop failure and increased variability to food insecurity, conflicts from livestock keepers who water their livestock at the river severely affects livelihood. This has worsened the problems of water resource conflicts at the few existing (*Malkas*) access to the main water source.

CHAPTER FOUR: PROJECT DESCRIPTION

4.0 Introduction

The chapter describes the project and major activities that will be involved during project implementation, the materials that will be used and the possible alternatives detailed in the next section

4.1 Overview

About four (4) communities live around the Asako Irrigation Scheme, namely: Walyuana, Wanyoyaya, Orma, and Somali. Walyuana forms the majority of the area, owning most of the land. The project area is located in the Walyuana region. The Walyuana are a small vulnerable marginalized community. The community does not have access to basic social services and they derive their livelihood from water in the River Tana.

.Some visible challenges observed in the Asako area are;

- Food insecurity in the area
- Backward tradition of agricultural practices for the reason that they depend on rain-fed agriculture.
- The community cannot afford modern pumping system or irrigation system because of their low income levels and low purchasing power
- Rainfall is unreliable

Project will basically consist of a solar powered pump, a pontoon system, a conveyance system, and infield distribution chambers. The water will be conveyed to the irrigation plots about 750m away through a 6' diameter Upvc pipeline. Water application in the farm will be through gravity flow through infield pipelines which will in turn discharge water through riser pipes into distribution chambers and off takes.

4.1.1 Project Cost

The project will have total investment cost of Kshs 30,000,000

Land Ownership

The average size of a farmer's landholding is from one to three ha. In Asako Small-Scale irrigation scheme, there are approximately 500 Households who own land surrounding the project area while around 10 Households own the whole of the project area. There are other

households (approximately 30 households) who do not own land within the area but wish to be part of the project.

4.1.2 Project design

Topographical survey was done to collect information about the ground elevation and others elevations of some necessary canals and existing structures with which engineers will be able to make a decision on design (Annex VII) option for each individual infrastructure and the system as a whole. Asako small-scale irrigation scheme is fairly flat, and a “furrow type” canal has been selected. The design and analysis of Asako small-scale irrigation was carried out using formula, principles and theories which have been commonly used in irrigation design in the FAO Manuals.

4.1.3 Design

➤ Water Demand Areas

Based on the water needs of Asako village community, Water demand has been classified into the following categories

- Household/ domestic water demand,
- Institutional water demand
- Crop water demand
- Livestock Water demand
- Commercial and Cultural water demand.

➤ Consumer Population Projections

The projection of human population figures was based on the growth rate of 4.1% pa and is informed by the 2009 national population census figures. Livestock population has been projected at the annual growth rate of 1% pa.

➤ Per Capita Consumption Rates

Due to the fact that the village has no development plan that classifies it either as high class, low class etc. a blanket service type for 100% of population taking this area as a low potential rural area and corresponding per capita water consumption rates guidelines, as contained in “**the Practice Manual for the Provision of Water Services in Kenya, Ministry of Water and Irrigation, Nairobi, 2005**” have been applied all through for the purposes of estimating the water demand of the area.

4.1.5 Crop and Irrigation Water Design

Mainline

The main pipeline is designed for the discharge of 100 m³/hr

Using continuity equation: $Q = A * V$

Where Q = Discharge = 0.01722m³/s

V = Velocity = 1.2 m/s (Assumed)

A = Cross-sectional area of pipe = 0.01435m²

$$A = \frac{\pi d^2}{4} \Rightarrow d = \sqrt[3]{\frac{0.01435 * 4}{3.14}} = 0.1352m$$

$$= 5.32''$$

Use 6'' Pipe (Available in the market)

Main Canal

According to the selected cropping pattern, the computed crop water requirements for the design of the main canal are 0.1052 m³/s. The computed design flow is to be checked with the existing canal section.

Using the defined canal hydraulic parameters, the main canal capacity is computed with the use of Manning formula.

$$Q = AR^{2/3}S^{1/2} / n$$

Where Q= discharge (m³/s)

R= Hydraulic radius (Flow area/wetted perimeter)

R= A/P

A= Wetted cross-sectional area of canal, m²

P= Wetted Perimeter, m

S= Hydraulic gradient or Bed slope of the canal

n= Manning's roughness coefficient, n=0.024 is adopted for the newly earth channels and n=0.018 for the masonry lined part of the main canal.

The shape of the canal cross section, A is trapezoidal shown below.

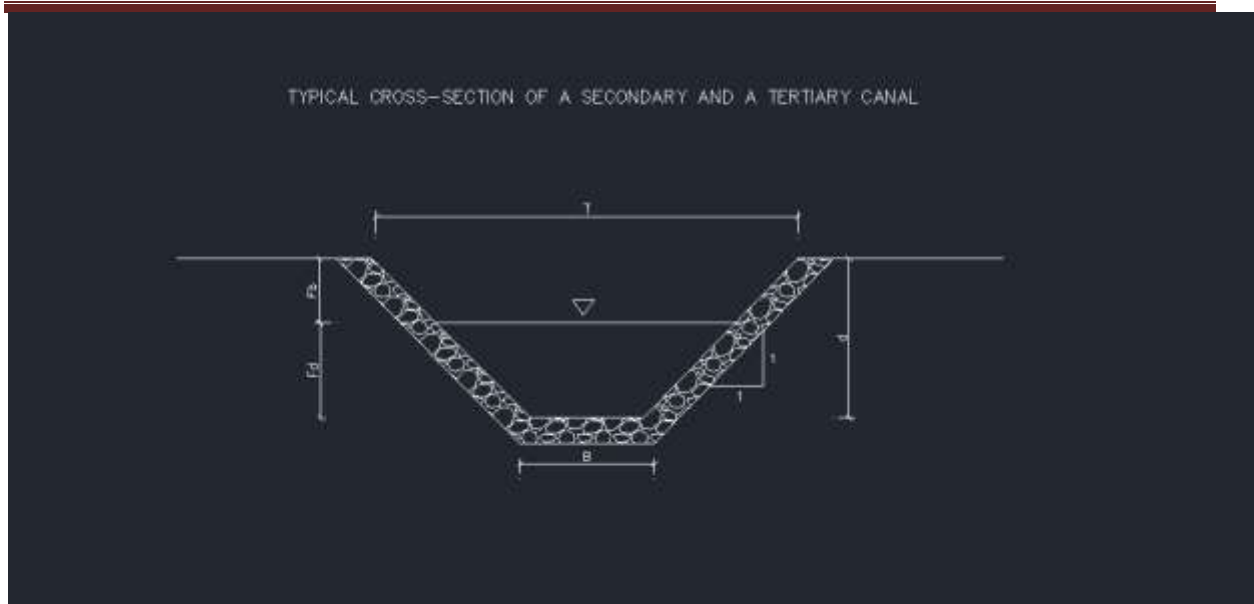


Figure 2: Design Shape of the canal

4.2 Construction phase

4.2.1 Support infrastructure

Support infrastructure will comprise of check dams upstream to control soil erosion canal works will include but not limited to the following:

- i. Excavation works
- ii. Lining with clay soil
- iii. Construction of pipe draw off system
- iv. Construction of communal water pipes
- v. Fencing of the reservoir as described in the bill of quantities and technical drawings
- vi. The project will be fully funded by KCSAP with minimal contribution from the community

4.3 Materials and Equipment Needed

Table 1 below indicate the materials, tools and equipment that will be used during construction

Table 1: Materials and Equipment

Materials	Construction/D Tools &Equipment
Preliminary Works	Grader for constructing canals
Provision and installation of Pontoon structure	Lorry -10 Tonne
Solar water pump & solar panels	
Main Pipeline and installation of main	Pick-up one tonne

<p>pipeline</p> <p>Infield Distribution farm layout</p> <p>Post handling facility indicate type grain storage</p> <p>Excavation works</p> <p>Personal protective equipment</p> <p>Fencing</p> <p>Fuel</p> <p>Water permits</p> <p>Land preparation</p>	<p>Water Booser (1,000litres) to spay along the channels to remove dust</p> <p>Vibrator</p> <p>Foot sheep Roller</p> <p>Concrete Mixer</p>
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CHAPTER FIVE: PROJECT ALTERNATIVES

5.0 Introduction

This chapter discusses the alternatives in the proposed Asako Irrigation scheme in terms of zero option, alternative construction materials, alternative irrigation areas and the water source options

5.1 No Project Alternative

The “Zero option” represents a situation which would result if the project was not implemented. In that case, both the positive and negative impacts of construction and operation of the project will not occur. This option will however, involve several losses to the proponent and the country as a whole. The major impact of not proceeding would be the forfeiture of expected benefits. These include:

- Adequate water for irrigation purposes
- Increased crop and livestock productivity
- Creation of employment
- Enterprise development
- Local economic development

The economic status of the community and Kenya will remain unchanged; and the local skills would remain underutilized. From the analysis above, it is apparent that the No project alternative is no alternative to the community and the government of Kenya.

5.2 Alternative Project site

The proposed project location was selected based multiple factors which include:

- Project target area: The area was selected for implementation of irrigation scheme through Asako Community based organization who applied for the KCSAP World Bank funded project. The site is situated in arid area and receive low rainfall of approximately 200mm per year
- Previous studies had indicated the suitability of the area for irrigation
- Existence of water resources from river Tana can support irrigation
- High agricultural production potential particularly high value crops

Alternative site would therefore have to bear similar characteristics. This would present a major challenge since most sites would not have all these characteristics.

5.3 Relocation Option

Relocation to a different site is an option available for the project implementation. At present the proponent does not have an alternative site. It means that the proponent in consultation with community has to look for the land. Looking for land to accommodate the scale and size of the project and carrying out required public participation may take about 6 months, although there is no guarantee that the land would be available. The proponent will take another 6 months to design and approvals since design and planning has to be according to site conditions.

Project design and planning before the stage of implementation will cost the developer millions of Kenya Shillings. Whatever has been done and paid to date will be accounted as a loss to the proponent. Assuming the project will be given a positive response by the relevant authorities including NEMA and Tana River County, this project would have been delayed by over (1) year before implementation. This is a delay that the county economy cannot afford. This would also lead to a situation like NO project alternative option. The other consequence of this is that it would be a discouragement for the crop sector development stakeholders in their bid to address effects of climate change. In consideration of the above concerns and assessment of the current proposed site, relocation of the project is not a viable option.

5.4 Analysis of Alternative construction Materials and Technology

The infrastructure for the proposed irrigation project will be constructed using modern locally and internationally accepted materials to achieve public health, safety security and environmental aesthetic requirements.

Equipment that conserves energy and water will be given first priority without compromising on cost or availability factors. They will be made using locally sourced stones, cement, metal bars fittings that meet the Kenya Bureau of Standards requirements. Heavy use of timber during construction is discouraged because of destruction of forests.

The exotic species would be preferred to indigenous species in the construction where need will arise

5.4.1 Irrigation Technology Options

Irrigation methods are the systems how to get water for irrigation purposes from its sources. The choice of irrigation methods depend on several factors such as topography, water

resources, the plants cultivated, the land tenure systems, the growing seasons and train and water regimes. The main irrigation technologies considered in this project include: surface irrigation, sprinkler and drip systems of which their benefits and limitations are considered in the choice of the best alternative

Surface canal irrigation

Surface irrigation is an irrigation system in which gravity flow is applied to move water across the land in order to infiltrate and wet it. Surface irrigation is further classified as border strip, basin or furrow irrigation. Surface irrigation is the most commonly used method of irrigation and represents as much as 95 percent of common irrigation activity today

The most obvious advantage of surface irrigation is that it is the most widely understood method of irrigation due to its popularity. Surface irrigation is comparatively cheap to develop, and requires minimal investment on the part of the farmer. Surface irrigation is not affected by climate and water quality characteristics. The major disadvantage of surface irrigation is that it tends to water logging and soil salinity if there are no provisions for adequate drainage. Another disadvantage is that it tends to be labor intensive

Canal is an artificial channel for water through lands that was perhaps naturally devoid of sustained water flow. Hence, water seeping canals down to soil below my, at times raise the ground water very close to the ground level. This may result in blocking all the voids in the soil and obstructing the plant roots to breathe. It has been observed that water logging conditions adversely affects crop production as it is reduced drastically. Apart from seeping water of canals, excessive and unplanned irrigation also caused water logging conditions. This happens because the farmers at the head reaches of canals draw undue share of canal water in the false hope of producing larger agricultural outputs.

Sprinkler Irrigation

Sprinkler or overhead irrigation is an irrigation system in which water is distributed throughout the field by the aid of high-pressure sprinklers. The idea is to simulate rainfall during dry weather. The advantage of sprinkler irrigation systems include their more even distribution of water when different soil types are found within one irrigation scheme. Sprinkler irrigation systems are better than surface irrigation in leaching out salts from the soil and they are not affected by uneven land distribution. The disadvantage of sprinkler

system is that they are affected by wind conditions which disturb the even distribution of water from sprinklers

Table 2 Advantages and Limitations of Spinkler Irrigation System

Benefits of Sprinkler Irrigation systems	Limitations of sprinkler irrigation
<ul style="list-style-type: none"> ✓ Systems losses(runoff, seepage) substantially reduced ✓ Over irrigation is completely eliminated and uniformity of application is high ✓ Irrigation water requirement reduced as compared to other methods ✓ No land levelling required in the field and land use for productive purposes can be maximized ✓ Fertilizer can be injected in the irrigation water to reach the root zone directly ✓ The system allows better weed control 	<ul style="list-style-type: none"> ✓ Poor uniformity and application efficiency in high wind regimes and/or dry and hot conditions ✓ Capital cost is high with greater operational costs due to higher energy requirements ✓ Not suitable for paddy crops ✓ Crops prone to disease due to moist environment ✓ Water with impurities and sediments may damage the system

Drip Irrigation

Drip irrigation is an irrigation system in which water is delivered at the root of the plant, drop by drop. It is also known as trickle irrigation. The main advantage of drip irrigation is that it is the most water-efficient method of irrigation. The disadvantages are that it is the most expensive and least aesthetically pleasing method because of all the plastic lines which have to be installed close to each other on the ground.

Table 3 Advantages of Drip Irrigation system

Benefits of Drip Irrigation systems	
<ul style="list-style-type: none"> ✓ Minimized fertilizer/nutrient loss due to localized applications and reduced leaching ✓ High water application efficiency ✓ Levelling of the field not necessary ✓ Ability to irrigate shaped fields ✓ Allows safe use of recycled water ✓ Moisture within the root zone can be maintained at field capacity ✓ Soil type plays less important role in frequency of irrigation ✓ Minimized soil erosion 	<ul style="list-style-type: none"> ✓ Minimized weed growth ✓ Highly uniform distribution of water i.e controlled by output of each nozzle ✓ Lower labour cost ✓ Variation in supply can be regulated by regulating the valves and drippers ✓ Fertigation can easily be included with minimal waste of fertilizers ✓ Foliage remains dry thus reducing risk of diseases ✓ Usually operated at lower pressure than other types of pressurized irrigation, reducing energy costs

Limitations of drip irrigation

- i. Expense; Initial cost can be more than overhead systems
- ii. Waste; the sun can affect the tubes used for drip irrigation, shortening their useable life.
- iii. Longevity is variable
- iv. Clogging; if water is not properly filtered and the equipment nor properly maintained, it can result in clogging
- v. Drip irrigation might be unsatisfactory if herbicides or top dressed fertilizers need sprinkler irrigation for activation
- vi. Drip tape causes extra cleanup cost after harvest. You will need to plan for drip tape winding disposal, recycling or reuse.
- vii. Waste of water, time & harvest, if not installed properly. These systems require careful study of all the relevant factors like land topography, soil, water, crop and agro-climatic conditions and suitability of drip irrigation system and its components.
- viii. Germination Problems; In lighter soils subsurface drip may be unable to wet soil surface for germination
- ix. Requires careful consideration of the installation depth
- x. Salinity; most drip systems are designed for high efficiency, meaning little or no leaching fraction. Without sufficient leaching, salts applied within the irrigation water may build up in the root zone, usually at the edge of the wetting pattern. On the other hand, drip irrigation avoids the high capillary potential or traditional surface-applied irrigation, which can draw salt deposits up from deposits below.

Most suitable option for proposed project

Based on the natural conditions (climate, soil infiltration, slope, water quantity, water availability), social conditions (expensive, labour, type of crop, level of technology) and environmental factors (water use efficiency, salinity control, pollution control) Surface canal irrigation presents the most suitable irrigation method for this project.

The river Tana flows downstream all the way to the Indian Ocean. Due to gravitational flow and water is being tapped, it is easy to pump water by use of solar and distribute to the crop

fields through the canals by gravitational force. This will be clean and economical source of energy with minimal costs of only maintain the canals, piping systems and solar

Rain water harvesting

This is feasible source of water for the proposed irrigation scheme since it has been adopted by other programs in the country. However due to the unreliability of the rainfall, it will not address the water needs of the farmers who require reliable water over a given period of time.

CHAPTER SIX: PUBLIC CONSULTATIVE PROCESS AND DISCLOSURE

6.1 Introduction

A participatory approach was adopted as an ongoing strategy throughout the entire project cycle. Public participation and consultations were done through individuals, groups and community meetings. Selection of ways to consult, and expand participation by community and other stakeholders, took into consideration literacy levels prevalent in affected communities; ethnicity and cultural aspects and practical conditions (like distance).

6.2 Objectives of the Public Consultations/meetings

The overall goal of the consultation process was to disseminate project information and to incorporate the views of the Project Affected Persons (**PAPs**) in the design of the mitigation measures and the management plan.

The specific aims of the consultation process were to:-

Improve project design and, thereby, minimize conflicts and delays in implementation;

- Facilitate the development of appropriate and acceptable entitlement options; Increase long term project sustainability and ownership.
- Reduce problems of institutional coordination.
- An important element in the process of impact assessment is consulting with stakeholders/community to gather the information needed to complete the assessment.

6.3 Participation Consultation/Interviews

Several visits were organized to the proposed irrigation site by the project team. The methodology involved the following: Site visits and key informants' discussions with forty (40) community members and key stakeholders from government departments. Site visits to the project areas, one (1) public baraza meeting with the affected community was conducted on 8th June 2021. Fifteen (15) questionnaires administered to the households and all the (15) questionnaires filled and returned.

6.3.1 Sources of Information

During the environmental impact assessment, public participation was a key component in getting information to be incorporated in writing this report. Positive and negative views of the perceived affected neighbors were sought. The exercise was conducted by a team of

registered environmental experts through administration of pre-designed questionnaires, and interviews in various areas surrounding the proposed project site



Plate 1: Public participation, participants filling questionnaire

Lead expert consulting with community members at Asako village

The neighboring communities were asked to comment and give views concerning the proposed project on various issues concerning the following:

- ❖ The positive impacts that may emanate from the development of the proposed project
- ❖ Measures that the developer should put in place during and after the project to mitigate impacts
- ❖ Whether the proposed project construction and occupation will cause the negative impacts on the following:
 - a) Local residents
 - b) Natural ecology of the area
 - c) The human environment
 - d) Public health and safety

-
- e) Effects on the soil
 - f) Effect on areas of scenic beauty
 - g) Effect on plant species composition

Many respondents were consulted during public appraisal exercise although, some declined to give their contacts or real identification card numbers. However their views have been incorporated in this project.

The sub item below summarizes issues were raised and captured in the questionnaires from the community (respondents) towards the proposed irrigation schemem project and issues captured during the desktop studies analysis. The issues have been categorized as positive and negative issues (Selected Sampled filled questionnaires attached as appendix)

6.3.2 Key issues arising from public participation meetings

Consultative meetings (baraza) with community in conjunction with the proponent and the administration. Minutes of the meeting is attached in Annex I

The list of attendants are presented in Annex II. The agenda of the meeting was to inform the community about the project and receive comments and suggestion from participants. For the focused group discussion filled sample questionnaire is attached in Annex IV

The following is a summary of issues raised by members who attended the meetings

6.3.3 Perceived Benefits

- a) **Enhanced food security and improved nutrition at the household level.** This will alleviate impact of erratic and unreliable rainfall pattern on the community's productive resources. Continuous supply and availability of food throughout the year.
- b) **Employment opportunities** will be offered to the local persons who will be hired to provide her/his services during construction and operation phase. In addition to direct employment, supplies of basic necessities to the workers will also lead to more employment opportunities and acquisition of entrepreneurial skills. This will engrain a sense of project ownership within the community
- c) **Reduction of idleness** amongst the youth due to an increase in income generating activities either directly or indirectly
- d) Ease the direct resource **dependency pressure on forest and wildlife resources**
- e) The project would ensure that greenhouse gas emission is reduced by using solar power to pump water
- f) Trees would also be planted in the project areas to act as carbon sink hence mitigating greenhouse gas effects to the environment

-
- g) Promote nutritional balance through integration of traditional high value crops such as amaranths vegetables and the yellow fleshed sweet potatoes that are highly rich in vitamin A hence reduced levels of malnutrition levels in the project area.
 - h) **Using solar powered submersible pumps would cub greenhouse gas emission.**
 - i) The **maize stalkes that would be left after harvesting** would be used as livestock feeds hence improve on livestock production

6.3.4 Issues of concern

- a. The community expressed concern on water distribution and rationalization which does not reach the targeted community. The project management will put in place mechanism to enable all Asako community members to access water in compliance with regulations
- b. Health risks associated with increased incidences of mosquitoes and malaria borne diseases due to increased breeding sites. This would be mitigated through capacity building to community on mosquito preventive control measures
- c. Lack of marketing strategy infrastructure for product; currently farmers do not have a crop storage and marketing plan. There is urgent need for scheme beneficiary farmers to develop collaborative and effective marketing strategies to access larger and more sustainable markets. The farmers will be linked to producer organizations so that they can register and facilitate marketing of their farm produce
- d. Lack of adequate knowledge and skills in irrigation. This could be attributed to limited knowledge and lack of irrigation crop production skills, tillage services, fertilizer, seed, integrated pest management and operations of irrigation equipment and management. The community will be trained through a service provider who is competent in irrigation and crop production skills
- e. Poor road infrastructure that would hinder supply of farm produce to markets at Hola
- f. Clearing of vegetation during construction phase, this would be addressed through reforestation programs and sparing of indigenous trees during the expansion and clearing process
- g. Lack of credit especially for irrigation purposes to enable grow high value crops and source inputs on time, and at competitive rates may hamper scheme productivity and adoption of climate smart agriculture techniques. The project beneficiaries through collective action can enhance access to financial service providers.

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- h. Human Wildlife conflict: Some of the respondents felt that the proposed project would bring a problem of wildlife (herbivores particularly warthogs, antelopes, buffaloes or even elephants that are within the area) and livestock conflict due to passage to water animals at the river Tana . The proposed site will be fenced and protected from wildlife
 - i. Accidents during Construction: There is likelihood that during the construction phase of the proposed project, construction workers may get involved in accidents as a result of falling building stones/bricks, sharp metals and machines used in the construction. The proponent will strictly adhere to safe working practices to protect the workers, neighbors and passers-by
 - j. Noise pollution: There was concern over the possibility of high noise and vibration levels in the project site as a result of excavation and construction works. The sources of noise pollution will include transport vehicles, construction machinery and metal grilling and cutting equipment

CHAPTER SEVEN: ANTICIPATED IMPACTS AND PROPOSED MITIGATION MEASURES

This chapter presents the assessment of issues likely to arise as a result of the implementation of Asako Irrigation project. The anticipated impacts are discussed in three phases namely construction, operational and decommissioning phases. During the implementation of the proposed construction and operation of the project. It is likely that the project will result in both positive and negative impacts to the environment. All possible practical measures should be put in place to ensure that any likely negative impacts are mitigated and positive impacts are enhanced and maximized

7.1 Impacts during Construction phase

Construction phase shall begin with excavation in an area of about 20ha. Construction impacts have the potential to create nuisance to adjacent neighbors but these could be managed to acceptable limits. In addition the construction impacts are also temporary in nature

7.1.1 Anticipated Positive impacts during Construction phase

a) Employment opportunity

Construction works will provide employment opportunities for both skilled and unskilled labour. Several workers including casual laborers, masons, carpenters, joiners, electricians and plumbers are to work during the project construction life. There will be increase in demand for goods and services such as food for construction, workers, housing, health care and need for transport.

b) Provision of Market for Supply of Building Materials

The construction work will require supply of large quantities of building materials such as cement, timber, steel, among others most of which will be sourced locally.

c) Local economic development

The proposed irrigation project will create employment and business opportunities that will contribute to improved local economic development. This will be characterized by expansion and emergence of new enterprise

7.1.2 Anticipated Negative Environmental Impacts during Construction phase

a) Vegetation Loss

Clearing of vegetation including grass, shrubs and trees is likely to occur during the laying of canals for water conveyance and other development that involve excavation. **Mitigation measures**

- Proper demarcation of construction areas to minimize trees to be felled
- Have strict control of construction vehicles to ensure that they operate within the area to be disturbed by access routes and other works
- Promote agroforestry during the operation phase to replace and enhance vegetation cover in the project area
- The contractor should ensure that vegetation is cleared only where necessary and if in the process mature trees are cut, new trees should be planted in areas adjacent to the cleared ones.

b) Increased soil erosion

Excavation of soil for canal construction and laying of pipeline as well as are major activities during the construction phase of the project. They are bound to result in significant amounts of loose of residual soil, prone to erosion through surface water runoff, especially during rainy season

Mitigation measures

- Minimize exposed areas by properly demarcating the project area to be affected by the construction works through minimal de-vegetation
- The contractor must establish implement drainage lines to avoid erosion in areas that are prone to erosion
- Topsoil must be reinstated and rehabilitated on top of subsoil
- All excavation works must be properly backfilled and compacted

c) Air quality and dust emission

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

Mitigation measures

- Masks should be provided to all personnel in dust generation areas throughout the period of construction
- All equipment on site should be properly maintained in good operating condition so as to emit minimal air pollution
- Emission of gases from fuel combustions by machines can be reduced by use of e.g exhaust systems that are in good working condition. This will significantly help in reducing the noise levels and the amount of destructive gases to atmosphere..
- Workers shall wear dust masks
- Vehicles delivering soil materials should be covered to prevent dust emission
- Activities generating dust (excavation, handling and transport of soils) to be carried out in calm weather.

d) Noise and vibration

The construction works delivery of building materials by heavy trucks, blasting and use of machinery/equipments including bulldozers, generators, metal grinders and concrete mixers will contribute to high levels of noise and vibration within the construction site and the surrounding area. Such noise within the site can cause nuisance and disturbance to the project workers and the residents, passers-by and other persons in within the vicinity of project site

Recommended Mitigation measures

- People participating in the construction should be provided with Personal Protective Equipment (PPE) such as ear muffs for ear protection
- Sound-attenuated equipment should be used as much as possible
- No unnecessary hooting by project and resident vehicles
- Noise levels should be kept within acceptable limits preferably as stipulated within the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Control Regulations 2009 :
- Limit pickup trucks and other small equipments to an idling time, observe a common sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible;

e) Increased Solid waste generation

Large quantities of solid waste will be generated at the site during construction works. Such waste will consist cement, and gravel packs and other packets of materials and equipment

metal cuttings, rejected materials, surplus materials, surplus spoil, and excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others.

Mitigation Measures

- The excavated material shall be recycled
- Minimize waste generated by adopting cleaner production methods e.g conserving raw materials, enabling the recovery and reuse of waste product where possible
- Use durable long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time
- Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements of nature i.e sunshine

f) Oil spills

Possibilities of such oils spilling and contaminating the soil and water on the site are possible. The potential for water contamination is likely and the effects are injurious to the aquatic life patterns and making drinking water unsafe for human consumption and domestic livestock

Recommended Mitigation Measures

- Vehicle maintenance should be done on purpose-built impervious concrete platforms with oil and grease traps
- All above surface tanks should be bounded and mounted on paved surfaces
- Ensure that all equipment is in good condition, clean and free from leaks
- Oil spill containment and clean up equipment should be safely kept by contractor

g) Safety Health and Environmental (SHE) Concerns

Every construction tool equipment and machines shall be well set adequately maintained. As well the construction area shall be kept free from objects such as sharps and tripping, which can cause emergencies and occurrences of accidents ranging from minor cuts to fatalities during construction

Recommended mitigation Measures

- The construction site shall be adequately protected or fenced off from unauthorized intrusions and warning signs, barricades should be properly displayed and strictly adhered to.
- Provision of safe working area with adequate and well-equipped First Aid should always be maintained on site at all times during the whole period of construction

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- In addition to the proponent should ensure that the contractor adheres to rules set by authorities for protection of his workmen such provisions of insurance and protective gear
 - Adequately washing facilities should be provided for workers' hygiene and protection
 - Engage contractors who are fully conversant with occupational health and safety matters at workplace. As regards compliance by the contractor, the proponent on his part should ensure that all mitigation measures are strictly enforced through his site representative and his assurance should be firmly embodied in a signed contract document.

Information and education on operation and management of the facility, including all the environmental aspects should be offered to all the concerned for purposes of project responsibility, sustainability in terms of water quality and yields as well as safety

7.1.3 Anticipated Negative Social and health Impacts during Construction phase

a) Gender based violence and sexual harassment (GBV/SH)

This impact is triggered during project construction phase when the contractor(s) fail to comply with the following provisions:

- ✓ Gender Inclusivity requirements in hiring of workers and entire project management as required by Gender Policy 2011 and 2/3 gender rule; and
- ✓ Failure to protect human risk areas associated with, disadvantaged groups, interfering with participation rights, and interfering with labour rights.

The proposed Mitigation Measures of Human Rights and Gender Requirements are:

- The contractor(s) shall require employees, sub-contractors, sub-consultants, and any personnel thereof engaged in construction works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse.
- The contractor(s) will implement provisions that ensure that GBV at the community level is not triggered by the project, including:
- Effective and on-going community engagement and consultation, particularly with women and girls.
- The contractor shall develop specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment.
- The contractor will ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.

a) **Sexual Exploitation and Abuse by project workers against community members**

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

The proposed mitigation measures to risks of SEA include:

- The SEA action plan will include how the project will ensure necessary steps are in place for:
- Prevention of SEA: including Code of Conducts and ongoing sensitization of staff on responsibilities related to the Code of Conducts and consequences of non-compliance; project-level IEC materials.
- Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management.

b) **Risk of Increased incidences of HIV/AIDS and STIs**

The influx of people may bring communicable diseases to the project area, including sexually transmitted infections (STIs), or the incoming workers may be exposed to diseases to which they have low resistance. This can result in an additional burden on local health facilities and resources. Local health and rescue facilities may also be overwhelmed and/or ill-equipped to address the industrial accidents that can occur in a large construction site.

Proposed mitigation measure for this are:

- Contractor(s) to sensitize workers and community members on HIV/AIDS awareness and other communicable diseases to be instituted and implemented as part of the contractor's Health and Safety Management Plan to be enforced by the Supervising Engineer. This will involve periodic HIV/AIDS and other communicable diseases Awareness Workshops for Contractor's Staff.
- Controlled access to contractor's workforce camps by outsiders.
- Contractor(s) to provide standard quality condoms at the construction site during the construction period.

c) Risks of increased spread of COVID-19 at work sites

The potential for the spread of any infectious disease like COVID-19 by projects is high . There is also the risk that the project may experience large numbers of its workforce becoming ill and will need to consider how they will receive treatment, and whether this will impact on local healthcare services including the project host community. The presence of international workers, especially if they come from countries with high infection rates, may also cause social tension between the foreign workers and the local populations.

The proposed Mitigation Measures against spread of COVID-19 amongst workers are:

- The contractor(s) shall put in place measures to prevent and manage the spread of the COVID-19.
- The contractor(s) will develop a SOPs for managing the spread of COVID-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilization. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions.
- Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel.
- The project shall put in place means to support rapid testing of suspected workers for COVID-19.
- Avoid concentrating of more than 15 persons or workers at one location. Where more than one person are gathered, maintain social distancing at least 2 meters. All workers and visitors accessing worksites every day or attending meetings shall be subjected to rapid COVID-19 screening which may include temperature check and other vital signs.
- Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used.

d) Child abuse

Children within the project area will be exposed to risks associated with interaction between them and project workers. This includes child labour and sexual abuse which coherently leads to teenage pregnancies and exposure to communicable diseases such as HIV/AIDS.

Mitigation measures

- The contractor will develop and implement a Children Protection Strategy that will ensure minors are protected against negative impacts associated with the project.
- All staff must sign, committing themselves towards protecting children, a contract which clearly defines what is and is not acceptable behaviour.
- Children under the age of 18 years will not be hired on site as provided by Child Rights Act (Amendment Bill) 2014.
- Refrain from hiring children for domestic or other labour, which is inappropriate given their age, or developmental stage, which interferes with their time available for education and recreational activities, or which places them at significant risk of injury.
- Comply with all relevant local legislation, including labour laws in relation to child labour specifically provisions of Kenya's Employment Act, 2007 (Cap. 226) Part VII on protection of children against exploitation.
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e) Impacts related to occupational and public/community safety and health

Poor sanitation could result from presence of potential environmental pollutants at the site including wastewater, decomposing solid wastes, dust and exhaust emissions. Accidents including cuts, pricks and bruises; electrocution from naked electrical cables; falling in uncovered holes and/or trenches and from raised places and suffocation from lack of oxygen in confined spaces. Accidents could result from lack of supervision and job training, improper handling of machinery and hand tools and inappropriate carrying out of tasks.

Mitigation measures

Mitigation options to some of the impacts have been discussed. Additional mitigation measures to other impacts are:

- Keep all passages clear at all times.
- Remove all soil, boulders, and other heavy materials from the edges of excavations.
- Fence the site for protection, privacy, reduction of trespass and theft, and control of entry by straying animals and therefore avoid conflicts between people at the site and the people in the neighborhood.
- Have a fully equipped First Aid Kit (containing a first aid manual and is equipped with sterile adhesive bandages, safety pins, cleansing agent/soap, latex gloves; sterile gauze pads triangular bandages, non-prescription drugs, scissors, tweezers and antiseptic amongst others) at the site at all times.

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- Put in place an appropriate emergency response plan including having emergency contacts (such as ambulance, fire tender and police) conspicuously displayed.
 - Dispose wastes from the site regularly and ensure high standards of cleanliness of all waste collection and disposal facilities.
 - Frequently undertake workers through refresher courses in order to make them have a basic understanding of the tasks under them, the hazards involved, and how to manage them.
 - Provide appropriate PPE including face masks, goggles, scarfs, boots and overalls among other protective clothing to all workers and people at the site and sensitize them to use them whenever they are in environments that warrant the use of such PPE especially in all situations where the body and skin are potentially exposed to hazards such as harmful dusts, sharp objects, burns and extreme temperature and/or when working in areas that present threatening experiences.

f) Grievances/conflicts

Common grievances expected to arise during the proposed project implementation include:

- ✓ Human and livestock interference with the project;
- ✓ Negative project impacts which may include disruption of income streams, physical harm, and nuisance from construction activities;
- ✓ Health and safety risks;
- ✓ Socially-unacceptable project staff relations with the communities and other stakeholders;
- ✓ Conflicts over water sources; and
- ✓ Pollution and other environmental related impacts.

Mitigation measures

The following are possible mitigation measures to manage grievances:

- Establish a grievance redress mechanism (GRM) for the proposed project;
- Seek to establish amicable relationships with stakeholders and manage the impact of the project activities on affected communities;
- Put in place a pre-emptive community liaison structure aimed at identifying potential issues arising from project-related impacts and addressing them before they become grievances;
- Establish a grievance redress mechanism targeting communities and other project stakeholders but not applicable to commercial and employee-employee relationships,

and which will allow stakeholders to easily put forth their concerns relating to the project, implementation and have them addressed in a prompt and respectful manner;

- Ensure the grievance redress mechanism is available to the affected community members and stakeholders at no cost;
- Educate all project stakeholders on the availability and use of the grievance redress mechanism in a manner that is understandable to all, before, during and after construction of the proposed project.

g) Destruction of cultural heritage sites

During construction, sites of cultural significance could be destroyed to pave way for infrastructure development. Such areas in the project include forest sites where religious and cultural practices are conducted. Destruction of such areas may erode the cultural heritage of the community and destroy community cohesion

Mitigation measures

- Proper identification and demarcation of sites of cultural heritage
- Establishing mechanisms for negotiation where disturbance of such sites is inevitable
- Protection of identified cultural sites

7.2 Operation Impacts during the Operation phase

7.2.1 Positive Impacts

- ✓ Employment Creation
- ✓ Increased income level.
- ✓ Increased productivity
- ✓ Improved food security
- ✓ Maximum land use
- ✓ Extended cropping seasons

7.2.2 Negative Environmental Impacts during operation phase

a) Vegetation loss

Clearance of vegetation in the farms may be done to allow for cultivation and this may lead to or aggravate soil erosion which eventually causes sedimentation in the river Tana. Since

the community also relies on fuel-wood as a source of energy the rate of de-vegetation might be aggravated as irrigation activities increase access to the buffer zone.

Recommended Mitigation Measures

- Strengthen the existing community based groups that promote conservation of trees through registration as Community Forest Associations
- Selective felling of trees according to the provisions of the county environment agency
- Creating synergies with farmers, government and non-governmental groups to enhance tree planting
- Institute appropriate conservation measures along the river banks

b) Changes in flow regime

Siltation due to intensive and unsustainable farming practices in the scheme may lead to significant changes in the river Tana flow regime. Significant changes in the flow regime (low flow regime in this case) is likely to alter micro-habitats leading to the loss of aquatic species and consequently the loss of livelihood for communities that rely on these species

Recommended Mitigation Measures

- Ensure compliance with water resource regulations so as to maintain at least steady base flow of the river to sustain ecological and social requirements downstream
- Maintain the mandatory buffer are of 50 meters for conservation of the river ecosystem
- Regular monitoring of water quantities to ensure compliance with WRA license
- Build capacity of the WRUAs to establish regulations on water management including fines against unauthorized access to irrigation water

c) Water pollution

The proposed project may cause pollution of River Tana through deposition of organic and inorganic matter from the farms. Such pollution include: sediment and particulate organic solids; Particulate bound nutrients, chemicals, and metals, such as phosphorous, organic nitrogen, apportion of metals applied with some organic wastes

Though insignificant in the area, the continued use of agrochemicals may cause non-point pollution to the existing water resources. This might have health implications on those who use the contaminated water. Water containing nutrients from fertilizers may cause

eutrophication which causes death of fish and other aquatic biota. Framers therefore need to be trained on safe use of agricultural chemicals and emphasis on integrated pest management

Mitigation measures

- Sensitize farmers on sustainable agriculture practices such as proper use of agrochemicals, river bank conservation, agroforestry and soil conservation
- Educate farmers on Integrated Pest Management practices, dangers of pesticide contamination and conservation of water bodies
- Strengthen existing customary laws on conservation of rivers

d) Salinization

The introduction of large volumes of water into the soil in a continuous basis through irrigation is likely to change both the soil physical and chemical attributes. Inappropriate management of water e.g through excessive irrigation and inadequate drainage will lead to water logging and leaching of water soluble nutrients to levels where they are no longer available for use of plants.

Mitigation Measures

- Provide adequate drainage within the farms
- Regular maintenance of the channels
- Regular monitoring and soil analysis to manage potential problems
- Sensitization of farmers on farm water management

e) Water logging

If proper land drainage is not practiced, irrigation has the potential of increasing soil salinity through raised water table and accumulation of soluble salts.

Water logging may occur because of poor levelling of canals that leave water to stand in some sections of the field. The concentrated water from the irrigation outlets and malfunctioning of canals may also cause soil erosion and water logging especially water holding soils the eventually affect stability of the irrigation canals,

Mitigation Measures

- Capacity building of farmers on irrigation water management
- Construction and maintenance of adequate drainage system
- Apply water using appropriate irrigation methods

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- Apply soil and water conservation methods on farms

f) Solid waste disposal

The solid waste will comprise mainly of agrochemical packaging materials, soil excavated and rock debris, metal cut offs plastics, cardboards, paper, wood and waste concrete among several others, which can cause water pollution and animal health risks..

Mitigation Measures

- Establish a waste disposal site for hazardous waste in a location approved by NEMA in accordance with the waste management regulations
- Sensitization of farmers on waste management
- Designate waste disposal sites/areas for agrochemical packaging
- Regular monitoring of waste management status in the farms

f) Soil Erosion

Different types of soil erosion are expected in the area including water erosion and gully. Continuous cultivation on cleared land without conservation measures, and animal tracks and uncontrolled grazing may cause loose soils that become susceptible to erosion. Intensified agricultural practices due to irrigation may accelerate soil erosion in the project area.

Mitigation Measures

- The design of farm irrigation systems will provide for conveying and distributing irrigation water without triggering soil erosion
- Provide free board in the design of the conveyance structures to protect them from floods and siltation
- Application of conservation treatments such as land levelling, irrigation water management , conservation tillage, and crop rotations to control irrigation-induced erosion
- Use cover crops to reduce soil displacement by water or wind

g) Sedimentation

Irrigation schemes can fail if sediment load of the water supply is higher than the capacity of the irrigation canals to transport sediment. Sedimentation from within the scheme itself can be a problem, for example, wind –blown soil filling canals

The increase in erosion due to the economic activity prompted by the reservoir and its access roads needs to be taken into account

Mitigation Measures

- Sediment extraction of headworks to be carried out regularly by the community members
- Provision of a sedimentation basin that will allow settlement of as much as possible sediment before getting into larger part of the canal system

h) Increase in Invasive species *Prosopis juliflora* (Mathenge)

The introduction of exotic species like *Prosopis Juliflora* may get rid of indigenous species or introduce disease agents which may affect plants, animals and/or man. Fertilizers and pesticides are widely applied to correct imbalances. These can percolate through the soil and/or be carried away in the drainage water polluting both groundwater and surface water especially in the downstream zone. The nutrients in fertilizers may give rise to eutrophication of surface water bodies and promote the growth of aquatic weeds. Pesticides residues are hazardous to health of both man and animals. The use of IPM will be promoted and enhanced

Mitigation Measures

- Cutting and uprooting the plant either manually or mechanically
- Clear the irrigation canals from plant growth
- The large trees of *Prosopis juliflora* can be used for fuel wood to generate income

i) Pests diseases and weed

Irrigated agriculture often provides improved conditions for crop diseases to develop particularly fungal and bacterial foliage diseases. This leads to increase in use of hazardous chemicals to aquatic systems and become rapidly concentrated in the food chain. Use of fertilizers result in eutrophication of the river Tana and may also affect health of the locals. Phosphates tend to be fixed to soil particles and therefore may reach the river when soil is eroded. Diseases and weeds spread rapidly through waste water and drainage water. Local variety of weeds may thrive in the irrigated environment and reduce agricultural productivity

Mitigation Measures

- Adopt integrated pest management control mechanism
- Training and awareness programmes on sustainable pest control
- Intensified extension services
- Use of linings, shade and intermittent drying out to complement traditional techniques of mechanical removal

j) Conflicts

Conflicts between farmers and livestock keepers due to destruction of crops

Conflicts may occur when livestock graze on cultivated land

Mitigation Measures

- Rules for grazing during the cultivation season should be formulated so as to minimize the destruction of crops by animals and to ensure amicable settlements of complaints over crop destruction
- Livestock should not be allowed to cause damage in the irrigated system
- Animal corridors to watering points should be provided within the scheme

Conflict between farmers and wildlife

Mitigation Measure

- Encourage community wildlife extension education
- Community CBO to work in collaboration with KWS and County department of environment

Conflicts among beneficiaries over water access and distribution within the scheme

Due to limitation in the amount of water to be distributed for proposed project, conflicts are likely to emerge over water allocation among the members of the scheme.

Mitigation Measures

- Water should be distributed in turns following spatial sequence of the plots
- Conflicts should be managed by water committee, if they are beyond the capability of the committee, they should be referred to the community court
- Each beneficiary should have access to water on equal basis
- Ensure beneficiary participation and community management during project planning

k) Occupational health and Safety

The use of pesticides, fertilizers and other agro chemicals may affect the farmers who handle them through inhalation or indirect skin contact. This may cause complicated health conditions. In addition, once they are washed into water bodies they may cause contamination and affect downstream users who draw water from the river.

Mitigation measures

- Ensure that trained first aid personnel are always available on site to handle emergencies.
- Provide appropriate PPE including face masks, goggles, scarfs, boots and overalls among other protective clothing to all workers and people at the site and sensitize them to use them whenever they are in environments that warrant the use of such PPE especially in all situations where the body and skin are potentially exposed to hazards such as chemicals, harmful dusts, highly infectious wastes, sharp objects, burns and extreme temperature and/or when working in areas that present threatening experiences.
- Have a fully equipped First Aid Kit (containing a first aid manual and is equipped with sterile adhesive bandages, safety pins, cleansing agent/soap, latex gloves; sterile gauze pads triangular bandages, non-prescription drugs, scissors, tweezers and antiseptic amongst others) at the site at all times.
- Put in place an appropriate emergency response plan including having emergency contacts (such as ambulance, fire tender and police) conspicuously displayed.
- Frequently undertake workers through refresher courses in order to make them have a basic understanding of the tasks under them, the hazards involved, and how to manage them.

7.2.3 Anticipated health and social impacts during operation phase

a) Health impact – creation of vector and rodents breeding grounds

If the project commences with no well-designed canal water drainages, water may end up stagnating and hence creating conducive breeding areas for mosquitoes and other water based vectors leading to transmission of human diseases like malaria, Schistosomiasis and cholera.

Mitigation measures

- All hollow areas at the site should be filled with soil to prevent stagnation of water.
- The inlet and outlet pipes to the canals should be properly fixed to ensure regular flow of water which will prevent water from stagnating in the canals for a long time.
- Bushes and long grass around the designated irrigation scheme will be cleared to prevent breeding of mosquitoes.
- The CBO to facilitate provision of mosquito nets to communities residing within the irrigation scheme

b) Gender based violence and sexual harassment (GBV/SH)

This impact is triggered during project operation phase when the Proponent or project management fail to comply with the following provisions:

- ✓ Gender Inclusivity requirements in hiring of workers and entire project management as required by Gender Policy 2011 and 2/3 gender rule; and
- ✓ Failure to protect human risk areas associated with, disadvantaged groups, interfering with participation rights, and interfering with labour rights.

The proposed Mitigation Measures of Human Rights and Gender Requirements are:

- i) Effective and on-going community engagement and consultation, particularly with women and girls.
- ii) Review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes; employment schemes for women; etc.
 - Develop specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment.
 - Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.

c) Sexual Exploitation and Abuse

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

The proposed mitigation measures to risks of SEA include:

- i) Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management.
- ii) Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA

awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights.

- iii) **Management and Coordination:** including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.

d) Grievances/conflicts

Common grievances expected to arise during the proposed project implementation include:

- ✓ Human and livestock interference with the project;
- ✓ Negative project impacts which may include disruption of income streams, physical harm, and nuisance from construction activities;
- ✓ Health and safety risks;
- ✓ Socially-unacceptable project staff relations with the communities and other stakeholders;
- ✓ Conflicts over water sources; and
- ✓ Pollution and other environmental related impacts.

Mitigation measures

The following are possible mitigation measures to manage grievances:

- Establish a grievance redress mechanism (GRM) for the proposed project;
- Seek to establish amicable relationships with stakeholders and manage the impact of the project activities on affected communities;
- Put in place a pre-emptive community liaison structure aimed at identifying potential issues arising from project-related impacts and addressing them before they become grievances;
- Ensure the grievance redress mechanism is available to the affected community members and stakeholders at no cost;
- Address all raised grievances, real or imagined and take reasonable steps to maintain confidentiality of the parties to the mechanism and regardless of the

complainants' participation in this process, give a guarantee that the complainant's statutory rights to undertake legal proceedings remain unaffected;

e) Child abuse

Children within the project area will be exposed to risks associated with interaction between them and project staff. This includes child labour and sexual abuse which coherently leads to teenage pregnancies and exposure to communicable diseases such as HIV/AIDS.

Mitigation measures

- The Proponent will develop and implement a Children Protection Strategy that will ensure minors are protected against negative impacts associated with the project.
- Children under the age of 18 years will not be hired at the site as provided by Child Rights Act (Amendment Bill) 2014.

f) Risk of increased spread of COVID-19

During project operation, there will be a lot of interactions among different people at the site. The potential for the spread of any infectious disease like COVID-19 is high. There is also the risk that the project may experience large numbers of its workforce becoming ill and will need to consider how they will receive treatment, and whether this will impact on local healthcare services including the project host community.

The proposed Mitigation Measures against spread of COVID-19:

- Mandatory provision and use of appropriate PPE shall be required for all project personnel.
- The project shall put in place means to support rapid testing of suspected workers for COVID-19.
- Avoid concentrating of more than 15 persons or workers at one location. Where more than one person are gathered, maintain social distancing at least 2 meters.
- Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used.
- Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs.

g) Impacts related to occupational and public/community safety and health

There are three main types of occupational health and safety hazards that may be of concern. These are physical, chemical and biological. Potential physical hazards will include noise and accidents. Chemical hazards will involve exposure to harmful chemicals by inhalation, ingestion and skin contact. Biological hazards involve exposure to pathogenic organisms which may cause diseases. Specific areas of concern include: noise and vibrations, congestion, body contact, failure to observe social distancing thus exposing other people to COVID-19. Accidents including cuts, pricks and bruises, falling in uncovered holes and/or trenches and from raised places and suffocation from lack of oxygen in confined spaces.

Mitigation measures

Mitigation options to some of the impacts have been discussed. Additional mitigation measures to other impacts are:

- Adopt proper working procedures and when working with chemicals, machines and equipment.
- Fence the site for protection, privacy, reduction of trespass and theft, and control of entry by straying animals and therefore avoid conflicts between people working in scheme and people in the neighborhood.
- Have a fully equipped First Aid Kit (containing a first aid manual and is equipped with sterile adhesive bandages, safety pins, cleansing agent/soap, latex gloves; sterile gauze pads triangular bandages, non-prescription drugs, scissors, tweezers and antiseptic amongst others) at the site at all times.
- Dispose wastes from the site regularly and ensure high standards of cleanliness of all waste collection and disposal facilities.
- Ensure employee welfare including provision of free or subsidized medical attendance if injured on work, making provisions for leaves and offs, and operation of shorter-shift period for workers in highly polluted working areas.

7.3 Anticipated Impacts during the decommissioning phase

Decommissioning refers to the formal process of removing something from the operational status. It requires time in order to properly deal with potential hazards and risks that may be encountered.

7.3.1 Decommissioning activities

A typical decommissioning involves water evacuation from the canal and pipeline securing irrigation infrastructure, demobilization of irrigation systems, pumps and plant and disconnection from the solar powered mains, removal of unstable fills and configuration for long term drainage, which includes measures such as out-sloping, water-barring, ditch removal and a variety to other site specific solutions

At the expected end of the economical life of the proposed project, the structure will be demolished and replaced with other development, which will be applicable and suitable at that particular period. The decommissioning exercise will have both positive and negative impacts.

CHAPTER EIGHT : ENVIRONMENTAL AND SOCIAL MANAGEMENT & MONITORING PLAN (ESM&MP)

The overall objective of the Environmental Management and Monitoring Plan (ESMMP) is to ensure that mitigation measures of identified adverse effects throughout the design, construction, operation and decommissioning phases are implemented and that they are effective so as to promote the positive effects. It will also enable response to new and developing issues of concern. The ESMMP is vital output of an Environmental Impact Assessment as it provides a checklist for project monitoring and evaluation.

8.1 Environmental Social, Management and monitoring plan during construction phase

Table 4: Environmental, social management and monitoring plan during construction phase

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
De-vegetation	<ul style="list-style-type: none"> ✓ Proper demarcation of construction sites to minimize disturbance ✓ As much as possible, avoid cutting down indigenous tree species of socio-economic importance 	<ul style="list-style-type: none"> -Demarcation of sites -Entire labour force 	<ul style="list-style-type: none"> -Irrigation reports/photographs -Site plan showing demarcation 	<ul style="list-style-type: none"> Contractor Environmental Management Committees WRUAs 	Throughout construction period	70,000
Soil erosion	<ul style="list-style-type: none"> ✓ The contractor should implement erosion control measures to avoid erosion in areas that are prone to erosion e.g drainage lines ✓ All excavation works must be properly backfilled and compacted 	<ul style="list-style-type: none"> Construction sites demarcated All excavation backfilled 	<ul style="list-style-type: none"> -Site plan showing demarcations 	<ul style="list-style-type: none"> Contractor WRUAs 	Construction period	N/A
Air Pollution (dust exhaust)	<ul style="list-style-type: none"> ✓ Use dust suppressants ✓ Sensitization of workers on occupational health safety ✓ Workers provided with 	<ul style="list-style-type: none"> -Workers/vehicle operators sensitized on reduced emissions 	<ul style="list-style-type: none"> -site visit /reports Photographs 	<ul style="list-style-type: none"> Contractor 	Construction	50,000

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
	protective gear like helmets, dust masks, ear muffs when working	-workers provided PPE	-Sensitization report			
Noise Pollution	<ul style="list-style-type: none"> ✓ Workers should be provided with Personal Protective Equipment (PPE) ✓ Use of PPE should be enforced ✓ Sound –attenuated equipment should be used in as much as possible ✓ Ensure use of equipment with exhaust systems in good working condition 	<ul style="list-style-type: none"> -PPE provided to workers Regular servicing of equipment's No of cases reported relating to noise pollution 	Complaints register	Contractor	Construction Phase	N/A
Solid Waste management	<ul style="list-style-type: none"> ✓ Minimize waste generated ✓ Recycling of the excavated material ✓ Storage of construction waste in designed collection points ✓ Appropriate waste disposal-directly/through licensed waste collectors ✓ The disposal site need to be more that 100 meters from water course and in apposition that will facilitate prevention of storm water run-off from the site from entering the water courses 	<ul style="list-style-type: none"> -Designed waste collection points established -Waste collection company engaged 	<ul style="list-style-type: none"> -Waste storage points -Waste disposal facilities/contract collector 	<ul style="list-style-type: none"> Contractor Community Environmental Management commitees 	Construction	150,000
Oil spills	<ul style="list-style-type: none"> ✓ Vehicle maintenance should be done on purpose built ✓ Impervious concrete platforms with oil and grease traps. ✓ Standard operating practices for re-fuelling mobile equipment 	Oil and grease traps established	Soil tests	Contarctor	Construction phase	10,000

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
	such as a minimum 15m from any water channel should be practiced					
Occupational health and safety	<ul style="list-style-type: none"> ✓ Availability of adequate and appropriate sanitary facilities ✓ Ensure workers health and safety throughout the campaign ✓ Train at least one employee on first aid skills ✓ Have fire extinguishers and train workers on how to use them ✓ Have dust suppressants to reduce dust 	<p>Latrines provided</p> <p>Recorded accidents occurrences and near misses</p> <p>OSH sensitization conducted</p>	Safety records	Contractor	Construction	50,000
Anticipated Health and Social Impacts						
Covid 19	<ul style="list-style-type: none"> ✓ Follow control protocol like use of face mask, social distance, sanitizing, hand washing 	Number of incidences reported	Reports	Contractor, County department of Health	Throughout	100,000

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
Gender based violence and sexual harassment (GBV/SH)	<ul style="list-style-type: none"> ✓ Implement provisions that ensure that GBV at the community level is not triggered by the project, including: ✓ Sensitization, community engagement and consultation, particularly with women and girls. ✓ Ensure adequate referral mechanisms are in place if a case of GBV at the community level 	<p>Number of recorded cases</p> <p>Number of sensitization workshops</p>	Reports	Contractor, Asako CBO County department of social services	Continuous	30,000
Sexual Exploitation and Abuse by project workers	<ul style="list-style-type: none"> ✓ Develop and implement a SEA action plan ✓ Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; 	<p>Number of recorded cases</p> <p>Number of sensitization workshops</p> <p>Number of persons by gender sensitized</p>	Reports	Contractor, Asako CBO County department of social services	Continuous	20,000
Risk of Increased incidences of HIV/AIDS and STIs	<ul style="list-style-type: none"> ✓ Contractor(s) to sensitize workers and community members on HIV/AIDS awareness and other communicable diseases as part of the contractor's Health and Safety Management Plan ✓ Contractor(s) to provide standard quality condoms at the construction site during the construction period. 	<p>Number of persons by gender sensitized</p> <p>Cartons of condoms distributed and to the relevant persons</p> <p>Number of sensitization workshops</p>	Reports	Contractor, Asako CBO County department of social services	Continuous	20,000

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
Child abuse	<ul style="list-style-type: none"> ✓ Comply with all relevant local legislation, including labour laws in relation to child labour ✓ Refrain from hiring children for domestic or other labour, which is inappropriate given their age, or developmental stage, 	Number and type of child abuse incidences reported	<p>Reports</p> <p>Existing records at the Children centres</p>	Contractor, Asako CBO County department of social services	Biannually	-
Impacts related to occupational and public/community safety and health	<ul style="list-style-type: none"> ✓ Have a fully equipped First Aid Kit (containing a first aid manual and is equipped with all the necessary accessories) at the site at all times ✓ Provide appropriate PPE including face masks, goggles, scarfs, boots and overalls among other protective clothing to all workers and people at the site and sensitize them 	<p>Number of Fully equipped first Aid Kits available</p> <p>Number of reported accidents</p>	Reports	Contractor, Asako CBO County department of social services, County department of public health	Continuous	20,000
Grievances/conflicts	<ul style="list-style-type: none"> ✓ Establish a grievance redress mechanism targeting communities and other project stakeholders but not applicable to commercial and employee-employee relationships ✓ Ensure the grievance redress mechanism is available to the 	<p>Number of reported cases on grievances</p> <p>Number of sensitization awareness creation workshops on GRM</p> <p>Number of community members</p>	<p>Reports</p> <p>Existing records</p>	Contractor, Asako CBO County department of social services,	Continuous	20,000

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
	affected community members and stakeholders at no cost	trained on GRM				
Destruction of cultural heritage sites	<ul style="list-style-type: none"> ✓ Proper identification and demarcation of sites of cultural heritage ✓ Establishing mechanisms for negotiation where disturbance of such sites is inevitable ✓ Demarcate all identified sites 	Affected cultural sites in the project area Number of mechanisms/meetings undertaken	Reports Photos Existing records at the county government office	National Museums of Kenya County department of Cultural services Contractor	Construction period	-
Sub Total:	ESMMP Construction phase					540,000

8.2 Environmental Social, Management and monitoring plan during operation phase

The environmental management and monitoring plan for the operational phase provides specific guidance related to the operational activities associated with the irrigation project. It is centered on sound environmental management practices that will be undertaken to minimize adverse impacts on the environment through normal operations of irrigated agriculture. The plan further identifies measures to be taken in an event of emergencies or incidences during the operation of the scheme. The table below shows operation phase of the irrigation project

OPERATION PHASE

Table 5: Environmental Social Management and Monitoring plan for operation phase

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
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Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
Water pollution	-Sensitize farmers on sustainable agricultural practices, river bank conservation, agroforestry, soil conservation -Educate on integrated pest management dangers of contaminating the river with synthetic fertilizers -Regular water monitoring -Strengthen customary laws on conservation of the rivers	-Soil conservation measures -Trees plant along with crop -Farmers practicing IPM - Regular water quality data from WRMA	-Training reports/photographs -Field observations on number of trees planting along with crop production -Minutes of community meetings	KCSAP, WRMA, Asako Community CBO County Government Agriculture Office in Tana Rivere	Throughout operation period	70,000
Sedimentation	-Sediment extraction at head works be carried out regularly	-amount sediment basin	-Low sediment levels in the larger part of the canal	County Government Agriculture Office in Tana Rivere Asako Community CBO	Throughout operation period	50,000
Salinization	-Provide adequate drainage within the farms Regular maintenance of canals	-Regular monitoring of soil analysis to manage potential problems	-Reports on the salinity levels of the soil samples	County Government Agriculture Office in Tana River WARMA	Throughout operation period	40,000
Water logging	Construction and maintenance of adequate drainage system Apply soil and water conservation methods on farms Apply suitable irrigation methods	Drainage systems properly maintained Conservation methods applied Irrigation methods monitored	Report on status of drainage systems Report on conservation methods being applied in the farms	County Government Agriculture Office in Tana River Community members(Asako Community CBO)	Throughout operation period	N/A
Solid Waste management	-Establish waste disposal site for hazardous waste in allocation approved by NEMA in accordance with waste management regulations --Designed waste collection points established	Regular monitoring of waste management status in the farms	-Number of Waste storage points -Number Waste	County government of Tana river Community members WARMA	Throughout operation period	150,000

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
	-The disposal site need to be more that 100 meters from water course and in apposition that will facilitate prevention of storm water run-off from the site from entering the water courses	- Storage of construction waste in designed collection points	disposal facilities/contract collector			
Soil Erosion	-Provide free board in the design of the conveyance structures to protect them from floods and siltation -Use of cover crops to reduce soil displacement by water	Design of farm irrigation systems conducted Cover crops used to reduced water displacement	Report on the conveyance structures established	KCSAP project Community members Community forest Association Water Resource User Association	Operation period	150,000
Pest, disease and weeds	-Training and awareness programmes on sustainable pest control -Adopt integrated pest management control mechanisms -Intensified extension services	No of persons trained IPM mechanism adopted Extension services provided/intensified	Reports Photographs	KCSAP project team Asako CBO Tana River County Government Department of Agriculture WRUA members	Operation period	100,000

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
Conflicts	<p>Animal corridors to watering points be provided within the scheme</p> <p>-Build capacity of local conflict resolution mechanisms</p> <p>-Conflict among beneficiaries over water access and distribution within the scheme</p>	<p>Animal corridors provided</p> <p>Capacities on conflict resolution built</p> <p>Ensure beneficiary participation and community management</p>	<p>Number of corridors (<i>Malkas</i>) provided</p> <p>Number of farming communities trained on conflict resolution</p> <p>Number of beneficiaries targeted</p>	<p>Community members</p> <p>WRUA members</p> <p>Tana River County Agricultural office</p> <p>Community members KCSAP project implementation team County Agricultural Office</p>	<p>Operation period</p> <p>Operation period</p> <p>Operation period</p>	150,000
Water borne diseases	<p>-Provision of treated nets to the targeted communities</p> <p>-Equip health centres with drugs</p> <p>-Provision of water treatment tablets</p>	<p>Mosquito nets provided</p> <p>Health centers equipped</p> <p>Water treatment tablets provided</p> <p>Communities sensitized</p>	<p>Number of targeted households provided with Mosquito nets, Water treatment tablets and sensitized</p>	<p>County Government in charge of Health services</p> <p>KCSAP County project implementation team County Director NEMA</p>	Operation period	
Occupational Health Safety	<p>All health risks equipments must be cleared from the project site</p> <p>Adopt integrated pest and disease control</p>	<p>Health risk equipments cleared</p> <p>Integrated pest and disease control adopted</p>	<p>Number of health risk equipments cleared</p> <p>Report on activities adopted on integrated pest and diseases contro</p>	<p>Asako CBO County Government in charge of Health services</p> <p>Tana River county Agricultural office</p>	Operation period	

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
Covid 19	Follow control protocol like use of face mask, social distance, sanitizing, hand washing	Number of incidences reported	Reports	Proponent	Throughout	100,000
Anticipated Health and Social Impacts						

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
Creation of vector and rodents breeding grounds	<ul style="list-style-type: none"> ✓ All hollow areas at the site should be filled with soil to prevent stagnation of water. ✓ The inlet and outlet pipes to the canals should be properly fixed to ensure regular flow of water which will prevent water from stagnating in the canals for a long time. ✓ Bushes and long grass around the designated irrigation scheme will be cleared ✓ d) The CBO to facilitate provision of mosquito nets to communities residing within the irrigation scheme 	<p>Length of hollow areas filled with soil</p> <p>Acreeage of bushes in the irrigation area cleared</p> <p>Number of households facilitated with mosquito nets</p>	<p>Reports</p> <p>Photos</p>	<p>Asako CBO</p> <p>County department of Water/Irrigation</p> <p>County department of public health</p>	Continuous	50,000
Gender based violence and sexual harassment (GBV/SH)	<ul style="list-style-type: none"> ✓ Develop specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment. ✓ Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation 	<p>Number of GBV reported incidences</p> <p>Number of awareness , creation, consultative workshop/meetings</p>	<p>Reports</p>	<p>Asako CBO</p> <p>County department of Social services</p> <p>County department of Childrens</p> <p>Gender based violence expert</p>	Continuous	20,000
Sexual Exploitation and Abuse	<ul style="list-style-type: none"> ✓ Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard activities; 	<p>Number of SEA reported incidences</p> <p>Number of awareness , /meetings</p>	<p>Reports</p>	<p>Asako CBO</p> <p>County department of Social services</p> <p>Gender based violence expert</p>	Continuous	-

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
Risk of Increased incidences of HIV/AIDS and STIs	<ul style="list-style-type: none"> ✓ Sensitize workers and community members on HIV/AIDS awareness and other communicable diseases to be instituted and implemented as part of the contractor's Health and Safety Management Plan, 	<p>Number of awareness , creation, consultative workshop/meetings</p> <p>Number of condoms distributed</p>	Reports	Asako CBO County department of Social services and County Public Health department	Continuous	-
Grievances/conflicts	<ul style="list-style-type: none"> ✓ Ensure the grievance redress mechanism is available to the affected persons at no cost; ✓ Address all raised grievances, real or imagined and take reasonable steps to maintain confidentiality of the parties to the mechanism and regardless of the complainants' 	<p>Number of conflict related cases reported and addressed</p> <p>Number of awareness creation workshops/meetings</p>	Reports	Asako CBO County department of Social services	Continuous	10,000
Risk of increased spread of COVID-19	<ul style="list-style-type: none"> ✓ Mandatory provision and use of appropriate PPE shall be required for all project personnel. ✓ Avoid concentrating of more than 15 persons or workers at one location. Where more than one person are gathered, maintain social distancing at least 2 meters. ✓ Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are 	<p>Number of PPEs supplied</p> <p>Number of hand washing facilities</p> <p>Amount in liters of sanitizers and liquid soap</p>	Reports	Asako CBO County department of Social services , County department of public health	Continuous	10,000

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
	used.					
occupational and public/community safety and health	<ul style="list-style-type: none"> ✓ Have a fully equipped First Aid Kit (containing a first aid manual and is equipped with accessories) at the site at all times. ✓ Provide appropriate PPE including face masks, goggles, scarfs, boots and overalls among other protective clothing to all workers and people at the site 	<p>Number of first Aid Equipments</p> <p>Number of awareness sensitization workshops/ meetings</p>	Reports	Asako CBO County department of Social services , County department of public health	Continuous	10,000
Total ESMMP Cost for Operational Phase						910,000
Grand Total cost of ESMMP						1,450,000

8.3 EMMP for the Decommissioning phase

Decommissioning refers to the formal process of removing something from the operational status. This being the final phase in the project cycle, decommissioning may present possible opportunities associated with the return of the land for alternative use. However, depending on the nature of the operational activity, the need to manage risks and potential residual impacts may remain well after operation ceased

The EMMP will direct the initial stages of decommissioning phase. The table below shows the EMMP of the decommissioning phase for the irrigation project.

Table 6: EMP for decommissioning phase of proposed project

Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
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Expected Negative Impacts	Recommended Mitigation Measures	Performance Monitoring Indicator	Means of Verification	Responsibility Monitoring Implementation	Time Frame	Cost
Demolition Waste	<p>Recycling Resuse; Sanitary land filling -Provide facilities for proper handling and storage of demolition materials to reduce the amount of waste caused by damage</p> <p>Ensure adequate collection and storage of waste on the site and safe transportation to the disposal sites and disposal methods at licensed disposal sites</p>	Registered waste collector engaged	Inspection and observation	Contractor	One-off	50,0000
Occupational health and safety risks	-Provision of appropriate personal protective equipment as well as ensuring a safe and healthy environment for demolition workers	Number of reported incidences	Inspection and observation	Proponent	Throughout decommissioning period	10,000
Covid 19	Follow control protocol like use of face mask, social distance, sanitizing, hand washing	Number of incidences reported	Reports	Proponent	Throughout	100,000
Total cost of decommissioning						170,000

CHAPTER NINE: CONCLUSIONS AND RECOMMENDATIONS

The proposed project presents multiple environment and social benefits including: Increased agricultural production, increased household incomes, local economic growth and enhanced climate resilience in a semi-arid region. It will also allow for optimal use of natural resources in the County. On the other hand the project could spur negative environmental impacts. These include: vegetation clearance during expansion and rehabilitation of the irrigation infrastructure; intensified water use conflicts or access to the water points, siltation and encroachment into sensitive ecosystems such as forest and riparian land. The negative impacts however can be mitigated through technical design consideration, community sensitization, strategic partnerships, staff capacity building-implementing agencies and continuous monitoring of environmental conditions against the baseline

7.1 Conclusion & Recommendations

From the findings of the study that are detailed in this report, the Asako irrigation project will play an important role in improving the livelihoods of the local community through increased and improved agricultural production. The improved agricultural production will enhance household food security; generate local employment and increased household incomes of targeted Asako Village members and the larger Waliyuana community in Asako

In addition to following the laid down guidelines and according to the information collected, collated and analyzed during the study, it is the lead experts considered opinion that:

- The project DOES NOT pose any irreversible environmental impacts identified that are generally related to development projects and the mitigation measures for those that have been clearly articulated;
- The project will bring positive environmental impacts that surpass the few and minor negative impacts identified. The negative environmental impacts are addressed by the detailed environmental management plan, which will be executed during the project implementation and operation phases to safeguard the environmental interests
- The proponent will collaborate with key stakeholders in environment, water, health and agriculture among others to ensure successful implementation and monitoring of mitigation.
- The proponent has agreed to adhere to the laid down laws and procedure of NEMA in setting up the project. Its successful implantation will contribute to the economic growth of the country in regards to poverty eradication as well as reducing the water use conflicts
- A copy of the environmental and social management plan must be given to the contractor prior to construction. The contractor needs to demonstrate how the ESMP will be implemented in the construction process.
- The proponent and government agencies particular NEMA-environmental lead agency should strengthen their grievances redress mechanisms

10.0 KEY REFERENCES

- Constitution of Kenya(2010)
- Community Land Act (2016)
- County Integrated Development Plan (CIDP 2018-2022) (Tana River County)
- Environmental Assessment Sourcebook, Vol. 2: Sectorial Guidelines. World Bank Technical Paper 140, 1991.
- Environmental Assessment Sourcebook, Vol. 3: Guidelines for Environmental Assessment of Energy and Industry Projects. World Bank Technical Paper 154, 1991.
- Government of Kenya (2000), Environment Management Coordination Act Cap 387
- Government of Kenya(2008), Kenya vision 2030, Government printer, Nairobi
- Government of Kenya (2019). Agricultural Sector Transformation and Growth Strategy 2019-2029
- Government of Kenya (2016), National Environmental Action Plan Preparation Guidelines. National Environment Management Authority, Nairobi
- Kenya gazette supplements Acts 2000; The Environmental Management and Coordination Act Number 8 of 1999. *Government Printer Nairobi*
- Kenya gazette supplement Acts, Building code 2000 by Government printer, Nairobi
- Kenya gazette supplement Acts, Public Health Act (Cap 242) Government printer, Nairobi
- Kenya gazette supplement Acts, Water Act 2000 by Government printer, Nairobi
- Kenya gazette supplement Number 56, Environmental Impact Assessment and Audit Regulations 2003 Government printer, Nairobi
- Kenya gazette supplement Acts, Occupational Safety and Health Acts 2007 by Government printer, Nairobi
- Kenya gazette supplement Acts, The Factories and Other Places of Work Act, (Cap 514) by Government printer, Nairobi
- Kenya National Bureau of Statistics (KNBS). (2014). Economic Survey report of Kenya.
- Legal notice No. 101 published by the NEMA in 2003. Environmental (Impact and Audit) regulations
- Sambroek, W.G., H.M.H Braun and B.J.A van der Pouw (1982) Exploratory Soil Map and Agro- Climatic zone map of Kenya 1980. National Agricultural Laboratories Kenya Soil Survey. Republic of Kenya

ANNEXES

11.0 ANNEX 1: MINUTES OF THE COMMUNITY CONSULTATION MEETINGS

MINUTES OF THE COMMUNITY BARAZA/MEETING ON FOR PROPOSED CONSTRUCTION OF ASAKO SOLAR SMALL-SCALE IRRIGATION SCHEME IN ASAKO VILLAGE, MADOGO WARD, TANA NORTH -SUB COUNTY IN TANA RIVER COUNTY HELD ON 15th JUNE, 2021 AT ASAKO VILLAGE AT 10.00 AM

Members Present:

List attached

Agenda

Project Brief

Community Sensitization on EIA

Public participation

AOB

Min 1./15/6/2021: Introduction

The meeting commenced at 11a.m with a word of prayers from the Mr Jomo Abagono Chairman of the proposed Asako Irrigation Scheme. He welcomed the participants and asked the residents to introduce themselves. He informed the meeting that rains in Asako are erratic and unreliable. Food crop production is very low and the only option is to introduce irrigated agriculture.. He stated that through irrigation food security can be addressed. He welcomed the visitors from Tana River Kenya Climate Smart Agriculture Project (KCSAP) County office and Nairobi and expressed their happiness for receiving the visitors again. He then introduced the County Project Coordinator from Tana River County office Mr Peter Munyoki and the Village Elder Mr Mohammed Bema .

Min 2./ 15/6/2021: County Environmental Social Safeguards Officer (CESSCO) (KCSAP's) Remarks

The CESSCO welcomed the participants and he made reference to the screening exercise which was undertaken at the community level. He also reported that the Engineer incharge of Irrigation in the County undertook a feasibility study in the area, and the participants were undecided on the proposed project site. He gave a brief highlight on the objective of the visit and the need to conduct an Environmental Impact Assessment on the proposed rehabilitation and expansion of Asako solar small-scale irrigation scheme.

He at the same time briefed them on their proposal on how to undertake selective bush clearing during opening up of land for the expansion and rehabilitation construction. He further narrated the importance of the Environmental Impact Assessment Exercise and called on proper attention to the lead experts' in quest for further clarifications. The team leader invited the ESIA lead experts to explain in detail the purpose of the visit

Min 3/15/6/2021Project Brief

A farmer Mr Abdi Qambicha from the community gave brief overview on how they came together and developed a proposal for funding by KCSAP He noted that they have no any machinery or training on irrigated agriculture However, there is an irrigated farm ASHAJIRMA FARM nearby where communities can learn from

Min 4./ 15/6/2021: Community Consultation/Sensitization on ESIA

The ESIA expert mentioned the need for public participation in Environmental Impact Assessment as a priority and legal requirement by the Government of Kenya, He enlightened the participants about ESIA; its purpose objectives; legal framework including legislation and policies governing environment; the rights and role of community towards environmental protection and management. He further took the community through selected legislation governing the environment including the new constitution

The community was informed that it is mandatory to hold at least one baraza to give the community/neighbors/stakeholders an opportunity to give their views with respect to the benefits; impacts both negative and positive in order to establish whether the project is economically viable, socially accepted and environmentally friendly/sound

Min 3. /15/6/2021: Community participation

The EIA lead expert guided the community members on procedures of giving their opinion and that each speaker was to follow but not limited to the following criteria:

- Indicate whether he or she is aware of the proposed expansion, rehabilitation, construction and its related activities incidental thereto and connected therewith the under the Kenya Climate Smart Agriculture Project? Yes/No
- Give opinion on the expected benefits from the irrigation project
- Give opinion on the anticipated negative/adverse impacts that may result from this project and related activities
- Propose mitigation measures to avoid, alleviate or reduce the adverse effects
- Identify any conflict, complaints expected to arise due to expansion, rehabilitation and construction
- Suggest ways to resolve conflict, complain amicably

-
- Indicate other issues relevant to the implementation of the irrigation project

The community beneficiary opinions were documented below:

Informed the proponent that there is a challenge drawing water from river Tana to the irrigated field which is about 3 Kms from the proposed site.. If the project was in place the food would be available and the problems of food insecurity malnutrition levels would be minimized. Food availability at household will be enhanced and incidences of food poor will be reduced.

Community youth member informed the proponent that there will be employment creation. The project will open avenues for the youth to produce food crops especially maize and sell as food and stovers as feed for livestock. It will also cushion conflict between livestock keepers and the farmers who plant crops. However the team was informed that wildlife is a big problem mainly the herbivores i.e Elephants, Buffaloes, warthogs, bush pigs

When asked about benefits of proposed water project they identified the following;

1. Employment creation
2. Crops for household consumption and selling
3. The irrigated crops will increase household income promote fodder for livestock upkeep and enhance the food security status of the community
4. The project will sensitize the community on planting of appropriate crop types, pasture and conservation of animal feeds

Min 3./ 15/6/2021: Possible adverse effects of the project and suggested mitigations

- The community were unanimous that there will be no serious negative environmental impacts resulting from the irrigation scheme construction activity.
- However, some minimal environmental degradation as a result of selective bush cutting and thinning might occur while opening the area for excavating the pan
- There will be removal of selected vegetation creating open spaces that would be used for pasture development,
- However the removed vegetation would be mitigated by planting palatable forage for livestock which would still cover the soil around the embankments and catchment areas.
- Establishment irrigation management committee to coordinate access and utilization of water facilities
- Water from River Tana will be pumped using solar to the fields and the engineer has develop a design whereby water will flow by gravity through the canals to the field.

-
- On wildlife meance it as agreed that there will be a fencing line and if possible electric fence to keep off the wild animals

Min 4./ 15/6/2021: A.O.B

OWNERSHIP OF THE LAND TO BE OCCUPIED BY THIS PROJECT INVESTMENT?

The Community participants reaffirmed that the land belongs to the community and no individual person in the community could claim ownership of the land. The ESIA Expert then informed the community that they would be expected to put their names down to show that they were consulted and they agreed that they would have this project implemented in their area.

CONSENT

The Community members present agreed unanimously that project implementation should continue. They acknowledged that the entire community was not present at the meeting but they would inform them all that had been discussed and agreed during the meeting.

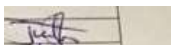
RESOLUTION

The NEMA Expert thanked the Community for giving consent for project implementation. He stated that the Community response to the ESIA exercise will go to the experts to facilitate issuance of other certification as the case may be.

CLOSING REMARKS

The County Project Coordinator thanked the participants for attending the meeting and informed that he will be available frequently during project implementation to monitor progress. He noted that success of the project depends on all stakeholders The Management Committee from the community must remain as a family and know that there will be maintenance cost.



There being no other business to discuss to discuss, the meeting was closed with a word of prayer at 2.30 pm.



Chairman Jomo Abagono

Tel 0723775843

11.1 ANNEX II LIST OF PARTICIPANTS

TANARIVER COUNTY GOVERNMENT
KENYA CLIMATE SMART AGRICULTURE PROJECT-TANARIVER COUNTY
ATTENDANCE SHEET

Activity ESIA FOR CONSTRUCTION OF ASAKO IRRIGATION SCHEME Date

S/N	Name	Gender (M/F)	Department/organization	ID NO	Tel.No	Signature
1	Jomo ABAGANA	M	ASAKO/ASITAK	5367227	0723775843	[Signature]
2	ABDI KAMPICHA	M	TIRMA FARM	5366434	0724132529	[Signature]
3	MOHAMMED OMANI	M	COMMUNITY MEMBER	28094663	0799083518	[Signature]
4	ABDULLAH KIONA	M	COMMUNITY MEMBER	5366290	0791310551	[Signature]
5	IBRAHIM GAYA	M	MEMBER	34757369	0113736538	[Signature]
6	HUSSEIN MUKANDIA	M	MEMBER	23667306	0702430548	[Signature]
7	ISMAIL M. ABAGANA	M	MEMBER	11888740	0704647039	[Signature]
8	ABUBAKAR KULONIG	M	MEMBER	36642781	0717071240	[Signature]
9	YUSUF HUSSEIN	M	MEMBER	11889892	0701743648	[Signature]
10	MOHAMMED ABDULLAH	M	ASAKO COMMUNITY REP	26300302	0708316989	[Signature]
11	YUSUF ATANO	M	MEMBER	23910842	0703910617	[Signature]
12	RUKIA FARIDA ABDULLAH	F	MEMBER	3583853	0726030764	[Signature]
13	Zainab Dekota Mbaraba	F	MEMBER	5366529	0707158154	[Signature]
14	Imalim Dila Juma	M	MEMBER	34772629	0746699965	[Signature]
15	Habiba Kone	F	SHAREHOLDER	20565045	0700674601	[Signature]
16	Faizuma Omani	F	SHAREHOLDER	26136736	0794979002	[Signature]
17	Mumina Juma ROBA	F	MEMBER	27969856	0741551370	[Signature]
18	IBRAHIM ABDIKHADIR	M	FARMER	27970012	0768356606	[Signature]

11.2 ANNEX III: PUBLIC CONSULTATION QUESTIONNAIRE.

ENVIRONMENTAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED CONSTRUCTION OF ASAKO SOLAR SMALL-SCALE IRRIGATION SCHEME IN ASAKO VILLAGE, MADOGO WARD, TANA NORTH -SUB COUNTY IN TANA RIVER COUNTY

County Project Coordinator (CPC), Kenya Climate Smart Agricultural Project (**KCSAP**), Ministry of Agriculture, Livestock and Fisheries. P.O. Box 10 - 70101 Tana River intends to establish an irrigation project under their Investment structures in Asako village in Tana River County.

To ensure that the project is implemented in an environmentally and social sound manner, the proponent the **County Project Coordinator (CPC)**, Kenya Climate Smart Agriculture Project (**CPC**) in consultation with EIA Lead expert is conducting an Environmental Impact Assessment_(**EIA**) for the proposed site.

The main objective of the **EIA** study is to identify key environmental, health, social and economic issues associated with the proposed project and establish appropriate mitigation measures for the negative impacts while enhancing the positive impacts.

Public Participation of interested and affected parties in the **EIA** is a requirement of the Environmental Management and Coordination Act, 1999.

In public and partnership participation, you have been identified as one of key informant. You are requested to document your views, opinions and concerns regarding the proposed irrigation project

This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study on the project and shall be treated confidential.

We appreciate your cooperation and thank you for your willingness to participate in this exercise.

Please return the completed questionnaire to the EIA/EA lead Expert.

Fredrick Aloo

Phone numbers: -

+254-726-589 117

E-mail address: -

fredrick.aloo@gmail.com

Address: -

P.O. BOX 34188-00100

NAIROBI – Kenya

11.3 ANNEX IV: SAMPLE QUESTIONNAIRE FILLED BY RESPONDENT

PROJECT: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR PROPOSED CONSTRUCTION OF ASAKO IRRIGATION SCHEME AND INFRASTRUCTURE WORKS IN ASAKO VILLAGE MADOGO WARD TANA NORTH SUB COUNTY TANA RIVER COUNTY

The Proponent County Government of Tana River: Department of Agriculture, Livestock & Fisheries and Cooperatives under. Kenya Climate Smart Agriculture Project (KCSAP) is proposing to develop Asako irrigation scheme in Asako village Madogo Ward Tana North Sub County with funding from the World Bank. The project is meant to assist local farmers improve agricultural productivity and enhance their resilience to climate change risk. The project will involve construction of a canal distribution boxes and paddles and a 100m diversion (to give room for construction works on the stream canal) In a bid to ensure safe and sustainable environment, the National Environmental Management Authority (NEMA) under EMCA (Amendment) of 2015 Section 58 requires that an Environmental Impact Assessment is done and public participation be undertaken to establish the views and concerns of the interested and/or affected stakeholder. Thus as a member of the local community/group/institution within/around the proposed project area we kindly request for your comments on the expected socio-economic and environmental impacts of the proposed project.

Your response will be treated with utmost confidentiality

Section A

Response details

Name	Institution/Organization	Telephone
Ismael M. LAMBUKA	LIVESTOCK PRODUCTION	0728241565

1. Gender

Male

Female

2. Age of the Respondent..... 46 years

3. For how long have you resided or worked in this area..... 11.....(years)

Section B

Human Natural Environmental Concerns

1. Are you aware of the proposed rehabilitation and expansion of Asako Irrigation scheme

Yes

No

2. Do you think the proposed rehabilitation and expansion of Asako Irrigation scheme and its activities pose any danger to the environment

Yes

No

If yes explain

..... N/A

3 Do you have any rejection/reservation on proposed rehabilitation and expansion of Asako Irrigation scheme

Yes

No

If yes explain

N/A

4 What do you think are the positive and negative socio economic and environmental impacts on the proposed project

Positive	Negative
<ul style="list-style-type: none">- Reduce Resource Constraints especially of livestock feed- Increase food security- Increased incomes to house holds- Mushrooming settlements and markets	<ul style="list-style-type: none">- Increased use of water- Waste of crop residues- Wild life menace elephants wild pigs dik dik- Use of pesticides- Hazardous to bees

5 Suggest mitigation measure for any negative impact that may result from implementing the project

- Value addition to crop residues
- Management & utilization of water
- Apply integrated Pest Management
- Do not apply chemicals on crops to allow bees to pollinate.
- Engage with KWS to control and fence off the area for wildlife

6 a) Do you anticipate any conflict or complain against proposed irrigation project with respect to:

- Land Yes No
If yes indicate.....
- Water Yes No
If yes indicate.....
- Public health and safety? Yes No
If yes indicate
- Loss of livelihood? Yes No
If yes indicate
- Cultural/heritage? Yes No
If yes indicate

Others

(b) If any in 6(a) above what are the mechanism to put in place to resolve the conflicts/complaints amicably

- Put in place a strong conflict resolution mechanism
-
-

7 On the whole, would you have any objections to the project being implemented?..NO


8 In which category do you fall? (tick where applicable: you can tick more than one box)

Neighbour resident Project official Stakeholder

Stakeholder Community leader/Member

Other Specify Extension officer.

PERSONAL INFORMATION

Signature..... 

Thank you for your cooperation

[Please provide these details for the purpose of authentication in this EIA study only]

11.4 ANNEX V: PHOTOS ON VISIT TO THE PROPOSED SITE



11.5 ANNEX VI : COMMUNITY MEMBERS FILLING INDIVIDUAL QUESTIONNAIRE CHECKLIST



11.6 ANNEX VI: SCREENING CHECKLIST

KCSAP Kenya Climate-Smart Agriculture Project

Completed by:

Position / Community: ISMAIL SOLOLA

Date: 12th May 2021

Field Appraisal Officer (CDE): [type here] EDWARD MENZA

Signature: *[Handwritten Signature]*

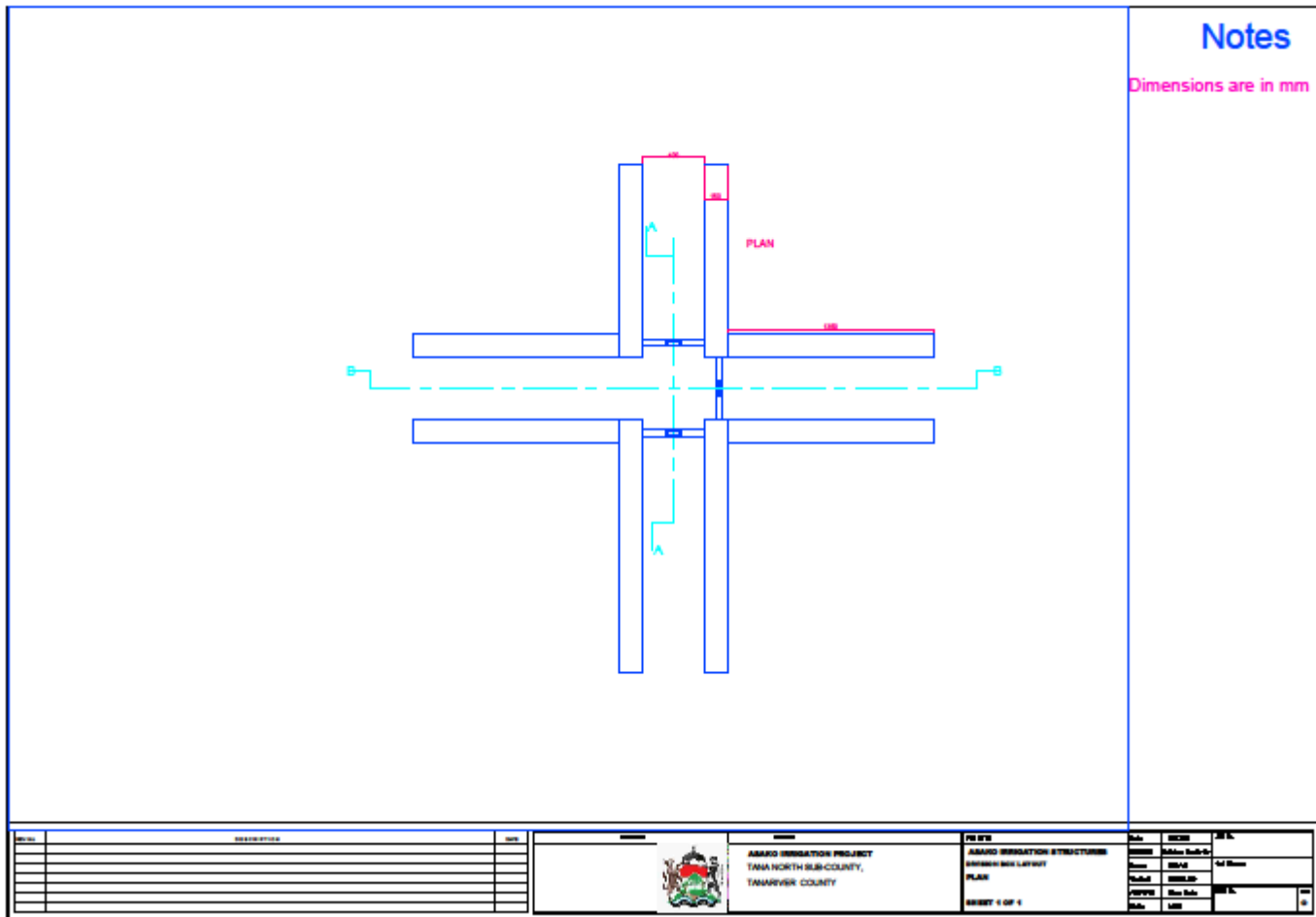


Date: 12th May 2021

RECOMMENDATION

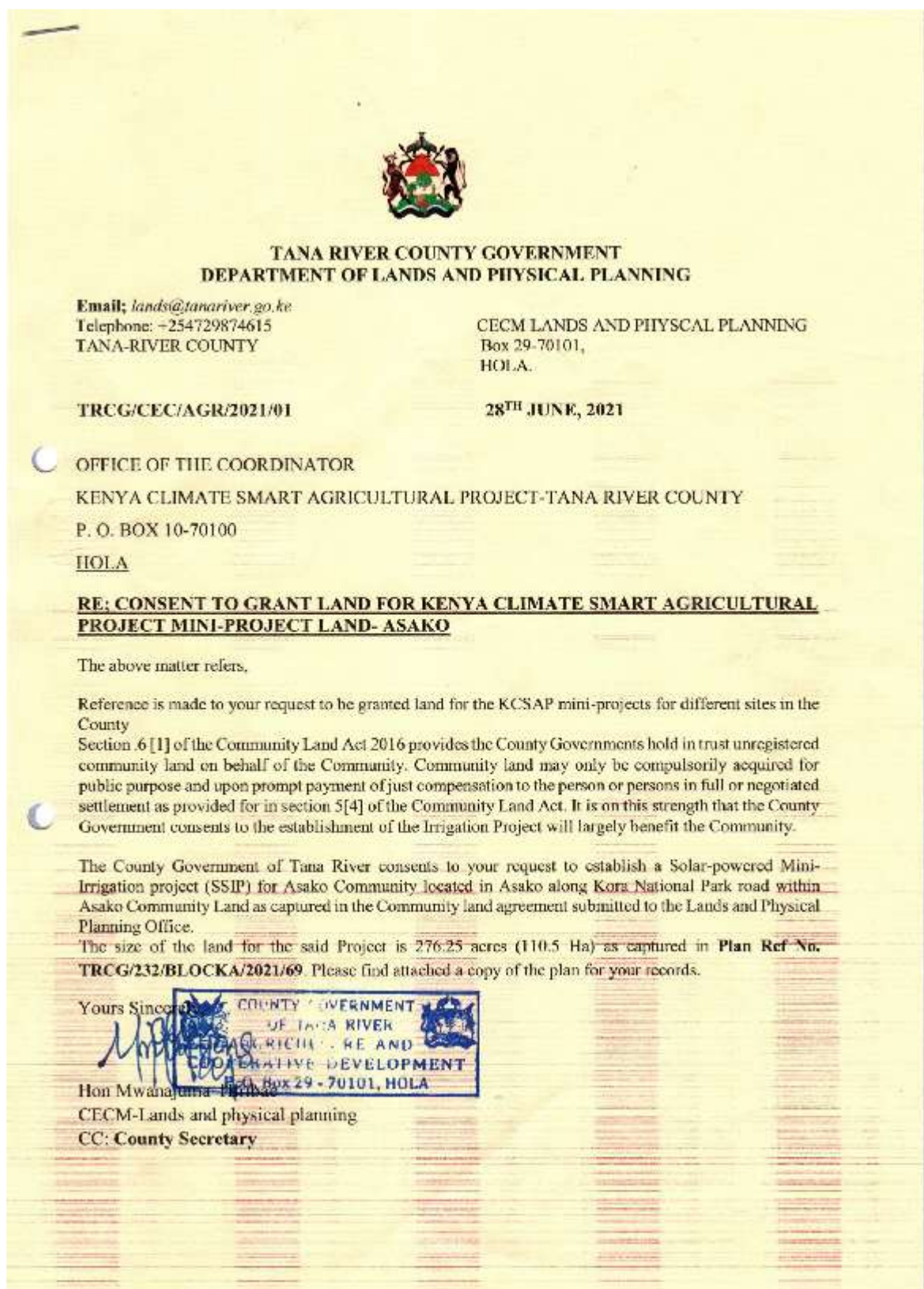
The project being medium risk as per legal notice 31 Section 2 (6a) of 2019, you are required to prepare and submit to NEMA a Comprehensive Environmental Impact Assessment Project Report.

11.7 ANNEX VII : IRRIGATION INFRASTRUCTURE DESIGN



11.6 ANNEX VII: COMMUNITY RESOLUTION AGREEMENT

A Resolution from the community for rehabilitation and expansion of the irrigation scheme on the Communal land





11.7 ANNEX VIII EIA CERTIFICATE AND PRACTISING LICENCE

FORM 7

(r.15(2))



**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT**

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTISING LICENCE

License No. : NEMA/EIA/ERPL/13629

Application Reference No: NEMA/EIA/EL/18097

M/S **FREDRICK ONYANGO ALOO**
(individual or firm) of address

P.O. Box 34188-00100, Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **9049**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: 1/5/2021

Expiry Date: 12/31/2021


Signature.....
(Seal)
Director General
The National Environment Management Authority

P.T.O.

