ENVIRONMENTAL IMPACT ASSSESSMENT PROJECT REPORT FOR THE

PROPOSED REHABILITATION OF ADHIRI WATER PAN IN SIAYA COUNTY

Declarations

I----------, on behalf of The Kenya Climate Smart Agriculture Project, submit this Environmental Impact Assessment (EIA) Project Report, for the Proposed desilting/rehabilitation of Adhiri water pan Project The EIA Project has been carried out in accordance with the Environmental ManagementCap 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003.

Signed at Nairobi on this

Signature

Designation: EIA/AUDIT LEAD EXPERT REG. NO

I, on behalf of Kenya Climate Smart Agriculture Project, submit this Environmental Impact Assessment (EIA) Project Report for the Proposed Construction of Adhiri water pan Project.

Signed at _____ this _____Day of _____2019

Signature _____

Designation: _____

Acronyms

EIA	Environmental Impact assessment
EMCA	Environmental Management Coordination Act
EMP	Environmental Management Plan
GOK	Government of Kenya
MM	Millimeters
NEMA	National Environment Management Authority
KCSAP	Kenya Climate Smart Agriculture Project
WHO	World Health Organization
WRMA	Water Resources Management Authority
WSB	Water Service Board
LVSWSB	Lake Victoria South Water Services Board

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EXECUTIVE SUMMARY

In the commitment to protect the environment and also recognizing the requirements of the government of Kenya on the fulfillment of environmental impact assessment and regulations, Kenya Climate Smart Agriculture Project (KCSAP), engaged experts in carrying out an environmental impact assessment report for proposed Adhiri water pan in Rarieda Sub-County..

The report presents the assessment findings in accordance with the environmental management and coordination CAP 387, Environmental (impact assessment and audit) regulations and the EIA and audit guidelines.The EIA Assessed the baseline environment condition and predicated the possible negative impacts and mitigation measures and an environmental management plan for the proposed project.

The objective of the Environmental Impact Assessment study is to ensure that sustainable development happens within the project implementation.

To adequately address the environmental issues emanating from the implementation of the proposed project, the team of experts carried out environmental and social screening for the project which was followed by the Environmental and Social Impact study. The latter comprised mobilization, liaison and stakeholders consultations, a scoping exercise, desk and field studies, data analysis, impact assessment, and analysis of health and safety issues associated with the proposed project.

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

The study findings show that the negative environmental impacts are minimal both in magnitude and scope. These impacts include: risk of spread of malaria and other water borne diseases and loss of vegetative cover. The potential negative impacts of the project are low and easy to mitigate, therefore they should not prevent the project from proceeding.

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

INTRODUCTION

This environmental impact assessment is carried on the behalf of Kenya Climate Smart Agriculture Project (KCSAP) .The KCSAP who is the proponent wish to desilt/rehabilitate a water pan at the site owned communally.

The proposed project objective is to provide water for domestic use as well as for livestock and Agriculture production

Project Objective

The objective of the project is to provide a water harvesting facility for the community members of approximately 5,000 Cubic meters at approximate cost of 8 miliion Kenya shillings.

EIA Objectives

KCSAP conducted this EIA in order to comply and fulfill health, safety and environmental standards ,the applicable laws and regulations in Kenya

Scope

The environmental impact assessment covered the proposed project site and to larger extent the catchment area for the Adhiri water pan

It focused on the following

1. Describing nature of the project ,location and rationale
2. Describing the pertinent policies, legislation regulation
3. Identification positive or negative environmental impacts of the project
4. Propose environmental mitigation plan to minimize those negative impacts
5. Conduct a public participation exercise during the process
6. Develop Environmental management plan (EMP)

Terms of Reference for EIA

This EIA was carried out in accordance with the stipulations of Legal Notice No. 101, the Environmental Impact Assessment and Audit Regulations; 2003.This is the Legislative supplement to the Environmental Management Coordination CAP 387 and was produced on June 13, 2003.

The analysis includes the following;

1. The collection of baseline socio economic data of the project area and potential impact expected from the project construction ,implementation, operation phase and decommissioning phases of the project
2. To review existing policy, legal and institutional framework and environmental management as relates to the water pan project
3. To identify and contact stakeholders ,plan and undertake stakeholders and public consultation at appropriate time and places

4. To conduct interviews through the community participatory process
5. To identify and analyze project alternatives in terms of siting technology and materials among variables that may be necessary
6. To develop mitigation measures and cost estimates from all the identified negative impacts of the project
7. To design an environmental and social management plan(including cost estimates) and a monitoring Project for the identified negative environmental and social impacts and describe how this plan shall be implemented (how, when, who ,where)
8. Review the water pan design and its compliance to national and international environmental requirements and standards.
9. To gather and provide any other data and information that will be useful or may be required for EIA by NEMA
10. To prepare 5 copies of EIA project and one soft copy (in CD Rom) for onward transmission to NEMA as provided for under EIA and EA regulations (2003)

Methodology and approach

over view

In executing the EIA the proposed project area and the surrounding catchment were assessed Literature review of the project site has been done and review of Environmental management and coordination act guidelines and related policies,various reports and reference material on physical and biological data have been consulted.

During the field investigations, pre-visit survey was conducted on the proposed site and the catchment area in order to have general overview of the project location, the community and other stakeholders. The foregoing groups gave valuable information through interviews and questionnaires administered during the public participation process.

Field work approach

The field work carried out was separated into three phases. This was to allow for systematic approach to predict the potential impacts and mitigation measures the phases included:

- Pre survey visit and desktop study
- Focused group discussions
- Questionnaire administration

Phase 1 pre-visit survey and desktop study

The survey was conducted within the proposed site and immediate catchment area and observations were made .The destop study involved literature review and study of past reports and baseline information.

Phase two: group discussions

The relevant stakeholders, beneficiaries , local administrators and opinion leaders held focused group discussion where they informed about the project by the proponent and their views on the possible impacts were collected with possible mitigation measures.

Phase three

A socio impact questionnaire was administered to the proponent , local administration and the beneficiaries to collect socio economic impact. A total of 20 questionares were issued

ENVIRONMENTAL BASELINE CONDITION

2.1 Background Information on the Project Area

The project is located on the boundary of Bondo and Rarieda Sub-Counties and hence it will benefit people from the two Sub-Counties. Rarieda Sub-County was curved out of the original Siaya District in 1998. In 2007 the Sub-County was further sub divided into Bondo and Rarieda Sub-Counties. The Sub-County borders Siaya and Busia Sub-Counties, and Suba Sub-County across the Lake on the South – East, to the West lies the Republic of Uganda. Rarieda Sub-County lies between latitude 0° 17'59''N and longitude 34° 17'49''and has a total area of 1,328. Km^2 of which 577 km^2 is land surface, while 751 km^2 is under Lake Victoria.

Rarieda Sub-County covers a total area of 644KM^2 of which 399.6 KM^2 is land surface and the remaining art is covered by L. Victoria

Photo 1 showing part of the existing Adhiri water pan

2.2 Topography

Topographically, the Sub-Counties are divided into scattered highlands and lowlands of Yala Swamp and Uyoma Plains. These result into differences in relief, soils and land use. These features give rise to altitudes ranging between 1140m and 1400m above the sea level. The oldest exposed volcanic rocks such as basalt, elite and ryolite cover the project area geologically. Others include intrusive of post Nyanzanian/preKavirondian age. In Uyoma Peninsula are found tertiary volcanoes consisting of the nephline lava agglomerates.

2.3 Climatic Conditions

The area has a modified equatorial climate with strong influence from local relief and the expansive lake, which influence rainfall amounts and distribution. Predominantly, the project area has warm, dry and humid climate with mean annual rainfall ranging between 800-1600 mm on bi-modal rainfall pattern of long rains occurring between March and May and short rains occurring between October and November. Temperatures too vary with mean of 22.5ºC and evaporation varies between 2000 mm and 2200 mm annually.

The months of March to September are considered to be the hottest whereas April to June are considerd to be the coldest months

2.4 Hydrological Systems

Despite bordering the largest fresh water lake in the region, the area often experiences water scarcity. The major water supplies in the area includes: Rarieda Water Supplies and South Sakwa, Olango-Akoko- beka- Nyangoma; Usigu- Wambasa and Penwa Water projects in rural areas. In addition, these water supplies are supplemented by shallow wells which include Magak, Midago and Rambogo shallow wells. Some of the existing water pans includes Kolango; Mabiju; Nyaera; Kothach; Kogola; Konyieng; Kodido; Ogenya; Kobom; Kobuoga; Heka; Tinga; Kochola; Apuodo; and Kotenga Water pans. There is still need for expansion of water supply systems in addition to desilting the existing dams like Ouya dam, Anyuongi, Gologolo, Aredo, Nyaguda, Kusura, Got abiero, Maranyona, East migwena, among others

The Yala River is also a major water source in the project area.

In Rarieda Sub-County, only 10% of the households have access to piped water while the latrine coverage stands at 45% which indicates the need for improved sanitation.

2.5 Geology and Soils

From the geological coverage, the soil types found range between black-cotton, sandy loams and laterites including red volcanic soils in the north.

The project covers 3 sub-counties have various soil types as highlighted below;

- Ferral sols
- Some areas have luvisols with low-moderate fertility
- Phaeozeous soils

2.6 Biological Diversity

2.5.1 Flora

Generally, the main vegetation types in the area includes dry woodland and savanna. The woody vegetation is dominated by *Acacia* sp.*, Albizzia* sp. and *Butytrospermum sp*., while *Cymbopogon*, *Hyparrhenia*, *Londetia*, *Cyperus* and *Papyrus* constitute herbaceous vegetation. The areas where the pipeline passes are characterised by scattered trees and shrubs, and herbaceous vegetation including several forbs, and grasses.The common tree types are Acacia spp, Catus and Euphorbia among others.

2.7 Infrastructure

The sector is comprised of the ministries of roads, transport, energy and housing. Others include, public works and the Kenya wildlife services (roads, airstrips other infrastructure).

On roads, the Rarieda Sub-County's main roads include the Ndori- Akala road which is tarmacked and transverses the entire Rarieda Sub-County. Most of the feeder roads are impassable during rain seasons and requires regular maintenance. Over the years, roads network has improved with the number of kilometres under tarmac.

The rural electrification is being accelerated and currently more than 12 shopping centres and 18 secondary schools are connected to electricity.

In Rarieda Sub-County, major markets and trading centres along the main road have been connected with electricity over the past few years under the rural electrification Project of the Sub-County. One of the recent power supply projects is power supply from Ndori to Luanda Kotieno through Asembo bay .However many places including the environs of Rarieda town need to be connected with electricity.

In terms of health infrastructure, Rarieda Sub-County has one Sub-Coutny hospital; Madiany Sub-County hospital. However the hospitals' infrastructure is not well developed to serve clients as expected. In general the Sub-County has about five health centres, 12 dispensaries and six private clinics.

2.8 Population

According to the 2008 projected population, Rarieda Sub-County has an estimated population of 144,631 people, where 68,800 are male and 75,831 are female

Rarieda Sub-County has witnessed a steady increase in population over the years. Densities are high in urban centres, shopping centres and beaches where there are considerable economic activities and better infrastructural development. The population density is 259 persons/ Km^2.

Rarieda Sub-County has an estimated population of 128,870 people with an average density of 323 persons per km^2.

2.9 Economic Activities

2.9.1 Agriculture and Livestock Production

Agriculture contributes 79% to the household incomes. The Agriculture sector is predominantly small scale in nature and it accounts for about 80% of the total Agriculture output. Production is carried out on

farms averaging 2-3 hectares mainly for subsistence purposes. Dominion farm is the only large scale farmer and is shared between Rarieda and Siaya Sub-County and grows the following crops: Paddy rice, cotton, sunflower, maize and sorghum. They also undertake beekeeping and fish farming.

The main food crops are maize, sorghum, beans, cassava and sweet potatoes. Where, maize and sorghum are the main staple foods. The main cash crop is cotton, which the ministry of agriculture has been trying to revive in the last 3 -4 years. Other cash crops like Amaranth and sunflower are also being grown in small scale.

Irrigation based farming is still very limited. The area under irrigation is about 106 Ha while irrigation potential is estimated at 1186 Ha mainly managed by registered groups doing horticultural farming along the lake shore and river Yala. The number of farmers doing irrigation both groups and individuals is minimal.

Farming in the area is hindered by a number of constrain such as low utilization of water and efficient water use technology. Others include high input cost, poor and long marketing chains, low level of mechanization and high transport costs.

Most livestock are local breed consisting of Zebu cattle, indigenous poultry, local goats and sheep. However, the population of exotic breed is steadily picking up as a result of increased extension services. The ability to fully exploit its potential in livestock production is seriously hampered by diseases brought about by ticks and tsetse flies or spread through livestock movement. Diseases such as East coast fever, trypanosomiasis and foot and mouth seriously limits livestock production, movement, trade and overall returns to investment in the livestock industry Unchecked keeping of livestock has resulted to overgrazing which has increased the loss of soil cover, through soil erosion.

2.9.2 Fishing

The area is endowed with a large water mass making fishing to be one of the major economic activities in the area. Fishing is an important source of food, employment and foreign exchange earner particularly in the lake region.However fish exploitation in the area is still low due to the use of inappropriate fish gears, exploitation by middlemen and lack of cooling facilities. The other problem that has affected fishing is the water hyacinth which has coverd most of the lake making fishing difficult.

However it's imperative to note that Over-fishing in breeding grounds in bays along the lakeshore and trawler fishing has negatively impacted on sustainable exploitation in the industry.

2.9.3 Trade and tourism

The Tourism sector is yet to be exploited to a large scale commercial sector. However, there has been considerable improvement in setting up hotel facilities due to increase demand for seminars and workshops in the area. Domestic tourism is also picking up well under management by County Councils and Kenya Wildlife Services. KWS has also been instrumental in promoting ecotourism.

Areas tourism potential include the vast lake Victoria shoreline, numerous island inhabited by hippos, crocodiles, water bucks, monkeys, monitor lizard, snakes and birds of various species like the crown bird and other crane species. Various tourism activities can be undertaken in Lake Victoria if fully exploited. These include; sport fishing, boating and cruising safaris. The numerous islands like Mageta,

Ndenda, and Oyamo can be used for camping safaris. The SUB-COUNTY lies within the south west tourist circuit, along with Ruma National Park in Homa-Bay and Ndere Island in Kisumu SUB-COUNTY. The cruising safaris could be formed to cater for tourists visiting Mageta, Oyamo, Ndeda and Sirigombi Island. Tourism activities can also be promoted in legendary sites such as Ramogi Hills, which is regarded as a pre-historic site explaining the origin of the Luo community.

2.10 Environmental management

Environmental management and conservation is still a challenge in the area as majority of the people directly rely on natural resources (land, water, forest reserves, sand and fishery) for their livelihoods. Overexploitation of these resources leads to their depletion and degradation of the environment. Most people employ bad farming and fishing practices that led to the degradation of the environment and the supporting natural resources. Excessive use of pesticides pollutes the environment, farming in wet lands, poor sand harvesting practices, continuous logging, and use of illegal fishing gears are some of the threats facing the environment in the Sub-County.

INSTITUTIONAL, POLICY AND LEGAL FRAMEWORK

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

Environment Management and Coordination CAP 387

The Environmental Management and Coordination Act (CAP 387) 1 is an Act of parliament that was enacted to ensure sound environmental management of our environment. This Act makes regulations that have lead to the establishment of the National Environmental Management Authority (NEMA) Kenya.

Every Kenyan according to the environmental management and coordination act CAP 387 is entitled to a clean and healthy environment and has the duty to safe guard and en hance the environment. The project falls in the 4th category of second schedule (58(1), (4)) of projects which require environmental impact assessment to be done .further section 58 of EMCA gives general guidelines in relation to the process which are:

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

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

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

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

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

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

(7) Environmental impact assessment shall be conducted in accordance with the environmental impact assessment regulations, guidelines and procedures issued under this Act.
(8) The Director-General shall respond to the applications for environmental impact assessment license within six months.
(9) Any person who upon submitting his application does not receive any communication from the Director-General within the stipulated time may within nine months of such submission start his undertaking

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

(a) Fails to submit a project report contrary to the requirements of section 58 of this Act;
(b) Fails to prepare an environmental impact assessment report in accordance with the requirements of this Act or regulations made thereunder;
(c) Fraudulently makes false statements in an environmental impact assessment report submitted under this Act or regulations made thereunder;

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

The Water Act 2002

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

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

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

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

The Agriculture Act 2015

The Agriculture Act CAP 387 of the Laws of Kenya seeks to promote and maintain a stable and sustainable agriculture, to provide for the conservation of the soil and its fertility and to stimulate the development of Agriculture land in accordance with the accepted practices of good land management and good husbandry. This Act primarily guides and regulates farming practices especially in relation to the proximity of farming within the riparian section. The Act specifies that no Agriculture activity is

allowed and or permitted within the riparian area of a wetland, river or Lake. The Agriculture Act is the principal landuse statute covering, *inter- alia,* soil conservation, and Agriculture land use in general.

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

The Forest Act 2015

The Forests Act, Cap 385 of the Laws of Kenya addresses reservation, protection, management, enforcement and utilisation of forests and forest resources on government land and provides for the establishment, control and regulation of Central Forests, forests and forest areas and on un-alienated Government land in Kenya. The Act, therefore, applies not only to state plantations and land controlled and managed by the Forestry Department for research purposes or for establishment of commercial timber plantations, but also areas which have been set aside for the conservation of fauna and flora, for the management of water catchment area, for the prevention of soil erosion or for the protection and management of indigenous forests on alienated Government land.

Public Health Act 242

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

This Act controls the activities of the project with regard to human health and ensures that the health of the surrounding community is not jeopardized by the activities of the project such as water development. The project can be a public health hazard as well as beneficial to the greater public health. A case example is of a water pan which can be breeding ground for mosquitoes and other water borne diseases and provision and protection of domestic water

The Land Planning Act

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

Physical Planning Act 2007

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

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

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

Any change of use of the actual development without authority constitutes an offence. Similarly, anyone who deposits refuse, scrap or waste materials in a designated area without the consent of the planning authority or the relevant local authority shall be guilty of an offence under the regulations. The general sentence under the regulations is a fine of not exceeding five thousand shillings or Imprisonment not exceeding six months, or to both, such fine and imprisonment.

Occupational safety and health act (OSHA) 2007

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

A)**Building operations and works of engineering implimentaion rules**

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

B) first aid rules

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

C) noise rules

The rules have established levels beyond which workers may not be exposed without protection.the noise prevevention and control rules are described in legal notice no 25 of kenya gazette suppliment no 22 of april 2005 and apply to every workplace ,premises place process and operations to which the provisions of the factories and othe palces of work act cap (514 applies).

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PROPOSED PROJECT

4.1 Overview

The objective of proposed rehabilitation/desilting of Adhiri water pan is to harvest water for domestic purposes. The approximate capacity of the ADHIRI water pan will be 5000 cubic meters.

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

4.2 The proposed project

The Adhiri water pan project will be managed and operated by AdhiriI community .The site has been allocated by the community members and registered as a community group, it has been in operation for sometime now but currently it is severely silted.

The Adhiri water pan components will consist of:

1. site survey and design
2. environmental impact assessment (EIA) survey
3. water pan excavation and pipe layout (draw off system)
4. fencing of the water pan
5. construction of cattle trough
6. Construction of sanitary facilities

Project budget

The total cost of the project will be approximately 11,231,384 million Kenya shillings.

ITEM NO	DESCRIPTION OF ACTIVITY	TOTAL AMOUNT
1.	Water Pan Construction & auxiliary structures	7,881,384
2.	Horticulture Production	1,962,000
3.	Catchment Protection	879,900
4.	Agro forestry	508,100
	Total	**11,231,384**

PROJECT ALTERNATIVES

Project Site

The project is to provide water to the community through rain water harvesting of surface runoff . During the inception period a meeting was held with Ogango village community members, to sensitize them about the proposed project to be implemented in the area.The process culminated in agreement to implement the proposed project as it will go a long way in benefiting all community members.

Technology: Water Pan Selection

Three types of gully - embankment water pans commonly used in Kenya are:homogeneous, zoned, and diaphragm. The water pan has been in use for sometime but due to siltation the capacity of the water pan has been so greatly reduced thus necessitating desilting. In desilting, either human labour or mechanical power or both can be utilized and the excarvated materialis to be placed on the leeward side such that the wind does not blow cuttings back into the pan.

It is also important to note that desilting will be done only up to the original depth so as not to interfere with the pan base which has been compacted earlier and thus increase seepage.

The water pan will also be provided with a cattle ramp with a stone riprap ramp access for livestock.The water pan will also be fenced and sanitation facilities (pit latrines and bathrooms provided).The water pan will be protected through planting of vegetation along the pan inlet and catchment areas to reduce soil erosion that increases sedimentation and render the pan maintenance uneconomical.

The water pan management committee will also be trained on their roles and responsibilties, sanitation, gender mainstreaming, conflict management and environmental management as well as operation and maintenance of the water pan.

5.3 No project Alternative

The no rehabilitation/desilting alternative would imply that the pan site be left in its present state. This decision is unacceptable because it would greatly affect development in this part of Kenya, as well impart negatively on water, sanitation and food security status in the project area. While the “no project construction’ alternative may ensure non-interference in the biodiversity, social conditions without the project will continue to be negatively impacted as a result of inaccessibility to water. It is important to note that the water pan is currently severely silted and a good part of it is covered by water weeds, hence is just a small portion of the water pan is available for use to draw water and or animals drinking.

PUBLIC CONSULTATIONS AND DISCLOSURE

Background

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

The Kenya government has enshrined the need for human societies' involvement in project development in the Constitution. This has been set out in the CAP 387 and Environmental (Impact and Audit) Regulations, 2003. Community consultation and participation ensures that communities and stakeholders are part and parcel of the proposed developments and in so doing assures the sustainable use of resources. It has also demonstrated successfully that projects that go through this process will acquire high level of acceptance and accrue benefits to a wider section of the society.

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

Objectives

The main objectives of the public consultation process were to:

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

Methodology

Public participation for the proposed Gozani water pan construction Project was conducted through questionnaires to allow for systematic understanding and interaction of the Potentially Affected Persons (PAP's) and the Proponents.

Over ten (20) questionnaires were issued to relevant line ministries, local administration and individuals whom the Consultant deemed were to be affected by the proposed development. These questionnaires are attached in the appendices for ease of reference.

A second stage whose findings are incorporated into this study involved holding of a Stakeholders public baraza on site. During the baraza, Stakeholders had a chance to interact with the proponent represented by the KCSAP Officer, relevant Ministries such as water. Presentation on project scope

was made, after which an open interaction forum followed during which all pertinient issues were raised and agreed upon with all stakeholders.

Consultation and Disclosure outputs

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

Consultations Beyond design stage

In order to ensure that the development runs smoothly, the consultations discussed here were structured to aid the completion of the Design and narrow down on key issues. These consultations should therefore be preceded by continuous engagement of various stakeholders under the following stages:

- Construction phase and reported through the Initial Environmental Audit; and
- Operation phases and reported through the Statutory Environmental Audit of the Project.

The consultation should ensure that community, and especially the donor of the land on which the water pan is to be located,commit to respect that the site where the water pan will stand shall be open to the public at all times.

Salient issues

Opinion on Project implementation

It is clear from the questionnaires received back that water is a key component of the residents. A sizeable number of residents admitted that they are interested in this project and in so doing pointed to the benefit that will accrue to them.

Health implications

Health issues were highlighted either as negative or positive. Negative in the sense that there could be increased incidents of water related diseases, introduction of mosquito larvae eating fish to the reservoir after construction was seen as the best method to mitigate the same.The project is viewed positively in the sense that with adequate water for domestic use and their livestock as the community is agro-pastoralist.

Anticipated impacts

As earlier mentioned, the current impacts identified are mainly related to water borne diseases. Positive impacts identified by stakeholders can be listed as follows:

- Adequate supply of water for household and livestock
- Improved household income levels
- Improved household food security and bettter nutritional status

- Employment creation for the youth and women

Some of the negative impacts identified include the following:

- Catchment erosion and siltation
- Encroachment into pan catchments
- Dust and air pollution
- Increased water borne diseases

Overall outcome of consultations

In the overall, the stakeholders considers this project positive and will like to see the implementation take off.

IMPACT IDENTIFICATION

Project Phase	Activities	Potential environmental attributes to be affected																		
		Physical				***Biological***		***Socio-economic***					***Infrastructure***							
		Land	*Climate*	*Water*	*Air*	*Fauna*	*Flora*	*Demography*	*Economic/ Employme*	*Welfare*	*Health*	*Culture*	*Energy*	*Water*	*Waste Managemn*	*Transport*	*Educaation*	*Housing*	*Telecom*	*Financial Implication*
Project Preparation	Location of project	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Surveying	Y	N	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	Y	N	N	N	Y
	Water pan site clearance	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N	N	N	Y
Construction	Excavate water pan site	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N	N	N	Y
	Transport borrow material to water pan site	Y	N	N	Y	Y	N	N	Y	Y	Y	Y	N	N	N	Y	N	N	N	Y
	Construct intake trench, water pan embankment and spill way	Y	N	Y	Y	N	N	N	Y	Y	Y	Y	N	N	N	N	N	N	N	Y
Operation phase	Draw off points for livestock	Y	N	Y	N	N	Y	N	Y	N	N	N	N	Y	Y	N	N	N	N	Y
	Draw off points for humans	Y	N	Y	N	N	Y	N	Y	N	N	N	N	Y	Y	N	N	N	N	Y

Table 0-1 showing impact identification matrix

IMPACTS PREDICTION: PROJECT LOCATION

Resettlement and compensation

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

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

The land on which Adhiri water pan is to be constructed including the ancillary water works was set aside by the local community and the water pan was constructed and since then it has been used for the benefit of all community members. . The community then set up a committee to be in charge which is registered by the ministry of social services as a CBO.

Impairment of historic and cultural sites

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

Catchment erosion and siltation

The Adhiri water pan catchment area is noted to have gentle slopes with sparsely distributed population. This has the potential to accelerate soil erosion and impose severe economic costs to the project if appropriate soil conservation measures are not included in the planning of the project. The fact that the water pan is being desilted is prove enough that soil erosion is a potential problem.This is considered to be a major and negative impact.

Soil erosition is the movement of top soil from one p[lace to anpother with either of the following agents water ,wind and animals,

Impacts on surface and groundwater hydrology

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

Inundation of mineral resources

The area to inundate does not have any identified mineral deposits. Thus no mitigation measures are proposed.

Debridement of Agriculture land and forests

The area to be used for the water pan was set aside by the local community for the construction. The area was demarcated indicating the area where settlement by the local community would not be permitted to safeguard the land for the intended purpose. There will be minimal loss of vegetation as the excavated material is disposed,being a significant impact, appropriate mitigations are proposed.

Health & Safety

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

- Introducing animal wastes directly through defecating and urinating and indirectly
- Accumulation of water in borrow pits pose health risks such as providing conducive habitat for disease vectors like malaria and other direct water borne infections,
- High risk to HIV/AIDS among the community as a result of social interactions with the contractors' workforce and other outsiders,
- Improved social and economic status of the served areas,
- Pollution of water sources from point sources as (cattle sprays, pit latrines, lack of sanitation)

Impacts Prediction: Construction Phase

Dust and noise pollution

During excavation and transportation of the borrow material there is bound to be emission of dust from the excavation sites and also from the vehicles transporting the borrow material.Similarly the equipment for excavation can generate considerable noise which could negatively affect the construction workers or people living near the excavation sites.These impacts are considered to be negative, major and temporary. Mitigation measures have been considered.

Workers' safety

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

Sanitation of construction camp

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

Impacts Prediction: Project Operations

Downstream erosion

When water is stored in a reservoir it leads to settling of suspended solids. When the same water is released from the reservoir it can cause considerable erosion of valley bank due to increased velocity of the surface flow. Adequate measures are therefore needed during the design stage to avert this situation.

Changes in water quality of the impounded reservoir

Storage of water in a reservoir alters its quality in proportion to the storage period. Due to photosynthesis water at the surface of such reservoirs will naturally exhibit algal growth whereas water at the bottom of the reservoir will be silt laden and anaerobic. Thus water for domestic use should be drawn from the reservoir at such a level as to avoid such conditions.

Introduction of disease vector problems

Standing water bodies such as reservoirs attract people to settle near by and provide the habitat and circumstances for water related problems. For the case of Adhiri water pan the commonly expected problems will be that of diseases related to mosquitoes and snails. These are considered to be major and negative impacts especially when it is noted that malaria and water related diseases are already the main ailments affecting the local community as pointed out in the socioeconomic survey. Mitigation measures have been considered.

IMPACTS EVALUATION

Source of impact	Impact description	Nature of Impact			
		Negative		Positive	
		Major	Minor	Major	Minor
Project Siting	Encroachment into forest reserve				Yes
	Catchment erosion and siltation		Yes		
	Encroachment into river catchments		Yes		
	Impacts on surface and groundwater Hydrology		Yes		

	Water use conflicts		Yes		
Construction	Enhanced erosion / changes in topography due to excavation		Yes		
	Increased water supply			Yes	
	Dust and noise pollution		Yes		
	Workers' safety		Yes		
	Sanitation of construction camp		Yes		
	Social pressure on local community		Yes		
Operation	Reduction in disease incidences such as those associated with use of water from contaminated shallow wells.			Yes	
	Regulation of flow of flooding downstream of pan				Yes
	Offer opportunity for fishing				Yes
	Provision of water for re-forestation activities			Yes	
	Introduction of disease vector problems	Yes			

Table 0-3, impact evaluation matrix

ENVIRONMENTAL MITIGATION MEASURES

Specific Mitigation Measures

The table below gives specific impact classification and mitigation measures

Impact	Impact Description	Nature of Impact		Proposed Mitigation Measures
Siting	Catchment siltation and erosion	Major		• Install silt traps in suitable locations • Distilting of silt traps when full.and this should be done before the rains • Integrated land use management involving all stakeholders to ensure catchment protection
	Encroachment into pan catchment	Major		• Encourage terracing to check soil erosion
	Impacts on surface and groundwater hydrology	Major		• involve local community in formation of water pan management committee with clear mandate of ensuring no encroachment takes place beyond pan area
Construction	Dust and noise pollution		Minor	• Ensure that emission levels of machinery are within permissible limits. • Ensure that there is no work at night
	Negative environmental effects from construction activities in the site (pollution from oil spills and solid waste and excreta)	Major		• Good site management including provision of on site sanitation facilities, disposal sites. Contract specifications to include these requirements
	Alterations in the flow of water and changes in water quality during the	Major		• Adequately divert the runoff away from construction areas

	construction of the water pan embankment			• Ensure good engineering practices
	Enhanced erosion / changes in topography due to excavation.			• Obtain earth fill from flooding zone. • Re-vegetate with native species • Fill borrow sites
	Social pressure on local community		Minor	• Enlighten personnel about STDs (HIV/AIDS) and use of condoms. • Help strengthen healthcare system • Strengthen basic facilities
	Downstream erosion		Minor	Provide stilling basin to check velocity of released water
	Changes in water quality of the impounded reservoir		Major	• Check upstream sanitation practices • Partner in enlightenment for increased environmental awareness in surrounding communities. • clear vegetation and remove it from area to be impounded
	Introduction of disease vector problems	Major		• Monitor the presence of disease vectors • Contribute to strengthening of local health facilities through public enlightenment • Contribute to public health Projects to eradicate / protect against malaria, schistosomiasis • Direct contributions in terms of drugs provision of infrastructure, etc. • Spillway ensures continuous flows, hence the likelihood of creation of habitats for bilharzias is remote
	Loss of scenery due to		Yes	Liaise with local community so that

	dumping of excavated material			excavated often fertile material can be put to good use

Table 0-1 impact classification and mitigation measures

ENVIRONMENTAL MONITORING & MANAGEMENT PLANS

Environmental monitoring is a key aspect of environmental management as it ensures a continuous or periodic follow-up on the identifiable environmental parameters both in quantity and or quality. To achieve the foregoing, a clear tabulation of all impacts, mitigations measures, those responsible and respective time frames are considered as follows:.

Environmental Management and Monitoring Plan for Proposed Adhiri water pan: Design & Preliminary Construction Phase						
Activities	**Potential Negative Impacts**	**Mitigation Measures**	**Responsible**	**Frequency/Timing**	**Cost**	**Verifiable Indicators**
1.Project Design Phase						
Planning, Surveying, EIA study,	Trampling on vegetation, lack of consensus towards the project between Stakeholders	Avoid unneccessary vegetation destruction, , intensify consultations	KCSAP , Department of water,surveyors and NEMA	Throughout project design stage, throughout the project cycle	As provided in the contract	Vegetation destroyed, project acceptability
2. Site Preparation Phase						
Excavation	Soil erosion	Compact the embarkment,proper design of the inelts,have soil conservation structures along the the run off channel,proper design of spillway,planting of grasses on	CPC,Contractor,Pan Managment committee	2 weeks	Provided in the project's cost	Incidences of haphazard vegetation clearing

		embarkment				
	Loss of biodiversity	Afforestration, Introduction new wetland species	KFS,Fisheries	Continous	Provided in the project's cost	
	Contarminatio n of soil	Ensure proper service for machinery, introduce oil collection bins whenever spillage is detected	Contractor	Contract period	Provided in the project's cost	
	Excessive noise and vibration from machinery	Carry out works during day time , Use protective gears	Contractor	Contract period	Provided in the project's cost	
	Acccidents and Injuries	Use of Personal Protetive Equipments(PPEs), Fence off the water pan area and introduce a gate and ensure control access, Project signboard	Contractor,Pan Management committee	Contract Period	Provided in the project's cost	
Constructio n of auxillary	Solid waste generated	Dispose waste at disgnated sites or engage NEMA licensed waste	Contractor and Pan Managment committee,CPS,Public	Contract Period	30,000	Number of accidents/incidence s recorded, number

works		collectors,re-use some of the solid wastes,have mobile toilets in place	Health			of technicians trained, number of warning signs installed and their intervals
	Excessive noise and vibration from machinery	Use of Personal Protetive Equipments(PPEs),Fence off the water pan area and introduce a gate and ensure control access,Project signboard	Contractor.Pan Managment Committee	Continuous	Provided in the project's cost	Incidences of fire occurrence
	Accidents and injuries		Contractor,Pan Managment Committee	Contract period	Provided in the project's cost	
Project Operation Phase	Water contarminatio n from use of agrochemicals	Promote intergrated pest managment,Promote organic farming,Promote safe use of agrochemicals	CPC,Pan Managment Committee	Continuous	Provided in the project's cost	
	Water pollution from toilet effluent	Use of biodigester for organic wastes,use of septic tank for inorganic – e.g waste waters from bathroom	CPC,Pan Managment Committee	Continuous	Provided in the project's cost	

	Contarminatio n of water by the users	Use of cattle troughs,Use of water kiosk,water testing and treatment,Train users on managment	CPC,Pan Managment Committee	Continuous	Provided in the project's cost,Water treatment to be done through partners	
	Siltation of the water pan	Train on pan maintanence,use score dams and silt traps ,revolving funds for pan maintaince	CPC,Pan Managemnt Committee,KFS	Continuous	Revolving fund s to come from water use charges/fees	
	Introduction of alien plant and animal species	Use of locally adapted environmental friendly plant and animal species,promote relevant use of alien plant species	CPC,KFS,Pan Managment Committee	Continuous	Provided in the project's cost	
	Vector borne diseases	Provision of long lasting treated mosquito nets,Introduction and stocking of the pan with with fish to prey on mosquito larvae,Rift Valley Fever vaccinations and routine spray on the livestock,Treatment of the	CPC,Public Health,Livestock,Veterina ry,Fisheries, Pan Managment Committee,Medical Health	Continuous	To be met through relevant stakeholders	

		affected				
	Water use conflict	Have grievance redress committee, Have Social Accountability Integrity Committee, Have different draw off point for the users Have a fence and gate Formalize the Pan Managment committee	CPC.Local adminitrators , Pan Managment Committee	Continuous		

EMP Framework: Operation Phase

Table 0-1 EMP operation phase

CONCLUSIONS AND RECOMMENDATIONS

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

To enhance the proposals in this report, all employees and contractors should comply with all Kenyan Regulatory requirements relating to the construction, operation and decommissioning of the water pan project and facilities.

Environmental management and monitoring programs will have to be conducted in full cooperation with local authorities. The rights and interests of local land owners, resource users, etc.must be respected.

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

Before excavation starts in pits, runoff control measures shall be designed to redirect surface runoff away from access routes and pit walls. Organic material, topsoil, and subsoil shall be stripped and piled separately adjacent to pits excavations for future site rehabilitation.To encourage revegetation, the organic layer will be separated from other overburden soils and replaced on pit slopes and bottoms after borrow material has been removed from sites designated for decommissioning.

Site clearing shall be minimized but will permit the safe and efficient movement of personnel,material and equipment, while allowing for excavation of materials. The contractor will have to institute erosion and dust control measures on site. Washing and maintenance of vehicles and equipment in the excavated area shall not be permitted. Signs will have to be erected to warn unauthorized personnel of safety hazards. Whenever possible, excavation sites for pits should be selected in areas where a minimum amount of overburden will need to be removed. Appropriate site drainage and erosion control measures shall be implemented for borrow sites which are no longer needed.Before commencement of the work, the Contractor shall provide KCSAP with their protocol for containment, transport and disposal of wastes. Hazardous materials will have to be stored within dedicated areas at work camps and marshalling yards in full compliance with regulatory requirements.

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

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Appendices

Photographs of community meeting

Minutes of public participation and consultation meetings

Questionnaires Used to collect data

Engineering Design and BoQs

photo Showing community members during public Baraza

photo showing part of community members during the public Baraza hearing