PROPOSED SAND HARVESTING IN LAKE VICTORIA, OFF CHWOYE BEACH, WANG'CHIENG' LOCATION, RACHUONYO NORTH SUB-COUNTY, HOMA BAY COUNTY.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT

Location:	LAKE VICTORIA, OFF CHWOYE BEACH, WANG'CHIENG' LOCATION, RACHUONYO NORTH SUB-COUNTY, HOMA BAY COUNTY.
Site GPS Coordinates:	LAT: 0^0 18'02.26"S, LONG: 34^0 45'06.48"E

PROPONENT:	***EIA CONSULTANT:***
County Concrete and Steel Ltd P O Box 19472 -40100 Kisumu 0722842180	George Adhoch EIA/EA Lead Expert NEMA Reg. No. 2356 P O Box 425 – 40100 Kisumu Tel: 0725237189

May, 2021

This Report has been prepared in accordance with the requirements of the National Sand Harvesting Guidelines, 2007, Environmental (Impact Assessment and Audit) Regulations, 2003 and Environmental Management and Co-ordination (Amendment) Act, 2015

Declarations

The EIA/EA Lead Expert

I, George Adhoch, do hereby submit this Environmental Impact Assessment Project Report, for the Proposed Sand Harvesting Activity in Lake Victoria, off Chwoye Beach, Wang'chieng' Location, Rachuonyo North Sub-County, Homa Bay County.

The project is covered under the Second Schedule of the EMCA 2015 (Amendment) Section 4 (a) and (c), and Section 7 (b), (d) and (e) all of which require that an ESIA be carried out to identify the environmental impacts, their significance and mitigation measures be proposed if any.

Due diligence has been observed in data collection, consultations and preparation of the report. The report was compiled without prejudice and is exclusively confidential. Apart from the NEMA and the Environmental Assessor, no other party shall have access to this report without the express permission of the proponent.

I certify that the particulars in this report are correct and righteous to the best of my knowledge.

GEORGE O. ADHOCH
EIA / EA LEAD EXPERT
NEMA REG NO. 2356
TEL: 0725 237189

Date 21/05/2021

Signature: _____

NEMA Registration No.....2356

The Project Proponent

I, ANTONY OMIMO hereby submit this Environmental Impact Assessment Project Report for the Proposed Sand Harvesting in Lake Victoria, Off Chwoye Beach, Wang'chieng' Location, Rachuonyo North Sub-County, Homa Bay County.

Date 24/05/2021

Signature _____

Designation: DIRECTOR

Table of Contents

List of Tables

Acronyms

AIDS	Acquired Immunodeficiency Syndrome
EIA	Environmental Impact Assessment
ESIA	Environmental & Social Impact Assessment
EMCA	Environmental Management & Coordination Act
EMP	Environmental Management Plan
MOH	Ministry of Health
NEMA	National Environmental Management Authority
NSR	Noise Sensitive Receptors
PPE	Personal Protective Equipment
WHO	World Health Organization
WRA	Water Resources Authority

EXECUTIVE SUMMARY

Project Background and justification

County Concrete and Steel Ltd, herein referred to us the proponent, is interested in harvesting sand from the bottom of Lake Victoria, Off Chwoye Beach, Wang'chieng' Location, Rachuonyo North Sub-County, Homa Bay County.

Currently the mouth of Sondu-Miriu River is heavily filled with sand washed from upstream. The lake around Chwoye beach is therefore shallow with poor water quality, hence affecting the lives of fish and fishing opportunities. Lake bed is an important sources of quality sand for building and construction. The sand is washed from upstream by rivers which deposits them at the lake bed. The durability of river-borne coarser clastics and their sorting by fluvial action make them best suitable raw materials/ingredients for building constructions. The market demand for quality sand is high throughout the country for construction of infrastructure projects.

The proposed sand harvesting activity will be undertaken by use of a floating vessel that will scoop the sand, load in onto the vessel before transporting it to the shore. The harvested sand will be offloaded in an open leased yard at Chwoye beach via a conveyor belt. The harvested sand will be stored at the yard, sieved and sorted before sale to the construction industry. The proponent will construct an access road to the site to be used by trucks. A Lease Agreement will be made by the adjacent land owner for use of his parcel for storage of harvested sand.

Such an undertaking in an environment not commensurate with such an establishment calls for an Environmental Impact Assessment. This EIA study was undertaken pursuant Environmental (Impact Assessment and Audit) Regulations, 2003 and Environmental Management and Co-ordination (Amendment) Act, 2015 that requires all proposed development projects listed under Schedule II of the Act, to undergo an Environmental Impact Assessment Study to determine the potential adverse impacts of a project and thereby devise appropriate mitigation measures. In so doing, adverse impacts are attenuated while enhancing project benefits.

The proposed sand harvesting in Lake Victoria, off Chwoye Beach is categorized under High Risk Projects in Second Schedule of EMCA, and specifically. Environmental (Impact Assessment and Audit) regulations, 2019 Section 6 (i): *Harvesting of aggregate, sand, gravel, soil and clay, and exploration for the production of petroleum and minerals in any form;* Therefore the project undergoes a Comprehensive Environmental Impact Assessment.

Methodology

The EIA study carried out through desktop research, field visits, public meeting and consultations. The consultant conducted extensive literature review including information sourced from the internet, in relation to the proposed project. During field investigations, information on physical, ecological and socio-economic aspects of the project area and its environs were determined. Government documents on harvesting were also studied with a view to understanding the Government policy toward projects of this nature. This study

analysed the potential adverse impacts of the project in terms of the possible effect to the environment and on the interested and affected parties. The study looked at mainly the operational phase of the project.

To identify, predict, and analyse the various impacts that may emanate from the project, various study methods and tools were incorporated. These included checklists, matrices, and expert opinion and observations.

An in-depth analysis of public concerns from the interested and affected parties was undertaken and views incorporated in the development of the Environmental Management Plan. This involved holding meetings with relevant stakeholders and discussions and dialogue with the neighbours adjacent to Chwoye Beach as well as relevant lead agencies relevant to the proposed sand harvesting activity.

The stakeholders contacted for comments include: The office of the Director of Environment, Homa Bay County Government, Water Resources Authority, Kisii Sub-Regional Office, Kenya Marine and Fisheries Research Institute (KEMFRI), Kisumu office, Rachuonyo North Sub-County Fisheries Office, Deputy County Commissioner, Rachuonyo North Sub-County, and Local administration.

The consultants conducted two consecutive meeting at Chwoye Beach to discuss the proposed sand harvesting activity with the fishermen and the neighbouring communities. The meeting included representatives from the neighbouring beaches along the project area, namely: Alara, Dunga Koriang, Kisiege, Rakwaro, and Wi Kawere Beaches. The meetings were held on 27th August, 2020 and 3rd September, 2020 respectively. Attached in the annexes of this study report are copies of samples of administered questionnaires, lists of attendance and minutes of the meetings

Project Impacts

The main positive impacts of the proposed sand harvesting activity include but not limited to:

- Generation revenue to the County Government of Homa Bay and Kisumu,
- Provide employment to a number of youths in the area;
- Help in de-silting the heavily silted lake especially at the mouth of Sondu-Miriu River,
- To reduce the effects of lake water receding,
- Provide the much needed quality sand to the construction industry,
- Improvement of area infrastructure like the area access roads,
- Reduce perennial floods experienced in the area,
- The proposed harvesting will help in deepening the shallow part of the lake hence greatly improve water quality greatly improves which will also improve the lives of fish and fishing opportunities.

Conversely, the expected impacts during the sand harvesting activity include the following:

i. Noise during sand harvesting and transportation
ii. Possible pollution of the lake water
iii. It will cause turbidity in the lake water hence interfering with light penetration and

water quality and thereby affecting delivery of nutrients to ecosystems

iv. Interference and destruction of the habitat like that of the pelagic communities like *Rastrineobola argentea,* and the *zooplanktivorous haplochromines, Yssichromis laparogramma* and *Y. Fusiformis*
v. Disturbance of fish breeding grounds
vi. Public and occupational safety and health
vii. The sediment plumes can suffocate invertebrates, algae and fish.

However the above potentially adverse impacts identified are short term and minimal in nature and expected to occur during the operation phase but will be readily ameliorated through the following proposed mitigation measures;

- Beach maintenance through landscaping by planting of trees
- On air pollution due to dust, the report recommends dust suppression through wetting of roads used by the trucks;
- The proponent to put various measures to mitigate on effects relating to general workplace safety including availing appropriate PPEs.
- On HIV/AIDS and other communicable diseases, the report recommends on creating necessary awareness at community level, supply of anti-retrovirals and collaborating with other health agencies in combating the pandemic; The proponent will also adhere to the WHO and MOH Covid – 19 prevention guidelines.
- Establishing a frame work for liaising with residents; and
- Erection of a public information board on the service road; and Erection of appropriate road & warning signs.

An Environmental Management Plan (EMP) has been developed outlining the areas of impact and proposing measures to manage them sustainably.

Conclusion

An Environmental Management Plan (EMP) has been developed outlining the areas of impact and proposing measures to manage them sustainably. Overall, the project is environmentally feasible and sound with minimal potential negative impacts, which can be managed through incorporation of the appropriate mitigation measures included in this report.

CHAPTER ONE: INTRODUCTION

1.1 Background

The proponent, County Concrete and Steel Ltd, a registered company, has proposed to undertake sand harvesting in Lake Victoria, Off Chwoye Beach, Wang'chieng' Location, Rachuonyo North Sub-County, Homa Bay County. The proposed sand harvesting will be undertaken by a floating vessel which will deliver the harvested sand to the beach for sale. The loading of sand onto truck will be done manually by local residents. The Proponent targets the mouth of River Sondu-Miriu which has huge deposits of sand washed from upstream.

1.2 Background and Rationale for the EIA

This Summary Project Report was undertaken pursuant to the requirements stipulated by The Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019 that requires all proposed development projects listed under low and medium risks, to undergo an Environmental Impact Assessment Study to determine the potential adverse impacts of a project and thereby devising appropriate mitigation measures.

The proposed sand harvesting in Lake Victoria, off Chwoye Beach is categorized under High Risk Projects in Second Schedule of EMCA, and specifically. Environmental (Impact Assessment and Audit) regulations, 2019 Section 6 (i): *Harvesting of aggregate, sand, gravel, soil and clay, and exploration for the production of petroleum and minerals in any form;* Therefore the project undergoes a Comprehensive Environmental Impact Assessment.

An environmental management, mitigation and monitoring plan has been prepared to provide details of mitigation measures necessary to reduce impacts and minimize any additional adverse environmental impacts during the project implementation.

The Consultant prepared Terms of Reference (TOR) for the proposed Sand harvesting activity and was approved as attached in the Annexes of this study report.

1.3 Scope and Terms of Reference of the Study

1.3.1 Scope

Screening of the activities of the project focussed on identifying the project's activities significant environmental impacts. These included the sensitivity of the area, public health and safety; the possibility of uncertain unique or unknown risks; the possibility of having individually insignificant but cumulatively significant impacts; etc. Scoping also focussed on identifying the key issues of environmental concern encompassing the significance of policy, legal, technical, economic and social impacts of the project.

1.3.2 Terms of Reference

The terms of reference have been derived from the provisions of Environmental (Impact Assessment and Audit) Regulations, 2003 and include: -

i) Provision of baseline and background information;

ii) Project and site description;
iii) Identification of environmental impacts of the proposed sand harvesting activity and their level of significance;
iv) Impact of the project on existing infrastructure;
v) Stakeholder participation viz social survey of views from neighbours;
vi) Identification of possible conflicts;
vii) Suggest mitigation measures for identified negative impacts; and
viii) Prepare a comprehensive environmental management plan.

1.4 Output

The output of the study is the production of this Environmental Impact Assessment Project Report with recommendations for submission to NEMA for purposes of seeking NEMA approval.

1.5 Methodology

The general steps followed during the assessment were as follows:

1.5.1 Environmental Screening

This step was applied to determine whether an environmental impact assessment was required and what level of assessment was necessary. This was done in reference to requirements of The Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2015.

1.5.2 Environmental Scoping

The Scoping process helped narrow down onto the most critical issues requiring attention during the assessment. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects.

1.5.3 Desktop Review

Desktop work provided a detailed description of the project with respect to spatial coverage, preliminary design layout, magnitude, implementation schedules and costs as well as human resources. Relevant documents were reviewed to obtain information on the baseline information in general but specifically at the project site. This documentary review provided further understanding the proposed activity, land use, local micro-environmental conditions, data on demographic trends, land use practices, development strategies and plans (local and national) as well as the policy and legal documents among others. Others included area maps, relevant legislations, regulations and guidelines and standards.

1.5.4 Field Survey

Physical evaluation of the project area was carried out with specific focus on landform trends, land use patterns, biodiversity, natural resources, hydrology and climatic variations. This was also an evaluation of the current environmental status with respect to physical, biological and socio-cultural perspectives. It was a systematic field inspection backed with available documentation and direct interviews. Field evaluation was planned to enable determination of the exact physical environmental features to be affected within the

proximity of the project site. In addition to identifying the potential positive and negative impacts, field assessments contributed understanding the proposed activity to be undertaken. Observable environmental data was recorded and potential positive and adverse impacts identified on a preliminary scale.

1.5.5 Public and Stakeholders Engagement

Stakeholder engagement was undertaken in the neighbourhood of the project area especially Chwoye Beach fishermen community to capture the views and concerns of interested and affected parties. The engagement process entailed public meetings/interviews. Public consultations were undertaken through open-ended questionnaires administered to interested and affected parties (IAP) mainly the fishermen operating in the beaches in the project area. The consultations were meant to give an indication of whether the proposed sand harvesting activity is welcome, and the perceptions held by the IAP on the Project.

The stakeholders contacted for comments include: The office of the Director of Environment, Homa Bay County Government, Water Resources Authority, Kisii Sub-Regional Office, Kenya Marine and Fisheries Research Institute (KEMFRI), Kisumu office, Rachuonyo North Sub-County Fisheries Office, Deputy County Commissioner, Rachuonyo North Sub-County, and Local administration.

The consultants conducted two consecutive meeting at Chwoye Beach to discuss the proposed sand harvesting activity with the fishermen and the neighbouring communities. The meeting included representatives from the neighbouring beaches along the project area, namely: Alara, Dunga Koriang, Kisiege, Rakwaro, and Wi Kawere Beaches. The meetings were held on 27th August, 2020 and 3rd September, 2020 respectively. Attached in the annexes of this study report are copies of samples of administered questionnaires, lists of attendance and minutes of the meetings

1.5.6 Reporting and documentation

This Environmental Impact Assessment project report was then prepared by approved and registered (by NEMA under reg. no. 2356) EIA/EA expert, who is familiar with the provisions of the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019 and other relevant regulations and laws of Kenya as indicated in the Legal framework. The contents were presented for submission to NEMA as required by law.

CHAPTER TWO: PROJECT DESCRIPTION

2.1 Project Site Location

The Proponent targets an area in Lake Victoria heavily silted with sand that washed from upstream into the lake by Sondu-Miriu River. The proposed site is 100m off Chwoye Beach, Wang'chieng' Location, Rachuonyo North Sub-County, Homa Bay County. River Sondu Miriu separates Homa Bay and Kisumu Counties.

Satellite image of the project area

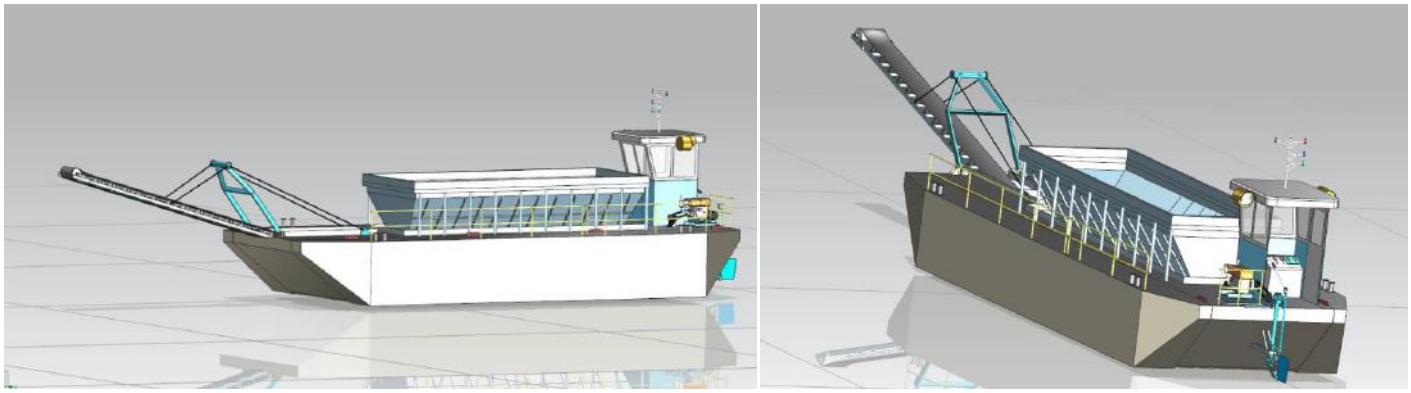
2.2 Project Description

The proponent intends to mechanically harvest the sand in the lake using a floating vessel on which the harvested sand will be loaded. The harvested sand will then be transported to Chwoye Beach where it will be offloaded using a conveyor belt before sale to the construction industry.

2.3 Project Execution

The proponent will lease a private land within Chwoye Beach area for offloading of the harvested sand. The Proponent will construct a temporary office structure and sanitary facilities at the site. The proponent will procure a floating vessel for harvesting the sand and transportation to the shore before sale. The proponent will operate in a designated area of 500m by 500m only. A temporary structure will be built on site to serve as a site office. The proponent will maintain access road connecting Chwoye Beach and Kobala centre for ease of transport of the material.

The sand will be sieved on site and fine materials sold to clients. Coarse materials and pebbles will be used in making blocks on site also for sale to the construction industry.



Sketch of a vessel to be used in sand harvesting

Sample vessel that the Proponent intends to use in sand harvesting.

2.4 Goal of the Project

To harvest sand washed into the lake by River Sondu-Miriu for sale in the construction and building industry.

2.5 Status of the Chwoye Beach

Chwoye Beach has intact vegetation comprising reeds, Hippo grass and other wetland vegetation, which offer protection to the beach. Due to excess siltation, the lake has been receding and claiming parts of the beach.

2.6 National sand harvesting guidelines, 2007

The proponent will adhere to the National Sand Harvesting Guidelines by:

a) Operations to be undertaken at designated sand harvesting site;
b) Lorries will use designated access roads only to sand offloading site at the beach;
c) Designated sand harvesting site and storage area are rehabilitated appropriately by the Water Resource Management Association, County Government and the Proponent under close monitoring and supervision by the Technical Sand Harvesting Committee in compliance with EMCA, 1999;
d) Sand harvesting or scooping is restricted to the lake bed with no harvesting allowed on the lake shore to avoid erosion;
e) The requirements of an environmental impact assessment/environmental audit pursuant to the Environmental Management and Co-ordination Act No. 8 of 1999 will be fulfilled.
f) Sand harvesting from the lake shall be undertaken in a way that ensures adequate reserve of the sand is retained to ensure pelagic species survival.
g) Loading of sand will be done in the designated site through controlled access points.

2.7 Proposed Environmental Protection Interventions by the Proponent

Sand is an important mineral for the construction industry in the Kenyan society at large. However, protecting the environment in areas where this practice of sand mining takes place has become an environmental concern given that the demand for sand increases with the growth of industry and construction. Sand mining can lead to considerable environmental damage.

During the sand harvesting activity, the proponent has committed to engage in activities the will help in restoring the lake ecosystem and the River Sondu-Miriu which delivers sand to the lake. The Proponent will engage in planting environmental friendly trees within the project area. A tree nursery shall be established by the Proponent to help in production of tree seedling.

As part of the project implementation, the Proponent will engage in activities that will restore the already degraded environment especially the access road form Kobala Centre to Chwoye Beach.

2.8 Justification for the Proposed Sand Harvesting Activity

Sand harvesting is a worldwide activity as it is important for the development of the economy because from this constructions are made for example building bridges and, roads. The demand for sand as a resource has increased because of the rapid development brought about by the county governments which require sand for construction. In the developing world, the focus is mainly on the product sand which is at risk of being depleted as well as destroying the riparian ecosystem.

There is no adequate monitoring programs in Kenya to safeguard this. This assessment therefore seeks to establish the impact of sand harvesting in Lake Victoria especially the area around Chwoye Beach and propose mitigation measures. This in turn, will ensure sustainable use of these resources.

Sand is always deposited at the bottom of the lake making it more shallow thereby causing floods during heavy down pours and receding of lake waters. The proposed sand harvesting activity once approved will enable the youth to engage in it thereby generating incomes.

Sustainable extraction of sand in theory, should be sustainable if the quantity of material extracted is within the volume 'replenished' by the system, and sufficient sand and gravel remains in the system to maintain lake beds environment.

2.7.1 Socio- Economic and Biological Impacts of Sand Harvesting

Water bodies act as a source of food and habitat for animals and are destroyed when sand harvesting is not carried out responsibly. All species require specific habitat conditions to ensure long-term survival.

Sand harvesting on the physical environment may cause: downstream changes in patterns of deposition, and changes in lake bed and habitat type. Sand harvesting generates extra vehicle traffic, which negatively impairs the environment. If not monitored well, sand harvesting may lead to school dropout among youths.

Table 1: Photo log

PHOTO LOG	
Water Hyacinth at Chwoye Beach. Notice the Cattle egret *(Bubulcus ibis)* in the background	

Flooding at Chwoye Beach as a result of receding lake waters	
The wetland ecosystem in the project area. Notice the Papyrus (Cyperus *papyrus)*, Hamerkop (*Scopus umbretta),* Sacred ibis *(Threskiornis aethiopicus)*	

CHAPTER THREE: BASELINE INFORMATION

3.1 Introduction

The Proponent intends to harvest sand deposited in Lake Victoria off Chwoye Beach, Wang'chieng' Location, Rachuonyo North Sub-County, Homa Bay County. Homa Bay County lies between latitudes 0° 15 South and 0° 52 South, and between longitudes 34° East and 35° East. The County covers an estimated area of 4,760 km^2 constituting 2,696 km^2 of land area and the water surface covers an area of 2,064 km^2. The County is located in South Western Kenya along Lake Victoria where it boarders Kisumu and Siaya counties to the North, Kisii and Nyamira counties to the East, Migori County to the South and Lake Victoria. The county headquarters is located about 420 km from Nairobi.

3.2 Physiographic and Natural Conditions

This section briefly describes the physical and topographic features, ecological and climatic conditions in the County. The County has 16 islands, with unique fauna and flora and an impressive array of physiological features with great aesthetic value of nature. Because of its proximity to Lake Victoria, fishing is one of the main activities as well as agriculture.

3.2.1 Physical and Topographic Features

The county is divided into two main relief regions namely the lakeshore lowlands and the upland plateau. The lakeshore lowlands lie between 1,163 – 1,219 m above the sea level and comprise a narrow stretch bordering the Lake Victoria especially in the northern parts of the county. The upland plateau starts at 1,219 m above the sea level and has an undulating surface which has resulted from erosion of an ancient plain. It is characterized by residual highlands such as Gwassi and Ngorome hills in Suba, Gembe and Ruri Hills in Mbita, Wire Hills in Kasipul as well as Homa hills in Karachuonyo. Kodera forest in Kasipul and the Kanyamwa escarpment that runs along the borders of Ndhiwa and Mbita also form part of the upland plateau. To the west of the county lies the Lambwe Valley where Ruma National park is located.

The county is dissected by a number of rivers namely Awach Kibuon, Awach Tende, Maugo, Kuja, Rangwe and Riana rivers, most of which originates from Kisii and Nyamira counties. There are also several seasonal rivers and streams which originate from highlands within the county. The county has 16 islands, some with unique fauna and flora and an impressive array of physiographic features with great aesthetic value as well as breath-taking scenery and forested landscape particularly those around the islands and the coast of Lake Victoria and a peninsula like Sikri of Mbita sub-county.

3.2.2 Ecological Conditions

Agricultural activities in the County vary with the seven Agro-ecological Zones namely:

i) Upper Midland (UM1), coffee-tea-zone which occupies southern parts of Kasipul and KabondoKasipul sub-counties where tea and coffee are grown.

ii) Upper Midland (UM3), marginal coffee zone covers Gwassi hills of Suba sub-county. Maize, millet, pineapples, sorghum, sunflower and tomatoes grow well here.
iii) Upper Midland (UM4), sunflower-maize zone covers areas surrounding Gwassi hills of Suba as well as Ndhiwa and Nyarongi areas of Ndhiwa sub-county. It supports maize, soya beans and pineapples.
iv) Lower Midland (LM2), marginal sugar zone occupies parts of Ndhiwa, Homa Bay Town, Rangwe, Kasipul and the north of KabondoKasipul sub-counties. This zone supports green grams, millet, sorghum, tobacco, sunflower, sugarcane, beans, pineapples, sisal and groundnuts.
v) Lower midland (LM3), cotton zone occupies parts of Homa Bay Town and Rangwe sub-counties. It is suitable for growing maize, sorghum, cow peas, ground nuts, beans, soya, sweet potatoes, sunflower, simsim, green grams, rice and vegetables.
vi) Lower Midland (LM4), marginal cotton zone occupies a strip along west of Karachuonyo, central Mbita and Gwassi areas of Suba sub-county. It supports the growth of cotton.
vii) Lower Midland (LM5), livestock-millet zone occupies S.W. Suba, Rusinga and Mfangano islands, Lambwe Valley and Gembe and Kasgunga areas of Mbita sub-county. It supports livestock rearing and millet growing.

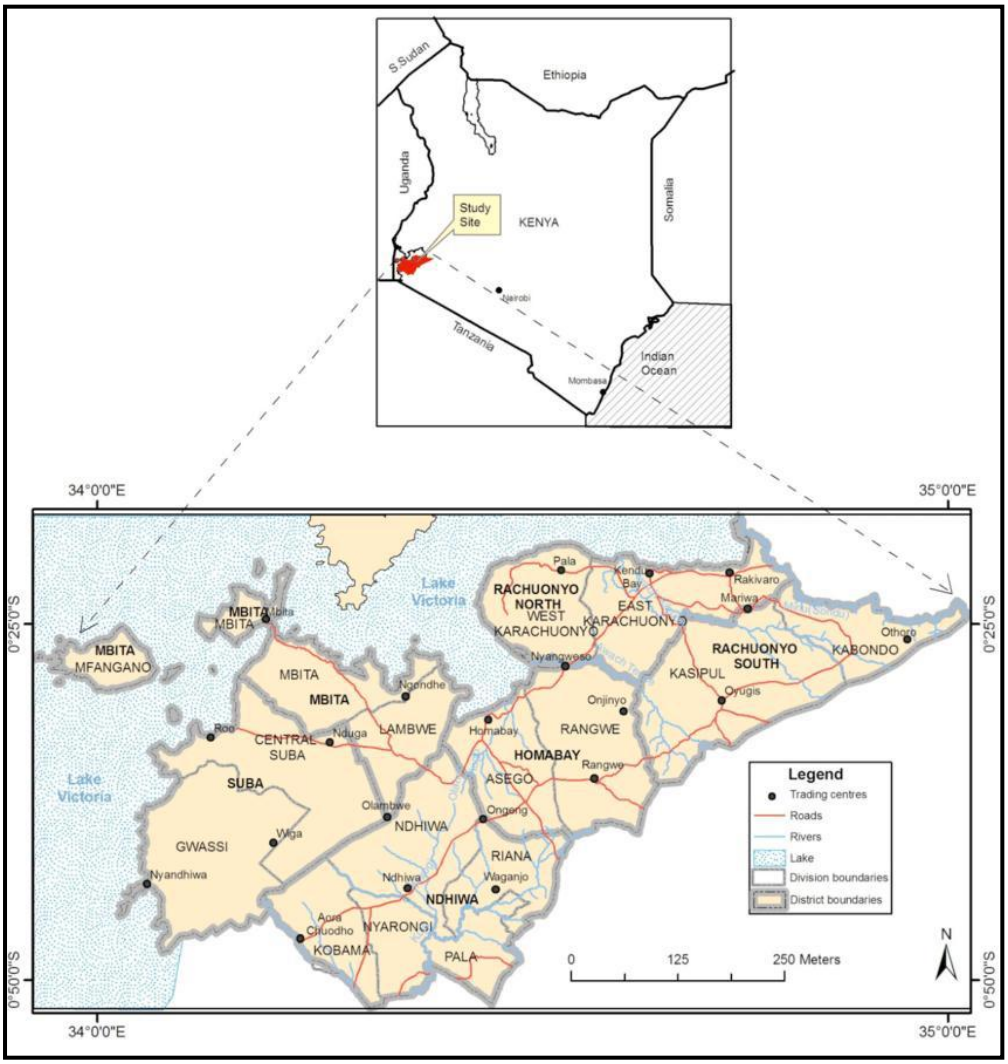
3.2.3 Climatic Conditions

Homa Bay County has an inland equatorial type of climate. The climate is however modified by the effects of altitude and nearness to the lake which makes temperatures lower than in equatorial climate. There are two rainy seasons namely the long rainy season from March to June and the short rainy season from August to November. The rainfall received in the long rainy season is 60 per cent reliable and ranges from 250 – 1000 mm while 500 –700 mm is received in the short rainy season. The county receives an annual rainfall ranging from 700 to 800mm.

Temperatures in the county ranges from 18.6°C to 17.1°C, with hot months being between December and March. February is usually the hottest month in the year. The temperatures are however lower in areas bordering Kisii and Nyamira highlands and higher in areas bordering the lake.

3.3 Administrative and political divisions

The county has eight constituencies/sub counties, 40 wards, 23 divisions, 140 locations and 265 sub locations. Karachuonyo North is one of the sub-counties in Homa Bay County. It also forms a constituency with six administrative wards, namely; West Karachunyo, North Karachuonyo, Central Kanyaluo, Kibiri, Wangchieng, and Kendu Bay Town.



Map of Homa Bay County showing the location of Rachuonyo North Sub-County

3.4 Population Profiles

Based on projections from the 2019 Kenya Population and Housing Census, Homa Bay County has an estimated population of 1,131,950 persons consisting of 536,187 males and 580,214 females. Among the eight sub-counties in the county, Ndhiwa has the highest projected population of 239,538 people by 2020 and 254,341 people by 2022. This is attributed to the existence of the Sukari industry existing in the sub county. To manage this high population there should be increased agricultural production for the sustainability of the Sukari industry.

Homa Bay Town on the other hand has the lowest projected population of 131,667 by 2020 and 139,804 people by 2022. Across all the constituencies, female population is higher than male population by an average margin of 4%.

Table 2: Wang'chieng' Location Population Profiles

		TOTAL	MALES	FEMALES	HOUSEHOLDS	AREA SQ.KM	DENSITY PERSONS/SQ KM
SUB-CONTY	RACHUONYO NORTH	178,686	85,409	93,273	41,809	435.4	410
LOCATION	WANG'CHIENG	17,513	8,376	9,137	4,051	37.4	469
SUB-LOCATIONS	KAJIEI	5,144	2,442	2,702	1,152	14.3	361
	KAMWALA	3,396	1,618	1,778	827	5.3	645
	KOBALA	5,009	2,381	2,628	1,093	12.4	402
	RAKWARO	3,964	1,935	2,029	979	5.4	734

Source: 2019 National Population Census

3.5 Water Resources

A large proportion of the community accesses water from unprotected spring and shallow wells shallow wells some of which dry up during the dry season. Some households and institutions practice rainwater harvesting though but due to small storage capacities, the water it is unreliable and prone to contamination. Surface water in the area, however, is highly contaminated from agricultural activities in the catchments of kisii and Nandi regions.

Other sources of water in the area include rainwater due to the flash rains that characterize the area because of the lake basin. However, the area residents have not fully exploited the opportunity since only a few rainwater-harvesting installations are observed. Rivers and shallow wells are the natural water sources in the area. In spite of these, clean water is still a challenge to the residents because of distance, reliability and quality. Water catchments areas are quite often encroached through human activities thus contributing heavily to environmental degradation.

3.6 Hydrology and Drainage

Lake Victoria forms the major water body in the project area. The project area has two prominent Rivers that drain into the nearby Lake Victoria. The area receives relatively low rainfall that is not evenly distributed. Ground infiltration of surface runoff also occurs along fractured zones to reappear later as springs poor surface drainage. The project area has well-drained loamy soils with no incidences of water logging. The project area has well drained sandy loamy soils with no incidences of water logging. The lake shore lowland is dominated by alluvial soils, mainly the sandy loam type which is well drained and suitable for cotton, sunflower, maize, beans, cow peas and vegetable production

3.7 Sanitation and Hygiene

The common mode of sanitation in this rural setting includes pit latrines. Every household has pit latrines within their premises. The pit latrines are shallow and some have varying seasonal water levels making it uncomfortable for use. Hygiene conditions, especially in

schools and household levels, are highly compromised by lack of clean water. Availability of water for efficient washing of hands, drinking and food preparation are among the key conduits to potential diseases outbreak that need to be addressed.

From observation within the study area, a number of households still lack sanitation facilities (latrines, toilets) due to poverty and presence of alternative defecating areas (bushes). This constitute one of the principal pathways for infection which can kill people once the human wastes are swept by running water into the water bodies. This is coupled to the notable long distance to health centers. Open defecation in the bushes poses a major risk to water quality and hence threat to public health in the areas with among infections being typhoid, cholera, diarrhea, hepatitis B, eye infections, skin diseases and other water borne diseases.

3.8 Waste Management

Being a rural set up, waste is not a major challenge. Solid waste from the project site will be handled by a licensed waste handler.

3.9 Geology and Soils

In the proposed project area, soils have a moderate to fertile soils for growing crops such as preferred crops in the county include maize, beans, sorghum, groundnuts, millet, cotton and cassava among many other minor crops. The rock formations within the area can be divided into three well defined groups, based on their relative age and lithology:

- Precambrian Intrusive -44%
- Pleistocene Sediments -22%
- Recent Deposits Sediments
- Precambrian Nyanzian systems

3.10 Biodiversity

3.10.1 Flora

Various types of natural vegetation are recognized in the area. Evergreen or semi evergreen tree bushes and grasses generally cover the hilly lands. The lowlands are mostly grassland with shrubs and often swampy and flood prone areas. The specific flora in the lake shore include reeds (*Phragmites sp*.), hippo grass (*Vossia cuspidata*), Papyrus *(Cyperus papyrus)* Common Cattail *Typha latifolia,* and Water Hyacinth (*Eichhornia crassipes)*

3.10.2 Fauna

The project area is endowed with several small mammals, avifauna, reptiles, fish, amphibians, insects, arthropods. A number of bird species could be observed at the lakeshore including: Heron (*Ardea spp)*, Hamerkop (*Scopus umbretta)*, Hadada ibis (*Bostrychia hagedash)*, Crested crane (*Balearica regulorum)* King fisher (*Ispidina lecontei)*, Cattle egret *(Bubulcus ibis)*

3.11 Climatic Conditions

The climate of the proposed project area is heavily influenced by its geographical location and altitude relative to Lake Victoria. The rainfall is heavy in two seasons of the year; that is March – May and October – December. The least rainfall received is in February and July.

Climatic condition is semi- arid and it has two rainy seasons. Long rains, between the months of March and May and short rains between September and November. Rachuonyo District experiences a humid sub-tropical warm climate with a mean annual precipitation varying from 800-1200mm. The mean annual temperature is about 22ºC while the maximum temperature is about 30ºC. Due to these high temperatures, the mean annual evaporation is relatively high approximately at about 1500mm.

3.12 Land and Settlements

The proposed project area is in an agricultural zone. Land is mainly used for food production and settlement. Due to the continued rise in population and decline in soil fertility there has been encroachment into wetlands to increase food production. This prompts the need for proper physical planning to enhance sustainable land use and environmental management.

3.13 Land Ownership and Land Use

Land is demarcated and owned under freehold systems. The lands have been divided to smaller portions with the increase population and demand for agricultural land. There is practice of subsistence farming and livestock. The community undertakes other economic activities to supplement income from Agriculture.

3.14 Crop, Livestock, Fish Production and Value addition

This section gives the main crops produced in the County, acreage under food and cash crop, main storage facility, livestock breeds and number of ranches available in the County.

3.14.1 Main Crops Produced

The main food crops produced in the county are maize, beans, green grams, sorghum, finger millet, kales, cassava, sweet potatoes and cow peas. The vast majority (80%) of the farmers produce maize and beans. This is because maize and beans are considered the staple food of the county. Cassava and sweet potatoes are the main county's insurance crops due to their resilience to adverse weather conditions. The main cash crops produced in the county are Sugar cane (Ndhiwa), Sunflower (Suba), Pineapples (Rangwe) and potatoes (Karachuonyo South and Karachuonyo East) and groundnuts (Homa Bay town, Rangwe, Ndhiwa, Karachuonyo South and North). There exists huge potential for cotton in Suba North, Homa Bay town, Rangwe, Ndhiwa and Karachuonyo North Sub-Counties. Coffee and tea are also marginally produced in the upper zones in the county.

3.14.2 Agriculture Extension Training Research and Information Service

Agriculture extension service is provided majorly by the County Department of Livestock, Fisheries, Agriculture and Food Security and to a small extent by the private sector. The county gets research services from Kenya Agriculture and Livestock Research Organization (KALRO) Opapo Sugar Research Station, ICIPE Mbita, Kenya Marine and Fisheries Research institute (KEMFRI) based in Kisumu and Kenya Agriculture and Livestock Research Organization Kisii. There has been an Agricultural Training Center that has since been converted into Tom Mboya University College. Self Help Africa through an NGO called Rheal Solution has established cassava multiplication sites in most of the sub counties. International Sweet Potato Center (CIP) has also established sweet potato multiplication sites in Rangwe, Kasipul and Kabondo Kasipul sub counties.

3.14.3 Main Livestock Breeds and Facilities

The main livestock breeds reared in Homa Bay county are: the east African zebu for meat, milk and draught power, meat and dairy goats, indigenous poultry, indigenous sheep and to some lesser extent dairy animals and few exotic poultry, donkeys, a few pigs, ducks and geese. Emerging livestock including quails and ostrich keeping is yet to be introduced in the county and has great potential. Livestock keeping is practiced in all parts of the County. Livestock production facilities in the county include: livestock auction yards in major livestock markets of Nyangweso, Rodi, Kipasi, Mbita, Sindo, Pala and Magunga, Oyugis, Ringa, Oriang and 2 slaughter houses one in Homa Bay and the other in Oyugis.

3.14.4 Main Fishing Activities

Two main commercial fish species in the County includes Nile perch (*L. Niloticus*) which accounts for 37,000 Metric tons annually and dagaa (*R. Argentae*) accounting for 34,000 metric tons annually. Production of Tilapia which is a local delicacy is still low and it is sourced through capture fisheries and fish farming. The fisher folk in the County are organized into Beach Management Units (BMUs) and the County has a total of 133 Beach Management Units (BMUs) which are distributed in 141 fish landing sites where active fishing activities are undertaken. Homa Bay County has a relatively long lake shore with less polluted inshore waters bordering Uganda. The County produces approximately 50% of the total fish production in Kenya's Lake Victoria.

3.15 Oil and other Mineral Resources

3.15.1 Mineral and Oil Potential

The geological structure of Homa Bay county favours the existence of minerals; Homa Bay has similar geological characteristics as Migori County where exploration has taken place and minerals such as gold, zinc among other minerals have been found. Investment will have to be made in exploring for these precious metals. Some potential also exists around the hot springs near Homa Hills where traces of precious minerals such as soda ash, iron ore and limestone have been noted. There is a prospect for oil exploration in Kobala and Lambwe.

3.15.2 Tourism and Wildlife

Homa Bay County sits in a prominent position to be a lead destination in the Western Tourism Circuit and is home to Ruma National Park which is the only park where unique and rare species like the roan antelope can be found. The county also hosts events and sites of mythical interest like the Tom Mboya Mausoleum, the Mfangano Rock Art, Oyugis Bird Sanctuary, Homa Hills Hot Spring and Simbi Nyaima. There are over 18 islands such as Rusinga and Mfangano, peninsulas and bays some with unique fauna and flora and an impressive array of physical features with great aesthetic value.

3.16 Major Industries

Homa Bay County has a limited presence of industries being home only to two fish processing industries in Homa Bay Town and Mbita Point, one sugar processing industry in Ndhiwa, an ice plant in Mbita Point that processes and packages drinking water and, an integrated industry in Kwethumbe (Suba) that processes forest products. The cotton processing ginnery in Homa Bay had collapsed due to market and technological challenges and with the introduction of cheap synthetic alternatives to cotton in the world market that made cotton farming unattractive to most farmers in the county. Effort is however being made by Cotton Development Authority (CoDA) to reintroduce cotton farming as a serious enterprise in the county particularly in Karachuonyo, Homa Bay Town, Ndhiwa and Rangwe sub-counties where great potential still exists. The county's cottage industry is still modest with about 6,400 artisans registered in 356 jua kali associations.

3.17 Forestry and Agro Forestry

Forest Conservation and Management Act no 34 of 2016 provides for the development and sustainable management, including conservation and rational utilization of all forest resources for the socioeconomic development of the country and for connected purposes. This Act gives the Kenya Forest Service mandates to conserve, protect and manage all public forests however, through the gazette supplement number 116 also specifies the functions of the county governments which is forestry including farm forestry extension services, forests and game reserves formerly managed by Local Authorities, excluding forests managed by Kenya Forest Service, National Water Towers Agency and private forests.

3.17.1 Main Forest Types and Sizes of Forests

Homa Bay County has two gazetted forests covering an area of 29.6 km^2. These forests are Gwassi and Wire Hills. The county also has eight non-gazetted forests covering an area of about 128 km^2. They are Ngorome Hills, Ruri Hill, Gembe Hills, Mfangano, Homa Hills, Asego Hill and Kodera Forest.

CHAPTER FOUR: POLICY, LEGAL ISSUES AND INSTITUTIONAL FRAMEWORK

4.1 An Overview

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

The government has long been concerned with environmental conservation and protection of human health. The Environmental Management provides the framework for sustainable management and protection of the environment and Coordination Act (1999). EMCA, 1999 was enacted to comprehensively address environmental issues, which were being governed differently by the various sectoral acts in place.

The EIA process is currently guided by the regulations promulgated in terms of the Environment (Impact Assessment and Audit) Regulation Act, 2003. The relevance of each of these acts to the proposed project is highlighted in this chapter.

4.2 Policy Provisions

4.2.1 Constitution of Kenya

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

(i) Equitable access to land
(ii) Security of land rights
(iii) Sustainable and productive management of land resources
(iv) Transparent and cost effective administration of land
(v) Sound conservation and protection of ecologically sensitive areas

4.2.2 Environmental Policy Framework

The National Environment Policy aims to provide a holistic framework to guide the Management of the environment and natural resources in Kenya. It further ensures that the linkage between the environment and poverty reduction is integrated in all government processes and institutions in order to facilitate and realize sustainable development at all levels. This is done in the context of green economy enhancing social inclusion, improving human welfare, creating opportunities for employment, and

maintaining the healthy functioning of ecosystem. The main goal of this Policy is "A better quality of life for present and future generations through sustainable management of the environment and natural resources". This would be achieved through among others promoting and supporting the use of innovative environmental management tools such as incentives, disincentives, total economic valuation, indicators of sustainable development, EIA Studies and Environmental Audit.

Kenya's environmental policy is geared towards sound environmental management for sustainable development. This is envisaged in the principle of prudent use, which requires that the present day usage should not "compromise the needs of the future generations". The policy aims at integrating environmental aspects into national development plans with the following broad objectives:

- Optimal use of natural land and water resources in improving the quality of human environment;
- Sustainable use of natural resources to meet the needs of the present generations while preserving their ability to meet the needs of future generations;
- Integration of environmental conservation and economic activities into the process of sustainable development; and
- Meet national goals and international obligations by conserving bio-diversity, arresting desertification, mitigating effects of disasters, protecting the ozone layer and maintaining an ecological balance on earth.

4.2.3 Kenya Vision 2030

Kenya Vision 2030 is the current national development blueprint for period 2008 to 2030 and was developed following on the successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation which saw the country's economy back on the path to rapid growth since 2002. Gross Domestic Product (GDP) growth rose from 0.6% to 7% in 2007, but dropped to between 1.7% and 1.8% in 2008 and 2009 respectively. The objective of the vision 2030 is to transform Kenya into a middle-income country with a consistent annual growth of 10 % by the year 2030". The 2030 goal for urban areas is to achieve "a well-housed population living in an environmentally-secure urban environment." This will be achieved by bringing basic infrastructure and services namely roads, street lights, water and sanitation facilities, storm water drains, footpaths, and others.

4.2.4 The Agricultural Policy

In Kenya the agricultural policy revolves around key areas of policy concern including increasing agricultural productivity, especially for small-holder farmers, emphasis on irrigation, encourage diversification into non-traditional agriculture commodities, enhancing food security, encourage private sector led development and ensure environmental sustainability.

The policy observes that droughts and floods have increased in frequency and intensity in the past three decades resulting in high crop failure and livestock death. Increased land degradation has decreased land resilience thereby exacerbating the effects of drought and

floods leading to devastating famine that has taken a toll on human and animal lives. Some of the famine experienced could have been avoided or their impacts significantly mitigated. Inadequate early warning systems, disaster unpreparedness, farming practices that are environmental unfriendly, destruction of rainfall catchment areas mostly as a result of human activities (settlement, farming).

4.3 Legal Framework

4.3.1 Environmental Management and Co-ordination Act (EMCA)

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

Section 87 sub-section 1 states that no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person, while section 88 provides for acquiring of a license for generation, transporting or operating waste disposal facility. According to section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste, shall apply to the NEMA for a license. Sections 90 through 100 outline more regulations on management of hazardous and toxic substances including oils, chemicals and pesticides

4.3.2 Environmental Management Regulations

Water Quality Management Regulations, 2006 (Legal Notice No. 120)

These regulations were drawn under section 147 of the Environmental Management and Coordination Act 1999. In accordance with the regulations, every person shall rephrain from acts that could directly or indirectly cause immediate or subsequent water pollution and no one should throw or cause to flow into water resources any materials such as to contaminate the water. The regulation also provides for protection of springs, streams and other water sources. This Regulation applies anytime there is a discharge of effluent into the environment without meeting the established standards. This requires all time compliance through the project cycle.

Waste Management Regulations, 2006 (Legal Notice No. 121)

The regulations are formed under sections 92 and 147 of the Environmental Management and Coordination Act, 1999. Under the regulations, a waste generator is defined as any person whose activities produces waste while waste management is the administration or operation used in handling, packaging, treatment, conditioning, storage and disposal of waste. The regulations requires a waste generator to collect, segregate and dispose each category of waste in such manners and facilities as provided by relevant authorities. Regarding transportation, licensed persons shall operate transportation vehicles approved by NEMA and will collect waste from designated areas and deliver to designated disposal sites. The Regulation will apply on disposal of solid wastes into the environmental without

complying with the established standards and procedures. The regulation requires all time compliance.

Noise and Excessive Vibration Pollution Control Regulations, 2009

Part II section 3(I) of these Regulations states that: no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment and section 3(2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual. Part II Section 4 also states that: except as otherwise provided in these Regulations, no person shall (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source. Effects of activities with noise and vibrations in excess of the established standards

Air Quality Regulations

Under the general prohibitions (Part II), section 5 states that no person shall act in a way that directly or indirectly causes immediate or subsequent air pollution. Among the prohibitions are priority air pollutants (as listed under schedule 2 of the regulations) that include general pollutants, mobile sources and green house gases.

Biodiversity Regulations

Part II of Regulations, section 4 states that no person shall engage in any activity that may have adverse impacts on ecosystems, lead to introduction of exotic species or lead to unsustainable use of natural resources without an EIA license. The regulation puts in place measures to control and regulate access and utilization of biological diversity that include among others banning and restricting access to threatened species for regeneration purposes. It also provides for protection of land, sea. Lake or river declared to be a protected natural environmental system in accordance to section 54 of EMCA, (Amendment 2015).

4.3.3 County Governments Act

The Act empowers county governments to protect the environment and natural resources with a view to establishing a durable and sustainable system of development. In addition, the county governments are responsible for development planning and control including the county spatial plans. The proponent will work in liaison with Homa Bay County Government to ensure compliance with land use requirements within the county.

4.3.4 The Water Act (2002)

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

Section 25 of the Act requires a permit to be obtained for among others any use of water from a water resources, discharge of a pollutant into any water resource. According to section 29 of the same Act, application for such a permit shall be subject to public consultation as well as an environmental impact assessment as per the Environmental Management and Coordination Act, 1999. The conditions of the permit may also be varied if the authority feels that the water so used is causing deterioration of water quality or causing shortage of water for other purposes that the authority may consider has priority. This is provided for under section 35 of the Act. The statute established to coordinate sustainable utilization of water resources including protection of the same from pollution and degradation (abstraction, use and disposal of wastewater thereof).

4.3.5 Water Resources Management Rules 2007

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

4.3.6 Agricultural Act

Part IV no. 48 states that if the Minister considers it necessary or expedient so to do for the purposes of the conservation of the soil of, or the prevention of the adverse effects of soil erosion on, any land, he may, with the concurrence of the Central Agricultural Board, make rules to ensure the preservation of the environment. These rules may include,

(i) Breaking or clearing of land for the purpose of cultivation is prohibited

(ii) Control, regulation or prohibition of grazing or watering animals,

(iii) With this prohibiting rules, the clearing or destruction of vegetation is deemed necessary by the minister for the preservation of soil and its fertility

4.3.7 Public Health Act Cap 242

This Act provides for 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 water users are not jeopardized by the activities of the project. The Act demands the adoption of practicable measures to prevent injurious and unhealthy conditions in the site. The Act requires the proponent to enhance effective management of nuisance i.e. noxious matter or wastewater as will be discharged from the proposed project throughout the project cycle.

Part IX section 115 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. Such nuisance or conditions are defined under

section 118 and include nuisances caused by accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

4.3.8 Forest Act

The Forest Act No7 of 2005 consolidates all forests under the act, and prescribes heavy penalties for damage to forests and trees. Charcoal burning in a forests or farmlands without a license or permit is an offence. Section 52(1) deals with felling, cutting, burning, injuring or removing of any forest produce only cover state, local authority or provisional forest. It sets heavy penalties for damaging trees. This will assist farmers in maximizing benefits from growing trees. Section 40(1) of the act sets to ensure that the forest areas under her management are maintained for biodiversity, cultural or recreational use. In addition it protects the concession area from destruction and encroachment by other persons.

Section 41(1) says that all indigenous forests and woodlands shall be managed on a sustainable Basis for purposes of, Conservation of water, soil and biodiversity, River line and shoreline protection. Cultural use and heritage. Recreation and tourism, Sustainable production of wood and non wood products, Carbon sequestration and other environmental services Education and research purpose and .Habitat for wildlife in terrestrial forests and fisheries in mangrove forests. The Act puts emphasis on the need to strengthen community-based institutions by creation of Community Forest Associations, which gives the public a greater participatory role to the community in the forest conservation.

4.3.9 Occupational Safety and Health Act 2007

This Act applies to all workplaces where any person is at work, whether temporarily or permanently. It provides for safety, health and welfare of persons employed and all persons lawfully present at workplaces. The duties and requirements of both the employer and the employee are clearly stated in the act.

4.3.10 Public Responsibility and Participation

Part XIII (Sections 140, 142, 143, and 145) of EMCA touches on Environmental Offences relating to standards, pollution, restoration orders, easements and conservation orders. These sections spell out penalties for the various categories of environmental offences and give the public powers (ref. Locus standi) to sue environmental offenders and /or seek redress through courts of law. Legal suits could be filled against individual offenders, bodies corporate, partnerships, principals or employers.

4.3.11 NEMA Compliance

The government established the National Environmental Management Authority (NEMA) as the supreme regulatory and advisory bodies on environmental management in Kenya under EMCA 1999. NEMA is charged with the responsibility of coordinating and supervising the various environmental management activities being undertaken by other statutory organs. NEMA also ensures that environmental management is integrated into development policies, programmes, plans and projects.

CHAPTER FIVE: ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of project, scale, and site.

5.1 The Main Alternative - Alternative 1

The main alternative described above is the proposed sand harvesting in Lake Victoria, off Chwoye Beach, Wang'chieng' Location, Rachuonyo North Sub-County, Homa Bay County. The proponent will harvest sand deposited at the bottom of the lake by River Sondu-Miriu using a floating vessel. The proponent is of the opinion that the harvesting the sand from the lake is one of the best options for making use of the sand which otherwise makes the lake silted.

5.2 No Project Alternative- Alternative 2

The No Project option in respect to the proposed project implies that the status quo will be maintained. This will mean that the proponent stops the proposed sand harvesting proposal. This would be an extreme option which would render the Proponent into poverty and unless there was justification, it is not an option. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- Cost of construction may be too high due to reduced supply of materials.
- The full economic potential of the washed sand will not be exploited.
- Poverty levels will remain high.
- No employment opportunities will be created for the community members
- The lake will become more and more shallower with sand deposits being washed in.
- The sediments will continue lowering the quality of the lake.

From the analysis above, it becomes apparent that the No Project alternative will be NO alternative to the proponent, investors, government agencies or the interests of the nation.

5.3 Analysis of alternative land uses – Alternative 3

Alternative 3 looks at different site use as opposed to the proposed sand harvesting. As stated elsewhere, the proponent will engage environmental management activities which include planting of trees and tree nursery establishment in the project area. The project implementation will ensure that soil erosion in the area is contained as well as riparian area erosion. The target area does not provide adequate fishing ground since the water is shallow due to sand deposits. Harvesting that will deepen the lake and improve the water quality for fish breeding and production.

5.4 Analysis of alternative Sites – Alternative 4

There were no alternative sites for the proponent to harvest sand in Lake Victoria. Quality sand for construction is believed to be deposited into the lake especially at the mouth of River Sondu-Miriu. Extraction of sand from the lake bed will involve scooping using a floating vessel and relaying via conveyor belt to holding area at the beach before sale. Best practice guidelines will be applied in compliance with sand harvesting regulations.

CHAPTER SIX: STAKEHOLDERS' CONSULTATIONS

6.1 Introduction

The Kenyan government has enshrined the need for human societies' involvement in project development in the constitution. This has been set out in Environmental (Impact Assessment and Audit) Regulations, 2003 which requires that community participation be part of ESIA. It has also been demonstrated that projects that go through this process will acquire high level of public acceptance and accrue benefits for 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.

In recognition to the ban of all public events and the requirement for social distancing by the government to minimize factors that may exacerbate the spread of COVID-19 disease, the public consultations were conducted as per the guidelines issued by the National Environment Management Authority, (NEMA).

The following measures were taken during public consultations with regard to prevention of the spread of COVID-19 and as per the guidelines issued by NEMA:

1. There was thorough consultation between ESIA experts and the project proponent which enabled choosing of most practical technique for various target stakeholder groups.
2. Social distance was observed throughout the public consultation exercises, and not physical contact was allowed.
3. Sanitizers were provided for use by the experts and the public during the consultation exercises.
4. Face masks we worn to reduce possible spread of COVID-19

6.2 Objectives of the Public consultation

The objective of the Consultation and Public Participation (CPP) as required in EMCA, Amendment 2015 was to:-

- Disseminate and inform the public and other stakeholders about the proposed sand harvesting activity in Lake Victoria with special reference to its key components, location, and anticipated impacts.
- Create awareness among the public on the need for the ESIA for the proposed project.
- Gather comments, concerns, and suggestions of the interested and, would be affected/interested parties.

- Ensure that the concerns of the interested and, would be affected/interested parties were known to the decision-making bodies and the proponent at an early phase of project development planning.
- Establish a communication channel between the interested, would be affected/interested parties, the team of consultants and the Government.
- Incorporate the information collected in the study by ESIA Expert.

The purpose for such a process was to identify the positive and negative impacts of the project and subsequently suggest mitigation measures. It also helped in identifying other miscellaneous issues which may bring conflicts during project implementation phase.

6.3 Approach and Stakeholder identification

During the study period, the ESIA team conducted visits to the project area in order to collect information on the biophysical and socio-economic environment.

Key informants included:

- Director of Environment, Homa Bay County Government,
- Water Resources Authority, Kisii Sub-Regional Office,
- Kenya Marine and Fisheries Research Institute (KEMFRI), Kisumu office,
- Rachuonyo North Sub-County Fisheries Office,
- Deputy County Commissioner, Rachuonyo North Sub-County, and
- Local administration and Village Elders.
- Beach Management Units (BMUs) and fishermen
- Mines and Geology department

The consultants made visits to the sites on diverse dates between 2nd August, 2020 and 30th September, 2020 to gather information from the relevant offices, organizations and project site. The Consultants organised two public meetings at the proposed project site which included the area Chief, Assistant Chief, Village Elders, Beach Management Officials and local residents. The public meetings were held on 27th August, 2020 and 3rd September, 2020 respectively. Open ended questionnaires were administered to key stakeholders and local residents in the project area. Copies of the administered questionnaires are attached in Annexes of this project report. The minutes of the public meeting and list of attendance are also attached at the annexes of this project report.

6.4 Salient issues raised

The following issues were raised from the public meeting and by the contacted stakeholders regarding the proposed sand harvesting activity.

Positive impacts

- Creation of employment, both direct and indirect
- Improved livelihoods and living standards in the area
- Reduction of floods
- It will boost the area development

- Provision of cheaper and quality construction material
- Revenue to county government
- Reduction of crime rate through engagement in employment
- Increased rural financial circulation
- Increased purchasing power of local communities
- Sand harvesting will reduce lake siltation, deepen the lake and improve lake water quality for fish breeding.

Negative impacts

- Safety risk to workers and local community
- Traffic inconvenience and accidents
- Habitat loss/interference with lake water biodiversity
- Human behavioural change – culture interactions
- Disturbance of normalcy
- Water pollution and turbidity
- Noise pollution during operation
- Destabilization of lake beds

6.1 Other Stakeholders Consulted

a) Director of Environment and Natural Resources, County Government of Homa Bay.

General Comments:

- The project will create jobs and avail raw materials for construction.
- Will interfere with aquatic life and create ecological imbalance
- Will lead to water and noise pollution

b) Water Resources Authority, Kisii Sub-regional office

General Comments:

- The project will improve livelihood within the community through job creation, increased fish stocks,
- No major foreseen net negative impacts that cannot be mitigated

c) Sub-County Fisheries Office

General Comments:

- The activity will help in job creation
- The project will open the heavily silted area for commercial transportation and fishing
- It will lead to destruction of fish breeding areas and other organisms.
- Limit the fishing area
- Influence in terms of character trains from new people coming in.

- Proper sensitization of the area residents.
- Feasibility study would bring out the community

d) Deputy County Commissioner, Rachuonyo North Sub-county

General Comments:

- The project will create direct and indirect employment
- Will help in providing affordable building materials.
- Reduction of flooding in the area after sand harvesting which will act as dredging/desilting.
- Destruction of breeding ground for some fish species
- It will affect the general ecosystem within the area

e) Kenya Marine and Fisheries Research Institute (KEMFRI)

General Comments:

- Disturbance of the bottom (sediment) has the potential of releasing pollutants/contaminants into the water column. Elevated levels of the contaminants might pose a health risk to the local community.
- Some tilapia species that depend on the sandy substrate for nest building might have their breeding behavior interfered with.
- There should be regular monitoring of the ecosystem.
- Provide water source for the community in the near term

To address the concerns raised during the public consultation exercise, the Proponent will undertake to ensure the following:

- The will be minimal pollution both to the water and the surrounding. The Machines used will be efficient and well maintained and therefore minimal noise will be produced.
- The Proponent has initiated an all inclusive public consultation exercise which includes all stakeholders and community.
- The Proponent is keen is listening and addressing all concerns for the interested and affected parties.
- The proponent will support local conservation initiatives and implement proper management of the surrounding beaches.
- The Proponent will engage the com munity and other stakeholders in forums to discuss project implementation progress and impacts arising from the works.
- The Proponent will work to restore disturbed areas
- Employment opportunities form the project will be given to the community as a first priority
- The proponent will strictly abide by the NEMA license conditions and Environmental Management Plan.

6.2 Analysis of the public consultation exercise

The overall conclusion from the public meeting and interviews with the local residents and key government officers led to determination of the following:

- If the EMP is adhered to, all the potential negative impacts will be addressed conclusively.
- The project is unlikely to have adverse effects to the environment if managed properly.
- The proposed project is acceptable to all the respondents and key government stakeholders.
- The proposed project will benefit the members of the community at large through boosting of the area economically and creation of jobs.

The consultant visited mines and geology department, Kisumu office on 10th September, 2020. It was, however, confirmed that the office is not concerned with approval of licensing of sand harvesting activities. That sand harvesting activity had been devolved.

6.3 Conclusion

The participation from the stakeholders, the public and neighbours were very successful and the participants were very cooperative. The stakeholders' views and opinions were incorporated in analyzing impacts and the development of the corrective action plan.

From the various public consultations undertaken by the EIA study team, it is obvious that the project is very welcome in the region. The public interviewed welcomed the proposed project and were optimistic that the project will create employment opportunities, stimulate the local economy by opening up sectors of business, and provide affordable building material to the local residents. There was no major negative issue raised as far as the sand harvesting activity is concerned. From the analyses, the Consultant concluded that there were no major negative public objections as far as the proposed project is concerned. Therefore the project is commendable for approval by NEMA.

Fist Public meeting at Chwoye Beach

Second public meeting at Chwoye Beach

Chwoye Beach Management Unit Chairman addressing the meeting

CHAPTER SEVEN: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

7.1 Impact Identification and Analysis

A development of this type and magnitude has the potential to impact on human health, existing infrastructure services and on the natural environment. Some of the impacts are unique to different stages of the project cycle from the site selection, preparation and construction to day to day operation and even decommissioning. It is for this reason that this project has been taken through an ESIA. The environmental impact assessment and analysis was done using a number of methods and tools. While identifying impacts, a checklist was used. This indicated all possible impacts that would accrue from implementation of this project. A weighted matrix was used to examine the level of impact for each particular impact.

7.2 Methodology

The impacts are examined under two categories i.e. negative environmental impacts and positive environmental impacts. The various impacts in these two categories are then examined in order of their level of importance and significance. They are also examined in categories of their time of occurrence (construction or operational phase). The following possible impacts were determined.

Table 3: Checklist identifying potential impacts from the project

Impacts generated	Project stage			
	Design	Construction	Operation	Decommissioning
Air				
pollution		-	-	-
increased noise		-	-	-
Soil				
soil loss		-	-	
compaction		-	-	
toxicity/contamination		-	-	
Bio-diversity				
loss of flora		-		
loss of fauna		-	-	
habitat alteration		-		
extinction of species				
Population				
health	+	+	+	
employment		+	+	
quality of life		+	+	
Infrastructure		-	+	
Security			+	
Water				
surface flow		-	+	
pollution		-	-	
Site drainage		-	+	
Others				
landscape		-	+	-
economy		+	+	-
aesthetics		-	+	-
Strain on existing infrastructure		-	-	-

- A symbol denoting negative impact

\+ A symbol denoting positive impact

The above checklist identifies potential impacts from the proposed projects' different phases

7.3 Significance Matrix

The weightings of significance within the table below range from 0-3 whereby 0 represents no significance; 1 represents low significance; 2 means there will be some significant effect; and 3 represents high environmental significance.

Seven (7) environmental attributes were considered against the project activities. A total score of 0-7 on any row will represent an activity with negligible or no significance. A score of 8-14 will represent activities with significant impacts that will require some intervention to avoid adverse impacts. Aspects ranging from 15-21 will have high significance and these would have detrimental effects on the environment if left unchecked. The matrix below conveys the negative impacts of the project activities against identified environmental attributes.

Table 4: Matrix showing significance of impact identified

Impact matrix	**Environmental Attributes**							
Weighting 0= not significant 1= low significance 2= significant 3= high significance	**flora**	**fauna**	**population**	**soil**	**air**	**hydrology**	**landscape**	**Totals**
Project Activities								
Design phase								
Planning and design	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Impact assessment	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Construction phase								
Ground clearing	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**6**
Excavation	**1**	**1**	**1**	**1**	**2**	**0**	**1**	**6**
Civil works	**1**	**1**	**1**	**2**	**1**	**0**	**1**	**7**
Materials transfer	**1**	**1**	**2**	**1**	**2**	**0**	**0**	**7**
Construction	**0**	**0**	**1**	**1**	**1**	**0**	**1**	**4**
Waste handling	**1**	**1**	**1**	**1**	**2**	**0**	**1**	**7**
Operation phase								
Residency	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Human movement	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**3**
Waste generation	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**12**
Traffic flow	**0**	**0**	**3**	**1**	**1**	**0**	**0**	**5**
Total	**8**	**8**	**13**	**10**	**11**	**1**	**6**	

The horizontal sum totals represent the significance level of the project activities on the environment. Not much emphasis will be placed on activities with low or no significance score that are less than 7.

The vertical totals depict environmentally sensitive environments. With 7 activities on each column, each attribute can have a maximum score of 21. The maximum score would represent a very sensitive attribute that will require some intervention to curb adverse

impacts. From the results of the table, it is obvious that there are few significant impacts of the project on the environment. There are however some positive impacts of the project with regard to economic gains, employment creation, market for goods, and housing provision.

7.4 Positive Impacts

The proposed sand harvesting activity is expected to bear a number of positive impacts to the surrounding community. The positive attributes have been discussed here below.

Revenue to the Government of Homa Bay

Value Added Tax (VAT) on construction materials/ tools to be purchased, among others will be sources of revenue for the county government and its institutions.

Employment

The area youth involved in the sand harvesting activity will earn incomes hence improved living standards general area economic development.

Improvement in the Aquatic Biology

The restoration of the lake depth will help in preserving aquatic biology. As a result there will be a gradual generation of all year round aquatic ecosystem in the lake thereby encouraging further development of relevant benthic fauna and flora.

Construction material

The sand collected from the lake is best preferred due to good quality. When sold out they help the construction industry and nation building.

The project will also require supply of construction materials most of which will be sourced locally within the project surrounding areas.

Economic growth

Through the use of locally available materials during the construction phase for example cement, steel metals and others; the project will contribute towards growth of the country‘s economy by contributing to the gross domestic product. The consumption of these materials, oil, fuel and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

7.5 Potential Negative Impacts

7.5.1 Soil Loss and compaction

(i) Harvesting sand from the lake will involve scooping of sand at the lake bed hence causing degradation.

(ii) Compaction will result due to movement of trucks coming for sand. Compaction has the undesired effect of hindering air and water penetration beneath the soil surface and thus limiting aerobic activities of soil dwelling organisms. This may have negative consequences on soil productivity on a localized scale.

Compaction also enhances run-off during the rainy season resulting into soil erosion.

Mitigation Measures

- Strictly control trucks to ensure that they operate judiciously and over designated areas to reduce soil compaction.
- Develop soil erosion management measures
- Develop tree planting Programmes
- Minimize clearance of existing natural vegetation at the at the site
- Re-establishing vegetation in whole or part of the disturbed areas

7.5.2 Habitat loss and disturbance of the lake bed

The sand harvesting activity will be carried out in Lake Victoria. This could have adverse negative impacts on the river riparian areas if not checked.

Mitigation Measures

- Conveyor belt to be used to channel sand to loading area hence less interference with the beach.
- The proponent will operate in a designated area of 500m by 500m only.
- Operations machine to be well maintained to produce minimal noise
- Disturbed areas to be rehabilitated immediately.
- There will be sustainable extraction of sand. The quantity harvested will be sustainable to ensure it is within the volume 'replenished' by the system.

7.5.3 Solid Wastes

Solid wastes will be in terms of human waste, food package materials from sand harvesters on site, truck drivers and loaders.

Mitigation Measures

The following mitigation options can be adopted;

- Any remaining waste should be safely burned and/or disposed in designated waste disposal areas,
- Sand harvesters to be encouraged to dump their personal wastes in designated covered dustbins
- The proponent to construct pit latrines for use by the workers.

7.5.4 Health and Safety Issues

The public and sand harvesters are also potentially exposed to risks of safety from the loading and offloading activities, access to the work areas by unauthorized members of public and potential road safety risks from trucks and vehicles accessing the site.

Mitigation Measures

The following mitigation measures are recommended to control effects of health and safety:

- Ensure appropriate road safety signage are strategically placed and drivers adhere to the requirements of such signage. This is to avoid accidents from trucks coming to the site.
- Erect speed breaks where human and vehicular traffic have high interaction opportunities;
- Provide appropriate barriers at the loading site to avoid injury from local people.
- The sites shall be isolated from unauthorised public.
- Involve the local people for enhanced ownership and management.

7.5.5 Spread of infections and diseases

Similar works places such as construction site it is anticipated, there will be social interaction either between workers themselves or workers and the neighbours/visitor to the site. These interactions may include having body contact with each other either through hand shake or sexual contact. These exposure if occur between infected individual and the project team may lead to spread of diseases and infections such as HIV/AIDS, COVID-19, TB, Cholera among other disease.

Mitigation Measures

- Workers should be provided with adequate sanitation facilities at the construction site
- High standard of hygiene should be maintained within the work site as well as maintaining social distance at work.
- Proponent to provide adequate clean and portal water to workers for drinking and construction work respectively.
- Proponent to provide hand wash basin/buckets, detergent and sanitizer for hand washing.
- The contractor should enforce strategies that ensure workplace overcrowding is minimised.
- Train workers on HIV and display of educational materials such charts
- Provide preventive and safe sexual measure to worker e.g. condoms
- Suspend construction work in case of severe outbreak of infection and spread in a work place and its neighbourhood.
- Strictly follow and adhere to government directives, policies, and regulation such as OSHA act, public health act among other act regarding to health.
- The Contractor will provide counselling and testing for HIV/AIDS to incoming construction personnel
- The Contractor will encourage the use of preventive measures like condoms by availing condom dispensers to construction staff

7.5.6 Potential Cultural Disruptions

There are no physical cultural and historical sites in direct interaction and/or conflict with the sand harvesting activity. However, the traditional lifestyles of the residents is notable as part of the diverse cultural spectrum of Kenya.

Mitigation measures

The contractor should sensitize all staff on local cultures and discuss with local community on the same.

7.5.7 Impact on Social Infrastructure

The proposed project is likely to interfere with the existing social facilities e. g access roads in the area.

Mitigation Measures

- Rehabilitate access road damaged due to heavy vehicle movement;
- Use warning sign especially when working in areas of high human and vehicle traffic.

7.5.8 Local traffic interruption

The local traffic in the sand transportation routes could be interrupted during the project operation period.

Mitigation measures

The proponent will observe traffic rules and install traffic warning signs where necessary.

CHAPTER EIGHT: ENVIRONMENTAL MANAGEMENT PLAN

8.1 Introduction

The Environmental and Social Management (ESMP) Plan is prepared to show how site-specific concerns and mitigation measures are addressed through the engineering, procurement, construction and operation phases of the project. It provides a link between the impacts of project activities and the mitigation measures put in place to minimize these impacts and enhance the positive impacts.

At completion of construction, the proponent will be responsible to implement environmental management measures associated with operation of the sand harvesting activity.

8.2 Responsibilities of the ESMP

In order to ensure the sound development and effective implementation of the ESMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organisations that will be involved in the project. The following entities shall be involved in the implementation of this ESMP:

- The Proponent, County Concrete and Steel Ltd
- County Government of Homa Bay;
- NEMA;
- Directorate of Occupational Safety and Health;
- Water Resources Authority; and
- The local administration.

8.2.1 The Proponent, County Concrete and Steel Ltd

County Concrete and Steel Ltd will be the implementing company to oversee or appoint a qualified and competent team to oversee the construction phases of the proposed development project.

The Proponent will be required to oversee the construction programme and construction activities performed by the Contractor, in compliance with the ESMP.

The Proponent shall co-ordinate all aspects of the environment during project implementation and operations. This should include the construction to monitor, review and verify the implementation of the project's ESMP.

8.2.2 County Government of Homa Bay

County Government of Homa Bay. Through the department of Environment, has mandate over some environmental management aspects including noise prevention, public health and sanitation.

8.2.3 Water Resources Authority (WRA)

WRA will be involved in the project through its issuance of project water rights.

8.2.4 NEMA

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

The project requires NEMA license and shall also liaise with NEMA in monitoring ESMP implementation as well as addressing any emerging environmental issues.

8.2.5 Directorate of Occupational Safety and Health

Directorate of Occupational Safety and Health (DOSH) will be responsible for registering the project site as a work station and subsequent enforcement of relevant provisions in occupational safety and health in line with occupational safety and Health Act, 2007.

8.2.6 The Local Administration

The relevant local administrators, including are chiefs, deputy county commissioner and county commissioner, shall be called upon where necessary during project implementation to provide the necessary advisory services and support to the project implementers.

8.3 Environmental and Social Management

An Environmental and Social Management Plan has been prepared to identify and sequence environmental activities that are needed in order to complete a required construction process.

Prior to commencement of sand harvesting activities, the contractor will be required to prepare his own construction and operational Environmental and Social Management Plan.

Tables below gives a summary of the Environmental and Social Management Plan during Construction, and operation phases of the project.

Table 5: Construction Environmental and Social Management Plan for the sand offloading/storage area

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Responsibility	Time Frame	Estimated Costs (KES)
Construction Phase –sand loading yard					
All construction activities	Occupational and community health and safety hazards	• Proponent should establish and implement a comprehensive Health and Safety Plan for the site; • The Proponent should ensure compliance with all standards and legally required health and safety regulations; • The Proponent shall establish an emergency response procedure and display on all work areas during sand harvesting activities; • The Proponent should provide a standard First Aid Kit at the site office at all times • Workers should be trained on site safety and regular safety briefs conducted; • Both workers and local communities must be sensitized on Covid 19 prevention measures in line with the government directives and workers provided with the requisite PPEs and sanitizers at their work station.	Contractor	During construction	50,000
Vegetation clearance, access road construction, trenching and movement of construction machines/vehicles	Soil Erosion and compaction	• The Proponent must implement erosion control measures to avoid erosion in areas that are prone to erosion; and • Vehicles must be restricted to the existing roads and areas earmarked for new tracks only; • Avoid unnecessary vehicle movement;	Contractor	During Construction	40,000
Interaction	Increased	• Contractor to maximise use of local casual labour to	Proponent,	During	30,000

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Responsibility	Time Frame	Estimated Costs (KES)
between immigrant workers and local communities	Incidences of HIV/AIDS and other STIs Spread of Covid -19	reduce the need for immigrant workers; • In line with the HIV/AIDs prevention act, the Contractor should ensure that prevention and management of sexually transmitted diseases as a result of social interaction between immigrant workers and local populations to reduce the risk of the transfer of HIV virus between and among the Contractor's personnel and the local community through: ✓ Education and sensitisation of workers and the local communities on STIs including provision of condoms to the project team and the public in conjunction with local NGO's dealing with HIV/AIDS; ✓ Where possible conduct regular sensitisation campaigns and monitoring and evaluation of the modes used during the course of the project; ✓ The Proponent has to institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at prominent locations ✓ The Proponent should ensure that the project workers are sensitised on the local culture; and ✓ The Proponent should ensure the mobilization and sensitization of the general population on reproductive health and STIs. ✓ Proponent to abide by WHO and MOH Covid -19	contractor, local officer of ministry of health	Construction	

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Responsibility	Time Frame	Estimated Costs (KES)
		prevention rules.			
All construction activities	Generation of construction wastes	The contractor will develop a proper Waste Management Plan that will: • Implement in-house waste management programme by installing facilities e.g. waste containers/bins on site during construction phase. This should be based on a procedure for waste segregation. • Proper segregation of solid waste prior to disposal; • Reduce generation of solid waste at the source; • Empty packaging materials like cartons and cement bags shall be piled in a safe place and sold to waste paper recyclers; • All hazardous wastes including material contaminated with hazardous wastes shall be stored in a designated area on site for regular removal and disposal in accordance with Environmental Management and Coordination (Waste Management) Regulations, 2006. The Contractor will have a NEMA licensed waste collector to dispose all the waste at approved locations. • The contractor should not burn hazardous wastes on site or dump in open pits. • Ensure there is adequate sanitary facilities	Contractor	During Construction	50,000

Operation Environmental and Social Management Plan

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs
Sand extraction from the lake bed	Disturbance of bottom of the Lake ecosystem	• The proponent will operate in a designated area of 500m by 500m only. • Operations machine to be well maintained to produce minimal noise • There will be sustainable extraction of sand. The quantity harvested will be sustainable to ensure it is within the volume 'replenished' by the system.	Proponent	During operation	40,000
	Occupational health and safety risks	• Provision of PPE (dust masks, safety jackets, gum boots,) • Ensure that personnel wear lifejackets at all times when in the lake • Avail Properly stocked First Aid box • The Proponent shall develop and implement detailed and site specific emergency response plans • Ensure that provisions for reporting incidents, accidents and dangerous occurrences during operations using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO) are in place. • Train personnel in safety at work, including procedures for supervision of personnel	Proponent	During operation	50,000
	Conflict	• Proper sensitization and creation of ownership • Defuse any conflicts among the members of the	Proponent	During operation	-

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs
		community			
	Solid waste Generation and disposal	▪ The site to have waste receptacles at convenient points to prevent littering during operations ▪ The Proponent to prioritize on options of waste reduction, reuse and recycling, particularly papers, cement bags other materials that can possibly be recycled.	Proponent	Operation	20,000
Workers welfare	Sanitary inconveniences	• Ensure that the workers are provided with an adequate supply of safe drinking water, which should be accessible at all times; • Provide conveniently accessible, clean, orderly, adequate and suitable washing facilities for the project workers. • Suitable, efficient, clean, well-maintained and adequate sanitary conveniences should be provided for project workers	Proponent	Operation	20,000
• Transportation of sand by clients • Loading of sand	• Noise, vibration and dust • Accidents	• Display warning signs on access roads leading to the site • Train workers in safety and health. • Carry out operations at daytime • Maintain vehicles and machinery in good condition in order to minimize gas emissions and noise. • Erect speed bumps to control motor vehicle speed • Plan for accident and emergency facilities.	Proponent	Operations	50,000
	• Ambient Air Quality	• 20kmh/h speed limits maintained by the lorry drivers along access roads to the site • Sprinkling of water on roads to reduce dust levels	Proponent	Operations	20,000

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs
Increased disposable income and Enhanced interaction between the locals and people from other parts of the county	Social delinquency and HIV/AIDS	• Organise community sensitization drives on prevention and management of HIV/AIDS through the local area administration, the project Management Committee, Sub-county Health Office, Sub-county Social Services Office, and sub-county Youth Office; • Liaise with NGO's within the project area to educate the community; • In conjunction with Ministry of Health provide Voluntary Counselling and Testing centres in all the existing medical facilities; and • Provide contraceptives at accessible locations.	Proponent	Operation	60,000 (annually)

8.4 Environmental and Social Monitoring

The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and that they are effective. Environmental and social monitoring will also enable response to new and developing issues of concern. The activities and indicators that have been recommended for monitoring are presented in the ESMP.

Environmental monitoring is also carried out to ensure that all construction and operation activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented. The proponent shall employ an officer responsible for implementation of social/environmental requirements. The proponent has responsibility to ensure that the proposed mitigation measures are properly implemented during project implementation.

The environmental monitoring program will operate through the remaining construction phase, and operation phase. It will consist of a number of activities, each with a specific purpose with key indicators and criteria for significance assessment.

Monitoring includes:

- Visual observations;
- Selection of environmental parameters; and
- Sampling and regular testing of these parameters.

Periodic ongoing monitoring will be required during the life of the Project and the level can be determined once the Project is operational.

Monitoring will be done in three fronts:

- Physical monitoring;
- Biological monitoring; and
- Social monitoring.

8.4.1 Internal monitoring

It is the responsibility of the proponent, County Concrete and Steel Ltd, to conduct regular internal monitoring of the project to verify the results of the project operations and to audit direct implementation of environmental mitigation measures contained in the ESMP.

The monitoring should be a systematic evaluation of the activities of the operation in relation to the specified criteria of the condition of approval.

The objective of internal monitoring and audit will be:

- To find out any significant environmental hazards and their existing control systems in force; and
- Meeting the legal requirements as stipulated in the Environmental Management & Coordination Act, EMCA-1999 as amended in 2015 and other relevant legal requirements as determined in this report.

8.4.2 External monitoring and evaluation

It is recommended that a consultant be hired to carry out Annual Environmental Audits in line with NEMA requirements.

NEMA has the overall responsibility for issuing approval for the Project and ensuring that their environmental approval conditions are followed during Project implementation. Its role therefore is to review environmental monitoring and environmental compliance documentation submitted by the implementing authorities and they would not normally be directly involved in monitoring the Project unless some specific major environmental issue arose.

The Proponent will therefore provide NEMA with reports on environmental compliance during implementation as part of their progress reports and annual environmental auditing reports. Depending on the implementation status of environmentally sensitive project activities, NEMA may perform annual environmental reviews in which environmental concerns raised by the project will be reviewed alongside project implementation.

Table 6: Environmental Monitoring plan

Project Activity/Aspect	Objective	Indicator	Responsibility	Monitoring Frequency	Project Phase	Location
Vegetation disturbance and land destruction	Conserve wetland habitat and organisms in it	• Size of area cleared; • Number of seedlings replanted; • Percent of lost ground vegetation cover	Proponent	Monthly	Construction Operation	Entire project area
Handling and Disposal of Waste	Proper waste management	• Waste Management Plan; • Agreements with waste handlers; • Waste collection and disposal records; • Status of housekeeping on site	Proponent	Weekly	Construction and operation	Entire project area
Spread of STIs and HIV/AIDS pandemic	Prevent spread of HIV/AIDS	• Sensitization records; • Campaign materials; • Availability of prevention material	Proponent	Quarterly	Construction and Operation	All construction areas
Occupational accidents and incidents on site	Enhance occupational health and safety	• Contractors Occupational Health and safety Plans; • Visual inspection; • Signs, posters displayed, • Safety and health awareness training records, • Statutory (OSHA) compliance status; • Accident and Incident Register	Proponent	Quarterly	Construction and Operation	Entire project area
Dust and exhaust emissions	Mitigate dust and exhaust emissions	• Dust Management Plan; • Records on issuance & use of PPEs as applicable; • Equipment/machinery maintenance records; • Daily water use for dust sprinkling;	Proponent	Quarterly	Construction and Operation	Entire project area

Project Activity/Aspect	Objective	Indicator	Responsibility	Monitoring Frequency	Project Phase	Location
		• Safety induction records; • Site inspection reports				
Noise and excessive vibration	Abate noise and excessive vibrations	• Excessive Noise and Vibration Control measures/Plan • Noise level monitoring results (in dB) • Number of related complaints registered	Proponent	Quarterly	Construction and Operation	Entire project area
Soil Erosion and compaction	Prevent unnecessary compaction and construction/operation-induced erosion	• Demarcation of areas to be cleared • Turbidity in water • Use/availability of designated routes	Proponent	Weekly	Construction and Operation	active construction/ operation fronts
Employment opportunities	Enhance project benefits	• Labour returns- Number of persons (by gender and region) employed directly by the project and levels of skills	Proponent	Monthly	Construction and Operation	All construction areas;
Green House Gas Emissions from the project	Reduced contribution to Green House Gas	• Fuel used for project construction/ operation works as per invoices/receipts	Proponent	Green House Gas Emissions from the project	Construction and operation	All project areas

CHAPTER NINE: CONCLUSION AND RECOMMENDATION

9.1 Conclusions

This ESIA Study Report has been prepared to provide sufficient and relevant information on the proposed Sand Harvesting Activity in Lake Victoria, off Chwoye Beach to enable NEMA establish whether activities of the project are likely to have significant adverse environmental impacts.

Sand harvesting has been widely recognized for its significant importance to the building industry and the State's economy. However, without appropriate sitting and management, sand extraction can have impacts on the surrounding environment and water resources. Sand is an important material for the construction industry in the Kenyan society at large. However, protecting the environment in areas where this practice of sand harvesting takes place has become an environmental concern given that the demand for sand increases with the growth of industry and construction. Sand mining can lead to considerable environmental damage.

The lake is a habitat to many organisms and therefore should be protected at all costs. Both the government and nongovernmental organizations should create awareness to the sand harvesters on the importance sustainable sand harvesting.

Sand harvesting will provide jobs for the people in the project area and will be a key source of income for the surrounding villages. It will provide the main source of sand for the construction of buildings, roads and bridges in Rachuonyo and the environs. However, the uncontrolled sand harvesting may lead to increased child labor, high rate of dropouts from schools, increased prostitution, and alcoholism and drug abuse in this emerging sand driven economy if not checked.

There major social or environmental issues raised have been well handled in the Environmental management Plan. All the anticipated adverse impacts associated with the project can be readily managed to acceptable levels with implementation of the recommended mitigation measures such that the overall benefits from the Project will greatly outweigh the adverse impacts.

In addition to this commitment, the Contractor will focus on implementing the measures outlined in the EMP as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects.

9.2 Recommendations

Implementation: It is recommended that the proposed project be implemented in compliance with all the relevant legislation and planning requirements of Kenya at all times. In line with this, the Proponent and any appointed contractor must take the legislative framework provided in this report into consideration, during the implementation of the project, as will be appropriate.

Adherence to ESMP: In addressing the environmental and social issues, the Proponent must follow the mitigation guidelines provided under ESMP. This will ensure that any potential adverse environmental impacts are managed and the safety of operators and the neighbouring communities is also assured.

Annual Environmental Audit: The Proponent should undertake environmental audit (EA) of the project, as required by the NEMA Regulations within the first twelve (12) months of commencing operations. This will ensure that the company does not lose track of its good environmental management record. This can be done by seeking the services of independent Environmental Consultants who should be Lead Experts registered by NEMA.

REFERENCES

- County government of Homa Bay 2018-County integrated development plan 2018-2022
- Kenya Nation Bureau of Statistics (KNBS), 2019. 2019 Kenya population and housing census. Volume I: Population by county and subcounty
- Kenya gazette supplement number 56. Environmental Impact Assessment and Audit Regulations 2003, Government Printers, Nairobi
- Kenya gazette supplement Acts Building Code 2000, Government Printers, Nairobi
- Kenya gazette supplement Acts Local Authority Act (Cap. 265), Government Printers, Nairobi
- Kenya gazette supplement Acts Penal Code Act (Cap.63) Government Printers, Nairobi
- Kenya gazette supplement Acts Physical Planning Act, 1999, Government Printers, Nairobi
- Pollution prevention and abatement handbook – Part III, (September, 2001)
- Kenya gazette supplement Acts Water Act, 2002, Government Printers, Nairobi
- Kenya gazette supplement Acts Public Health Act (Cap. 242) government printer, Nairobi
- Noise Prevention and Control Rules 2005, Legal Notice no. 24, Government Printers, Nairobi
- The Occupational Safety and Health Act, 2007, Government Printers, Nairobi
- World Bank (1991), Environmental Assessment sourcebook volume I: Policies, procedures and cross-sectoral issues. World Bank, Washington.
- Kenya gazette supplement number 57, Environmental Management and Coordination (Controlled Substances) Regulations, 2007, Government printer, Nairobi
- Kenya gazette supplement number 68, Environmental Management and Coordination (Water Quality) Regulations, 2006, Government printer, Nairobi
- Kenya gazette supplement number 69, Environmental Management and Coordination (Waste management) Regulations, 2006, Government printer, Nairobi
- Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009, *government printer, Nairobi*

APPENDICES

Appendix A: NEMA Licence for the EIA/EA Lead Expert

Appendix B: Certificate of Registration for the Company

Appendix C: KRA PIN Certificate

Appendix D: Completed Consultation Questionnaires

Appendix E: Public Meeting List of Attendance

Appendix F: Public meeting minutes

Appendix G: TOR Approval