MANGO TREE MARINE LIMITED

ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

Coordinates:

Longitude E 34.138510° and latitude S 902570°

Name and Address of Proponent:	**FIRM OF EXPERTS:**
Mango Tree Marine Limited P.O Box 3300-40100 Kisumu, Kenya.	Gomake Consultancy Co. Ltd K9, 1st Floor, Benisa Flat Opp. Seasons House Seasons Road off Thika Superhighway Kasarani P.O. Box 5540, 00100 Nairobi, Kenya Email: info@gomakeltd.co.ke

MARCH 2025

CERTIFICATION

Project Proponent: Mango Tree Marine Limited

Assignment Title: Environmental Impact Assessment Study for the Proposed Sand Harvesting Project in Lake Victoria next to River Kuja Mouth, Migori County

Report Submitted by: KENNEDY IKUJANA

Signature: ..... Date: .....

GOMAKE CONSULTANCY COMPANY LTD.
15 MAR 2025
P. O. Box 5540-00100, NAIROBI-KENYA
TEL: 0720 964 333
Email: Info@gomakeltd.co.ke

For Gomake Consultancy Company Limited,
Firm of Experts Reg. No. 8511

On Behalf of:

Mango Tree Marine Limited
P.O. Box 3300-40100
Kisumu, Kenya.

MANGO TREE MARINE LTD.
15 MAR 2025
P.O. Box 3300-40100, KISUMU

Signature: ..... Date: 15/03/025

Designation: Accountant

ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED SAND HARVESTING AT KUJA RIVER MOUTH

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LIST OF ACRONYMS AND ABBREVIATIONS

BMUs	Beach Management Units
CBD	Convention on Biological Diversity
DOSHS	Directorate of Occupational Safety and Health Services
EA	Environmental Audit
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ESMP	Environmental and Social Management Plan
FGDs	Focus Group Discussions
Ha	Hectare
IFC	International Finance Corporation
IMO	International Maritime Organization
IUCN	International Union for Conservation of Nature
KMA	Kenya Maritime Authority
KWS	Kenya Wildlife Service
NEMA	National Environment Management Authority
OSHA	Occupational Safety and Health Act
PAHs	Polycyclic aromatic hydrocarbons
PCM	Public Consultation Meeting
PPE	Personal Protective Equipment
RRMA	Riparian Resource Management Association
TDS	Total Dissolved Substance
TSHC	Technical Sand Harvesting Committee
TSS	Total Suspended Solid
WRA	Water Resources Authority

NON-TECHNICAL SUMMARY

This Environmental Impact Assessment (EIA) Study report was prepared as per the provisions of the Environmental Management and Coordination Act No. 8 of 2015 and the Environmental (Impact Assessment and Audit) IEIA/EA Regulations 2019. It is also in line with local and international laws and policies that regulate projects of this nature. This Study gives the findings of the Environmental Impact Assessment undertaken as an integral part of the planning and design process. The Study highlights salient social, economic and environmental issues associated with the Proposed Sand Harvesting.

The perennial flooding at Kuja River flood plain occurs due to heavy rains in the catchment as well as deforestation upstream as a result of poor land use practices, causing serious sedimentation and forming river mouths at the river mouth. The sand harvesting project should therefore be undertaken to forestall human suffering during floods among other things opening up of canals, drainages, streams and water channels to reduce siltation.

Views gathered from stakeholders point to the anticipation that the Sand Harvesting Project will help to control flooding within the Kuja River Mouth while reducing displacements, water borne diseases and deaths. In addition, the project will also improve navigation within the lake and the river and resuscitate livelihoods such as farming and other economic activities that were previously been interrupted by floods. Respondents mentioned that the project will also help in mitigating against human-wildlife conflict especially the menace of hippos who during floods find their ways to people homes that becomes extension of riparian due to flooding. In spite of the consulted parties airing a few concerns and suggestions over how certain aspects of the project should be handled, they indicated support for the proposed development and look forward to its implementation.

The adverse elements notwithstanding, the benefits that will be realized from the proposed sand harvesting outweigh most of the inconveniences and negative impacts that have been categorized in this ESIA Study as temporary, moderately significant and limited to the project area. The ESIA Study determined that if the project is implemented with due attention to the mitigation and monitoring measures entailed in this document, most if not all, adverse environmental and social impacts will be manageable. Overall, the Proposed Sand Harvesting Project is deemed timely, highly beneficial and should therefore be allowed to proceed within the given framework.

It is recommended that for the prevention and mitigation of potentially adverse environmental and socio-economic impacts, the following should be done:

- The operation and maintenance of the proposed project must comply with the best management practices and the principles of environmental management including the principles of sustainability, intergenerational equity, prevention and precaution;
- Ensure the views expressed by the public during the consultation exercise are integrated in the design and implementation plan of the project, especially where aspects of social interest are concerned;

- Regular environmental and social safeguard monitoring and auditing should be undertaken and any identified shortcomings addressed. This will ensure that all projects are in conformance with established laws and regulations for the management of environment, safety and health;
- Institute effective communication, education and awareness raising for project workers and neighbours for enhanced acceptability and social harmony;
- The proponent should ensure the local community benefits from employment opportunities during the implementation of the project that is being executed; and
- The proponent should expedite on the works to minimize adverse livelihood impacts and inconveniences to the community due to the perennial flooding.

1. INTRODUCTION

1.1 The Proponent

The Proponent, Mango Tree Marine Limited (incorporated in Kenya) is part of the larger Mango Tree Group Ltd, a professional maritime enterprise which provides comprehensive services in: navigation route survey; waterway setting, Sand harvesting, water surface / water hyacinth clearing; ship design, building and maintenance; port / pier design, construction, operation and water transport service provision. Since its establishment in 2011, Mango Tree Group has been fully implementing the strategies as "brand, quality, efficiency, integrity" to enable it to rapidly grow and develop with successive branches in South Sudan, Uganda, DRC, Burundi and Kenya. Incorporation certificate and PIN of the Proponent are attached under **Appendix II** of this report.

In Kenya, Mango Tree Marine Limited implemented the Dredging of Kisumu and Mbita Ports under bigger Kisumu Port Expansion and Modernization Project whose objective is to enable the business demand and future growth of the traffic in the lake.

1.2 Project Background

The Proponent, Mango Tree Marine Ltd has proposed to carry out Sand Harvesting at Kuja River Mouth to reduce the impact of flooding due to sedimentation at the river mouth by easing the flow of water to the lake.

The Kuja River Mouth is a biologically and hydrologically significant area located at the convergence of the Kuja River and Lake Victoria at about GPS Coordinates Latitude -0.902570°, Longitude 34.138510°. This region serves as a critical interface where riverine and lacustrine ecosystems interact, influencing nutrient cycling, sediment dynamics, and habitat diversity. The study area encompasses several stations strategically positioned to capture variations in ecological and hydrological conditions, ranging from the open lake to the river's upstream reaches.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed sand harvesting at Kuja River Mouth Project including its associated components is categorized a **high-risk** project mining and other related activities including harvesting of aggregate, sand, gravel, soil and clay and is required to undergo a **full ESIA study**.

The proposed project has the potential of causing impacts to the environment. It is against this backdrop that Mango Tree Marine Limited commissioned Gomake Consultancy Company to carry out an Environmental Impact Assessment (EIA) Study for the project. The Consultant's current license to practice as a firm of expert is attached in **Appendix V** of this report.

1.3 Project Justification

Kuja River is one of the six major rivers in the Lake Victoria basin. Geographically, the Kuja River originates in the highlands of Nyamira County, traversing through Kisii, Migori, and other regions before discharging into Lake Victoria. The river and its catchment are essential

for local livelihoods, supporting agriculture, fisheries, and water supply. However, the ecosystem faces challenges from deforestation, sedimentation, pollution, and extractive activities such as sand and artisanal gold mining. The study area's dynamic hydrodynamic conditions make it a hotspot for biodiversity and a critical zone for environmental monitoring and management.

Mitigation to the impact of flooding has been made to dredge and unblock the river channel at the River mouth to ease the flow of water into the lake. Construction of dykes on both sides of the river was implementedon both sides of the River. Construction of dykes along the shoreline is further proposed to mitigate the anticipated lake backflow during sand harvesting

1.4 Objectives of the EIA study

The main objective of the EIA study is to carry out a systematic examination of the baseline environmental conditions within the project area in order to determine how the project will impact the environment. The specific objectives of the study included, but are not limited to the following:

- Determination of the suitability of the Proposed Sand Harvesting at Kuja River Mouth with the local environmental conditions.
- Identification and evaluation of the significant environmental impacts of the proposed project with special emphasis on:
  - Biodiversity
  - Fisheries
  - Water quality and pollution
  - Impact on socio-economics and livelihoods
- Assessment and analysis of the environmental and social costs and benefits that may accrue from the proposed project.
- Incorporation of the Environmental and Social Management Plan and Monitoring mechanisms during implementation of the project.

1.5 EIA Study Terms of Reference

Screening was done to determine whether or not the proposed project falls within a category that requires EIA prior to commencement. Other considerations during the screening process included a preliminary assessment of the environmental sensitivity of the areas that will be traversed by the Proposed Sand Harvesting. This entailed a desk review of information and designs availed by the Proponent. It was determined that the project is listed in the EMCA Amended Second Schedule through Legal Notice No 31 of 2019 as a High Risk Project under mining and other related activities including harvesting of aggregate, sand, gravel, soil and clay for which a full environmental impact assessment study shall be undertaken.

Terms of Reference for the Study was formulated and submitted to NEMA for approval and is attached in **Appendix I**. The key issues identified are concerned with include increased turbidity on Lake and River Water; loss of biodiversity due to unavailability of phytoplankton; impact of sound and vibration of the dredger; oil spills and bioaccumulation and bio magnification of polycyclic aromatic hydrocarbons (PAHs) from sand harvesting activities;

impact Sand harvesting on fisheries and livelihoods; increased human-wildlife conflicts; compromised health and safety and employment, among others.

The process involved having discussions with the Proponent on the key issues and collection of primary and secondary data on the same. The primary data was collected using both qualitative and quantitative methods of data collection through field visits/site walks, public and stakeholders' consultation. Secondary data was collected through literature review which included the review of policies, Acts and regulations; County Development Plans; project area maps; previous project area reports among others.

This exercise was designed to meet the requirements of EMCA 1999 (Amended 2015) and the Environmental (Impact Assessment and Audit) IEIA/EA Regulations 2019. For the most part, the exercise involved studying the environmental impacts of Proposed Sand Harvesting. In addition, baseline information was obtained through desk studies, physical investigation of the project areas, public and key informant consultations. The study adopted an integrated approach whereby a multi-disciplinary team was engaged in the data collection and analysis. Generally, the key activities that fed in to the EIA Study entailed, but are not limited to the following:

- A site visit to collect baseline information of the project area.
- A comparative analysis of the project with existing economic activities in the area.
- A review of relevant policy and legislation.
- Discussions with the project proponent to obtain information on various project aspects.
- Identification of health and safety concerns that may be occasioned by the project.
- Seeking views and input through discussions and interviews with the public and key informants.
- Assessment of the site to detail the various existing and likely impacts.
- Proposal of mitigation measures to avert or minimize negative impacts.

1.6 Scope and Methodology of the ESIA Study

The study identified the anticipated and foreseeable impacts on the environment resulting from the implementation of Proposed Sand Harvesting Project. The physical scope covers the River mouth region including Kabuto, Aneko and Kuja River ecosystem where the project will be sited and the adjacent environment that may be affected by, or which may affect the project. All potential impacts, (localized or delocalized) have been carefully evaluated against the guidelines provided by the Environmental Management and Coordination Act, EMCA 1999 (Amended 2015) and the Environmental (Impact Assessment and Audit) IEIA/EA Regulations 2019.

The study involved literature review and fieldwork to collate relevant environmental data for environmental impact assessment. Scope of study was refined to enable proper planning for gathering of baseline information and contextualization of the impact assessment.

The study established baseline conditions of biodiversity that will potentially be affected by the Proposed Sand Harvesting Project. After review of activities of sand harvesting and associated impacts baseline study focused on water quality parameters that influence ecological

conditions of fish. These include both spatial and temporal distribution of the water quality parameters. Biodiversity taxa that their ecological behaviours is likely to be affected considered in the baseline are fish, birds, reptiles and amphibians, and plants. The assessment covered the river mouth area, 6 km into the open lake and on the upstream of the river mouth. Impact analysis therefore mostly dwelt on the water quality and biodiversity taxa and effects on the livelihood of the residents in the river mouth area.

1.6.1 Ecological Study Methodology

A multidisciplinary approach was employed to comprehensively assess the ecological and environmental dynamics of the Kuja River Mouth. Field sampling, laboratory analysis, and spatial modelling formed the core of this methodology, ensuring a robust data-driven understanding of the ecosystem. The methodology encompassed five key components:

Water quality was assessed by collecting samples from strategically selected stations spanning both riverine and lacustrine environments. The sampling and analytical protocols followed the methods outlined by APHA (2005). Parameters such as temperature, turbidity, and total suspended solids (TSS) were measured in situ using portable probes, while pH, dissolved oxygen (DO), conductivity, and total dissolved solids (TDS) were analyzed to capture the chemical profile of the water. Nutrient concentrations, including nitrates, nitrites, ammonium, phosphorus, and silicates, were quantified using spectrophotometric techniques, providing insights into nutrient dynamics and potential eutrophication risks. Chlorophyll-a concentrations, a proxy for phytoplankton biomass was determined using a hand-held Algal torch that records chlorophyll a concentrati0ons alongside water turbidity and algal counts.

Sediment analysis involved the collection of core samples from multiple depths at each station. These samples were analyzed for texture and grain size using sieving and hydrometer methods, categorizing sediments into clay, silt, and sand fractions. Visual inspection and redox potential measurements were conducted to assess geochemical conditions, with surface sediments often exhibiting oxidative states and deeper layers reflecting anoxic conditions. These findings were crucial in understanding depositional environments and sedimentary processes.

Macroinvertebrates were sampled using a combination of Surber samplers and kick nets, targeting representative habitats across the study area, according to a combination of protocols prescribed by Merritt and Cummins, (2017); Gerber and Gabriel (2002); Samways (2008).The collected specimens were preserved in ethanol and identified to the lowest taxonomic level possible following identification keys by Bouchard, (2004). Metrics such as community composition, abundance, and relative abundance were calculated, while biodiversity indices, including the Shannon-Wiener and Simpson's indices, provided quantitative measures of ecological diversity. This analysis shed light on the health and functionality of the benthic community.

Zooplankton samples were collected using fine-mesh plankton nets (50 µm) and preserved in Lugol's iodine solution for laboratory analysis. Dominant taxa such as Copepods, Cladocerans, and Rotifers were identified under a compound microscope using as described by Ward and

Whipple (1959) and Pennak (1978), , and their abundance was recorded. Diversity indices were calculated to evaluate the structure and dynamics of the zooplankton community, which serves as a critical link in aquatic food webs.

The fisheries assessment focused on both larval and adult fish populations. Seine nets were used to sample fish larvae, with abundance and spatial distribution patterns analyzed to identify critical nursery habitats. Adult fish species were cataloged to evaluate diversity and population structures, including size-class distributions. Stomach content analysis provided insights into trophic interactions and prey preferences, highlighting the ecosystem's food web dynamics.

An outboard engine was used to inspect the river mouth for the presence of free floating and submerged macrophytes. Emergent macrophytes were seen along a pre-established transect. An outboard engine was used to inspect the river mouth for the presence of free floating and submerged macrophytes. A variety of macrophyte species were detected. Those who could not be easily identified were labelled and pressed. Macrophyte zonation were determined by identifying dominating species.

1.6.2 Identification and Engagement of Stakeholders

The consultant conducted additional stakeholder identification and engagement based on the desktop review in order to fill any potential gaps. The stakeholder identification and engagement included; identifying the various administrators, county officials, Lead agencies officials, local leaders as well as the public in the project area

The stakeholders identified include:

- NEMA Migori County
- DOSH Migori/Homabay
- Fisheries Departments
- Government officials
- Beach Management Units (BMUs)
- Health and Education Institutions
- Water Resources Authority
- Religious Leaders
- Local administration

Following the identification of the different stakeholders, different methods of engaging with these stakeholders based on their roles and positions were devised.

1.6.2.1 Method used for Stakeholder Engagement

The methods applied to engage the stakeholders included key stakeholder interviews, Questionnaire administration, Focus Group Discussions (FGDs) and Public Consultation meetings (PCMs). The FGDs were mostly carried with Lead agencies and BMU leadership in getting fish related information and activities along the river mouth shoreline while PCMs were carried in all the locations bordering the Lower Kuja River. One FGDs with Lead Agencies

and two PCMs were convened at Kabuto and Aneko on 5th February, 2025 and 6th February 2025 respectively.

One set of questionnaires was used to gauge the perception of key stakeholders, such as staff from NEMA, DOSH, County Government, National Government, Kenya Fisheries Service and Civil Societies about the proposed project. Another set of questionnaires was used to obtain the opinions of households, which were located in areas / settlements the project area.

Feedback forms/questionnaires were distributed towards the end of PCM to get feedback from the meeting participants.

The process of consultations was carried out as follows:

- Carrying out key informant interviews by using key informant guide;
- Administration of ESIA questionnaires to key stakeholders including local administration officers, service providers and lead agencies;
- Holding a question-and-answer session with PCM participants;
- Administration of ESIA feedback forms/questionnaires to PCM participants;
- Administration of socio-economic questionnaires to the community.

1.7 The Study Team

All partners coming from different disciplines and experiences have spearheaded the implementation of innovative and appropriate approaches to development thinking, namely scientific and well researched outcomes, participatory approaches that enhance dialogue, forge partnerships and encourage conflict management and resolution. The team's diverse disciplines are consistent with the multi/inter/trans– disciplinary nature of the environmental management tools and the code of practice for the registered EIA/EA firm of experts.

Name	Expertise
Kennedy Kijana McAbongo	Team Leader/ Environmental Lead Expert
Collins Ongore	Aquatic Ecologist
George Wandera	Sociologist
Fredrick Maseno	Safety and Health Advisor
Linus Odera	Environmental EIA/EA Associate Expert

1.8 The Project Cost

Cost estimates for the proposed project mainly include the cost that will be used to construct temporary sand holding site onshore since the sand harvesting vessel is already existing. It is estimated that the proposed project will cost Kshs. **5,049,130.00** (Five Million Forty-Nine Thousand One hundred and Thirty Shillings). The NEMA fees is payable at 0.1% the project

cost with a minimum of 10,000.00 whichever greater. Therefore, the total fee payable to NEMA is Ten Thousand Shillings (Ksh. 10,000).

2. PROJECT DESCRIPTION

2.1 Introduction

Sedimentation is the accumulation of silt, sand and other debris on the bottom of a river, lake, canal or stream over time. An excessive build-up of sediment can cause a series of issues. For instance, it can reduce the depth of the waterway and prevent the passage of ships. It can also lead to contamination that poses a threat to aquatic plant and wildlife. In the project area the sediment accumulation has blocked the smooth flow of Kuja River into Lake Victoria causing backflow leading to flooding of the settled farmlands and beaches around the area.

It has become necessary to find a way to remove a large accumulation of sediment within the river mouth area to ease the flow of water to the lake so as to reduce cases of flooding.

The sediment removal process uses a machine known as a dredger to excavate the accumulated sediment and sand. A dredger is either partially or completely submerged in water and allows the operator to easily gather the sediment and transport it to a different location. When sand harvesting is done, the sand shall be relocated to the Proponent's holding site within the County for commercialization.

2.2 Benefits of Sand Harvesting

2.2.1 Increasing Waterway Depth

As sediment builds up on the bottom of the lake and the river channel, it reduces the depth of the water. Sand harvesting will strip away the accumulated debris, to restore the water body to its original depth and reduce the risk of flooding.

2.2.2 Commercialization of sand for construction

The sediment removal process shall also be used to gather sand, gravel and other debris used to make concrete for construction projects.

2.2.3 Environmental Remediation

Sediment removal will help to restore the onshore lands in the project area to its original condition by reversing the effects of land degradation due to on farm sand harvesting.

2.2.4 Preserving Aquatic Life

Sand harvesting is projected to produce a healthier aquatic eco-system that can result in a more suitable habitat for fish and other wildlife. It will also be used for trash and debris removal to support eco-friendly waterways.

2.2.5 Remediation of Eutrophied Water

Eutrophication is an excessive amount of nutrients in a water body typically caused by water runoff from the surrounding land. Eutrophication has led to an overabundance of plant growth such as water hyacinth and hippo grass at the river mouth that may result in oxygen deprivation and can cause the death of aquatic wildlife. The proposed Sand harvesting may be the most viable remediation option since the area has experienced eutrophication leading to overabundance of plant growth at the river mouth.

2.3 Different Types of Dredgers

There are several types of dredges used in the sediment removal process. The most common types of dredgers are:

2.3.1 Plain-Suction

A plain-suction dredge is the most common type of sediment removal equipment. Unlike other dredger versions, it doesn't contain a tool for penetrating or cutting into the bottom of the water body — it relies on suction to remove loose debris.

2.3.2 Cutter-Suction

This type of dredge contains a cutting tool that loosens material from the bottom and transports it to the mouth of the suction apparatus. The use of a cutter-suction dredge may be necessary for removing debris from hard surfaces that would prevent efficient suction via standard methods. The sucked debris will then be transported via a pipeline to the disposal areas within the project area. The community during the public consultation meetings suggested reclaiming derelict sand harvesting pits within the project area.

2.3.3 Auger-Suction

An auger-suction dredge essentially bores holes into the bed to loosen and suck up the debris. The rotating auger can burrow deeply into the surface. This type of dredge works well for sludge removal applications at wastewater treatment plants and other areas requiring heavy-duty sediment removal.

2.4 The Sand harvesting Process

During the process of sand harvesting, the Proponent shall mainly use Plain-Suction Dredge to remove sediments and sand from the bottom of the lake and river. During sand harvesting, the dredger operator will lower the boom of the dredger to the bottom of the body of water. A rotating cutter-bar then uses teeth to loosen the settled material, as the submersible pump removes the sediment from the bottom of the lake or river.

The dredger is equipped with a submersible pump that relies on suction to excavate the debris. A long tube carries the sediment from the bottom of the body of water to the surface and onto the dredge compartments which can hold up to 4 tons. The silt and debris are then transported away for final processing. The disposal of the dredged material including sand shall be conducted in compliance with NEMA and the county government of Migori laws and regulations.

3. ANALYSIS OF ALTERNATIVES

3.1 Overview

Alternatives with respect to the proposed project, technology and waste management were analyzed with an aim of coming up with the most sustainable project considerations that will ensure optimal benefits are realized from the project. A range of factors were put into consideration including the receiving environment, anticipated impacts and views and concerns gathered from the stakeholder consultations. The alternative options are discussed below.

3.2 No Project Option

Proponent, Mango Tree Marine Ltd has proposed to carry out Sand Harvesting at Kuja River Mouth to reduce the impact of flooding due to sedimentation at the river mouth by easing the flow of water to the lake in response to the recommendations of the Parliamentary The no project option therefore means that the human suffering during floods as a result of the blocked Kuja River mouth will continue unabated. Displacement of human populations and disruption of the school calendar (since the schools in the area are used as evacuation centers during floods) will continue during flooding seasons. The only possible advantage of this option is that the environment will not be interfered with. The No Project Option is the clearly the least preferred.

On the flipside, this option will deny the project region benefits that can only be realized from the Proposed Sand Harvesting project as mentioned below:

- Restoration of the Kuja River mouth to its original depth and reduce the risk of flooding due to backflow;
- Sand and gravel harvesting for construction projects;
- Reclamation of the onshore lands in the project area to their original condition by reversing the effects of land degradation due to on farm sand harvesting through dumping of the dredged materials in these pits;
- Removal of trash and debris to support eco-friendly Kuja River; and
- Reduction of eutrophication leading to overabundance of plant growth within the River Mouth.

3.3 Analysis of Alternative Biodiversity and Ecological Management Strategies

Kuja River mouth is heavily influenced by upstream activities, including agricultural runoff, artisanal mining, and deforestation, which contribute to elevated nutrient and sediment loads. These pressures result in habitat degradation and biodiversity shifts, with pollution-tolerant species such as *Tubifex tubifex* dominating certain stations. In contrast, the open lake demonstrates enhanced primary productivity due to nutrient dilution and greater light penetration.

Some of the proposed management strategies include:

- Catchment Management: Implement integrated strategies to mitigate upstream sedimentation and nutrient loading, including sustainable farming practices and agroforestry initiatives.
- Riparian Zone Conservation: Restore riparian vegetation to improve water quality and enhance habitat connectivity.

- Sand Mining Regulation: Enforce sustainable mining practices and conduct regular environmental assessments to minimize habitat degradation.
- Critical Habitat Protection: Designate high-biodiversity areas as conservation zones and establish buffer zones to reduce human disturbance.
- Community Engagement: Involve local communities in conservation through education and alternative livelihood programs.
- Long-term Monitoring: Develop a framework to monitor ecological changes and inform adaptive management practices.
- Policy Development: Advocate for policies that integrate environmental conservation with economic development and foster cross-sectoral collaboration.

3.4 Analysis of Alternative Sand harvesting Technology

The Proponent plans to use plain-suction dredger in areas where there are loose debris such as sand and other sediment into the dredger compartments by use of suction technology. The dredged materials inside the ship will mostly be re-used as building material for construction industry.

Plate 1: Proposed sand harvesting equipment

3.5 Analysis of alternative material storage sites

Currently, the Proponent has material storage site in Mbita where the harvested sand will be stored before re-use in construction industry. However, during the public participation meetings, it was proposed that an alternative sand holding site be established within Migori County. Measures shall be put in place to ensure that the harvested sand do not get into the water system again through soil erosion.

4. ENVIRONMENTAL BASELINE CONDITIONS

4.1 Project Location

The Proposed sand harvesting site is situated within the Lake Victoria next to the mouth of River Kuja in Aneko Area of Got Kachola Ward Nyatike South Sub County and Kabuto Area of North Kadem Ward Nyatike North Sub County, Nyatike Constituency in Migori County. The county is situated in the South-Western part of Kenya. It borders Homa Bay County to the North, Kisii and Narok Counties to the East and the Republic of Tanzania to the South. It also borders Lake Victoria to the West. It is located between latitude 1° 24‟ South and longitude 34° 50‟ East and covers an area of 2,596.5 km including approximately 523.32 km^2 of water surface. Geographically, the Kuja River originates in the highlands of Nyamira County, traversing through Kisii, Migori, and other regions before discharging into Lake Victoria.

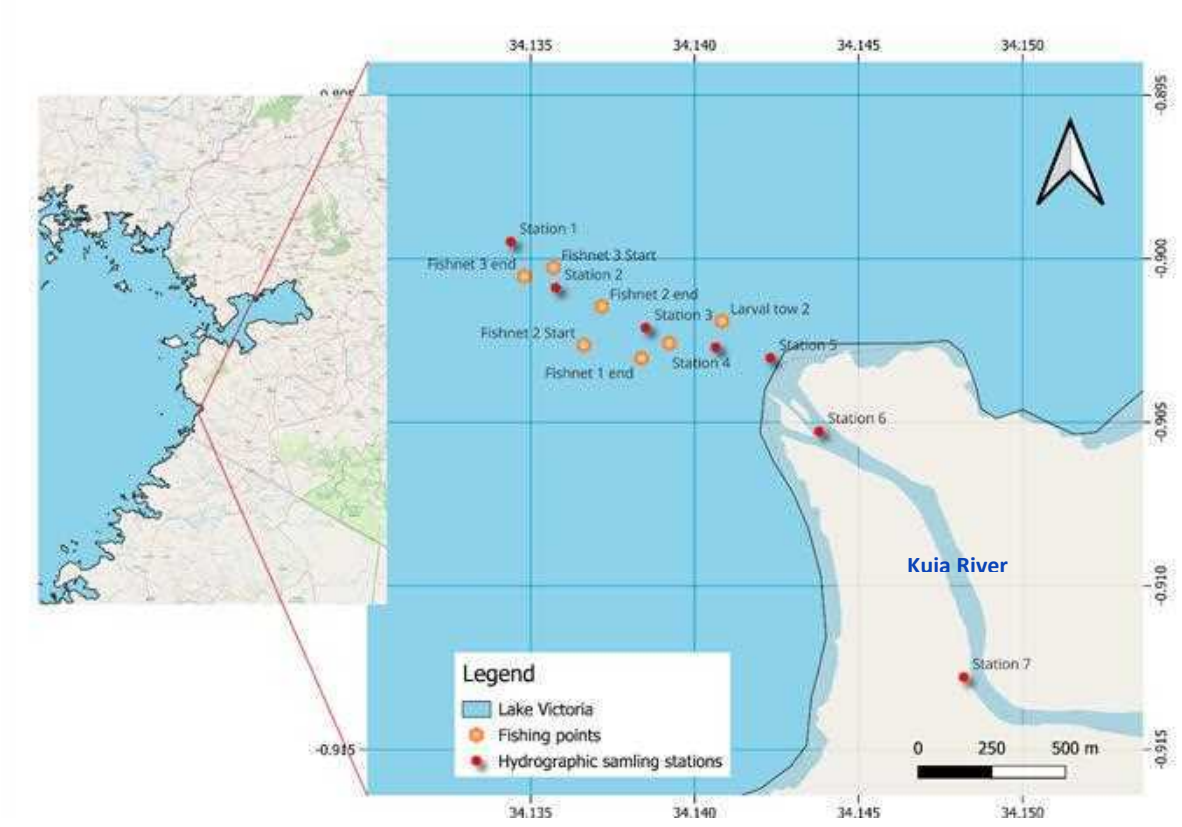

Figure 1: Map showing the study area of Kuja River

Located at the confluence of the Kuja River and Lake Victoria at about GPS Coordinates Latitude -0.902570°, Longitude 34.138510°, this area is characterized by a unique blend of hydrodynamic and ecological processes that shape its biodiversity, water quality, and sedimentary environment. The study area serves as a crucial ecological corridor supporting diverse aquatic and riparian habitats, providing resources for local communities, and sustaining commercial and subsistence fisheries.

Sand mining is an important economic activity in the region, providing construction materials for growing urban areas. However, it also poses potential risks, including habitat degradation, sedimentation, changes in hydrodynamics, and loss of biodiversity. On the other hand, sand mining itself has the potential for providing remediation to some of the existing ecological

impacts and would help ameliorate the possible ecological risks associated with the prevailing resource use practices.

The Kuja River catchment is also influenced by other extractive activities, such as artisanal gold mining in areas like Macalder, located upstream. These activities have been associated with pollution, including elevated levels of mercury and other heavy metals in water and sediments. Agricultural runoff, driven by extensive farming in the catchment, adds further pressure, introducing nutrients, pesticides, and sediments into the river system.

Rivers like the Kuja play a pivotal role in transporting nutrients, sediments, and organic matter to lakes, influencing their productivity and ecological balance. However, these systems are increasingly impacted by anthropogenic activities, including deforestation, urbanization, and overfishing. Such pressures compromise water quality, alter sediment dynamics, and disrupt aquatic ecosystems, highlighting the need for targeted conservation efforts.

4.2 The Environmental Survey Results of the Project Area

4.2.1 Physico-chemical parameters

The analysis of physicochemical parameters at the Kuja River Mouth revealed distinct patterns between stations located in the lake and those in the river, reflecting the differing hydrodynamic and ecological conditions. The figure below illustrates these variations, providing a comparative overview of key parameters across stations.

Water temperatures were notably higher at Station 1, located in the open lake, compared to Station 7 in the river. This difference is attributed to the open lake's exposure to solar radiation and its broader surface area, which allows for significant heat absorption and retention. Conversely, Station 7 experiences cooler temperatures due to the inflow of water from upstream. The turbulence and shading by riparian vegetation likely further contribute to the reduced temperature in the river.

Dissolved oxygen (DO) levels were significantly higher at Station 7, reflecting the aeration from the river's turbulence and the inflow of oxygenated water. In contrast, DO levels were lower at Station 1, consistent with the lake's stratification and reduced mixing, particularly during calm conditions. This pattern highlights the river's role in enhancing oxygen levels, which could influence biogeochemical processes near the river mouth.

Both conductivity and total dissolved solids (TDS) were markedly higher at Station 7. This observation suggests a higher concentration of dissolved ions and minerals in the river water, likely from upstream geological and anthropogenic sources such as agricultural runoff and soil erosion. In contrast, these parameters were lower at Station 1, indicative of the dilution effect within the larger lake ecosystem.

The pH gradient between Station 1 and Station 7 was slight but notable, with Station 1 showing higher pH values. This could be attributed to the reduced influence of organic acids and terrestrial inputs in the lake compared to the river. Additionally, photosynthetic activity in the lake's euphotic zone may raise pH levels due to the uptake of carbon dioxide by phytoplankton.

The concentration of total suspended solids (TSS) was significantly higher at Station 7, reflecting sediment-laden inflows from the river, particularly during periods of increased runoff or erosion. In contrast, the open lake at Station 1 showed reduced TSS levels due to sediment settling and the lack of direct terrestrial inputs. Elevated TSS in the river can influence light penetration, potentially affecting primary production downstream.

Both alkalinity and hardness were elevated at Station 7, indicative of the geochemical contributions from the river catchment area. These parameters reflect the buffering capacity and mineral content of the water. Lower values observed at Station 1 are consistent with the dilution of these substances in the larger volume of the lake.

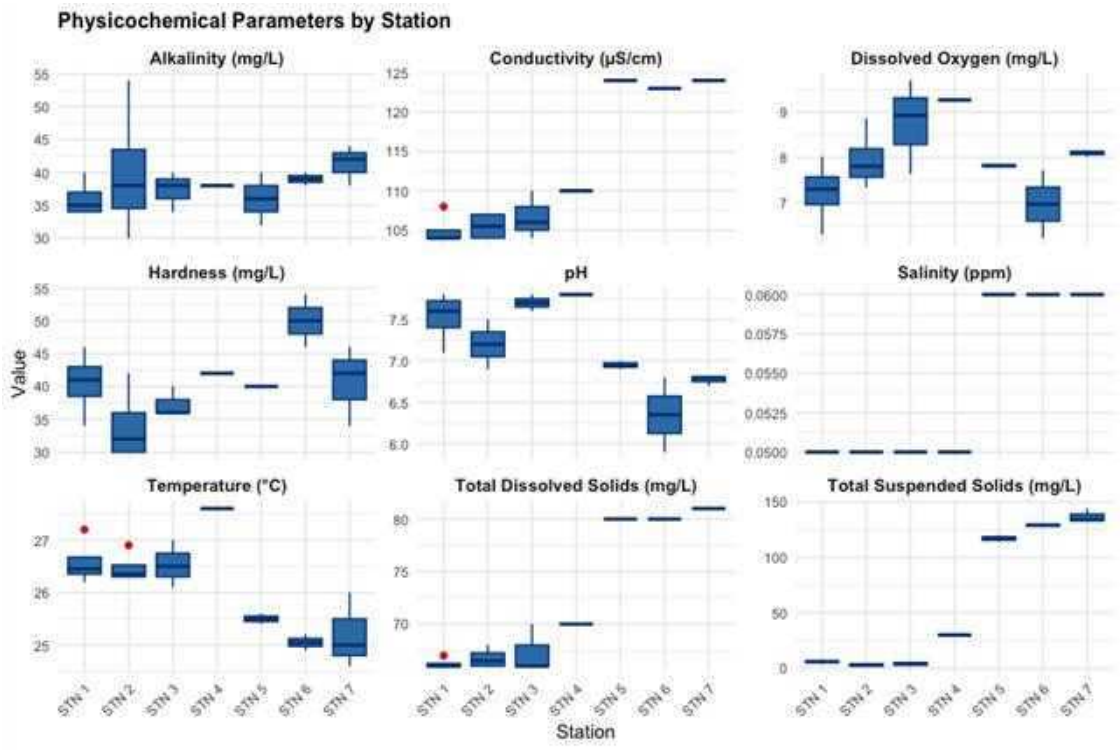

Figure 2: Physicochemical parameters

4.2.2 Nutrients parameters

The analysis of nutrient parameters at the Kuja River Mouth highlighted significant spatial variations between riverine and lacustrine zones. These differences underscore the contrasting influences of terrestrial inputs and in-lake processes.

Total phosphorus and soluble reactive phosphorus levels were considerably higher at Station 7, reflecting the river's role as a conduit for nutrient-rich inputs from agricultural runoff and soil erosion. In contrast, Station 1 exhibited much lower levels, likely due to nutrient dilution in the lake's larger water volume and uptake by aquatic vegetation or phytoplankton. Elevated phosphorus levels at Station 7 emphasize the impact of upstream catchment activities on nutrient dynamics at the river mouth.

Nitrates and nitrites were also found in significantly higher concentrations at Station 7. These nitrogenous nutrients are commonly associated with fertilizer runoff from agricultural activities upstream. The lower concentrations observed at Station 1 suggest that these nutrients are either

diluted within the lake or assimilated by phytoplankton and other aquatic organisms, supporting primary production in lacustrine habitats.

Ammonium levels showed a similar trend, with higher concentrations at Station 7. This is likely due to organic matter decomposition and inflows from livestock or domestic activities in the catchment. Conversely, ammonium levels at Station 1 were reduced, reflecting the oxidation of ammonia in well-oxygenated lake waters.

Silicate concentrations were elevated at Station 7, indicating a strong terrestrial contribution. Silicates are derived from the weathering of silicate minerals in the river basin. In the lake, biological uptake by diatoms, which require silicate for their frustule formation, likely explains the lower concentrations observed at Station 1.

Chlorophyll-a concentrations, a proxy for phytoplankton biomass, were notably higher at Station 1 compared to Station 7. This observation reflects the lake's clearer waters, which support greater light penetration and primary production. In contrast, the higher turbidity and suspended solids in the river at Station 7 likely limit light availability, reducing phytoplankton growth and chlorophyll-a levels.

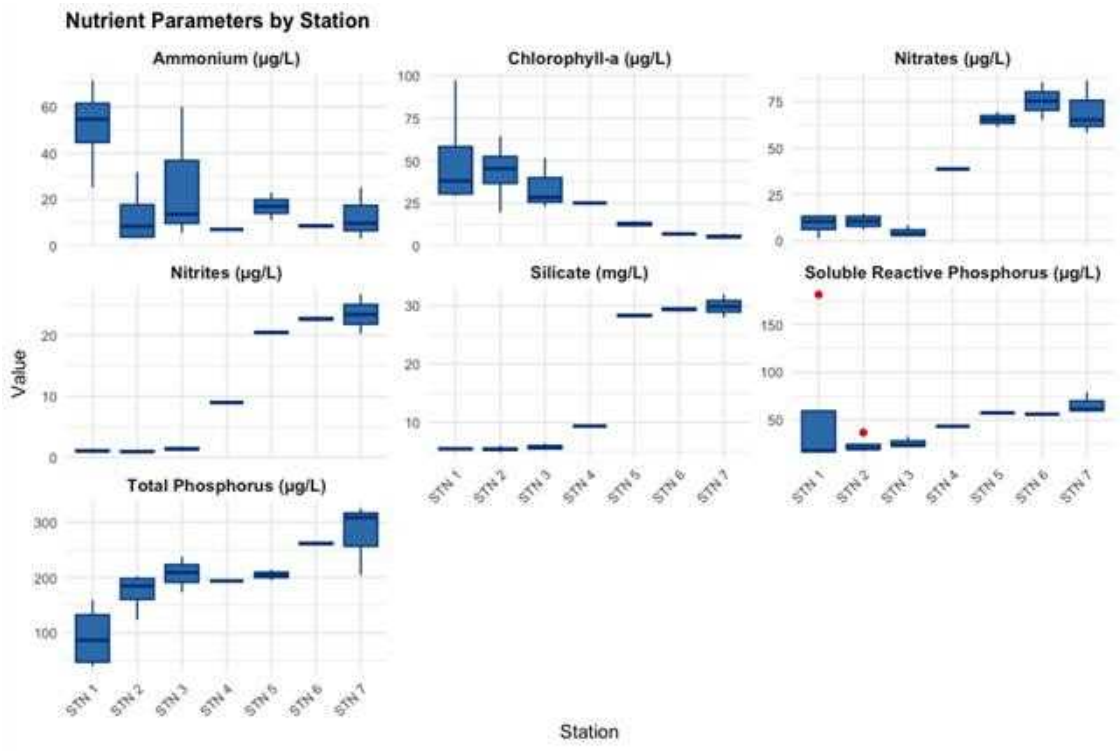

Figure 3: Nutrient parameters

4.2.3 Bottom characterization

The analysis of sediment core samples collected from various stations revealed distinct variations in texture, grain size, and color, reflecting the underlying environmental and depositional characteristics of the lake bottom.

4.2.3.1 Sediment Texture and Grain Size

Clay sediments were predominant in stations 1, 2, and 3, with a fine grain size of approximately 0.03 mm. This texture indicates deposition in low-energy environments where fine particles settle out of suspension. In contrast, sand sediments were found in stations 5 and 6, characterized by a coarser grain size of 0.5 mm. The sandy texture at these stations suggests deposition in higher-energy settings, such as areas with stronger water currents or wave action.

4.2.3.2 Sediment Color and Geochemical Conditions

The sediments exhibited a distinct color pattern. Surface layers were predominantly brown, indicating a high content of iron minerals. This coloration reflects oxidative conditions prevalent at the sediment-water interface. Conversely, subsurface layers in clay-rich stations (stations 1, 2, and 3) displayed a gray hue, signifying anoxic or reducing conditions, which are typical of deeper sediment layers shielded from oxygen exposure.

4.2.3.3 Environmental Implications

The observed sediment characteristics offer insights into the lake's depositional and geochemical processes. The clay-rich stations are likely located in deeper, more sheltered areas with low-energy conditions, while the sandy stations represent dynamic zones with higher energy levels. The vertical color gradient, transitioning from brown at the surface to gray at depth, underscores the ongoing biogeochemical transformations within the sediments.

Table 1: Summary of sediment texture, grain size, and colour characteristics

Station	Sediment Type	Grain Size (mm)	Color	Subsurface Color
1a	Clay	0.03	Brown	Gray
1b	Clay	0.03	Brown	Gray
1c	Clay	0.03	Brown	Gray
1d	Clay	0.03	Brown	Gray
2a	Clay	0.03	Brown	Gray
2b	Clay	0.03	Brown	Gray
2c	Clay	0.03	Brown	Gray
2d	Clay	0.03	Brown	Gray
3a	Clay	0.03	Brown	Gray
3b	Clay	0.03	Brown	Gray
3c	Clay	0.03	Brown	Gray
5	Sand	0.50	Brown	N/A
6	Sand	0.50	Brown	N/A

4.2.4 Biodiversity

4.2.4.1 Macroinvertebrates

Abundance and Distribution

The macroinvertebrate survey across six stations revealed notable variations in total abundance and community composition. The total abundance ranged from 1 individual at Station 6 to 73 individuals at Station 3 (Figure 4). Station 3 recorded the highest abundance, primarily dominated by *Tubifex tubifex* (Haplotaxida, Tubificidae), accounting for over 79% of the relative abundance. This dominance suggests a favorable habitat for detritivorous species, likely due to high organic matter content.

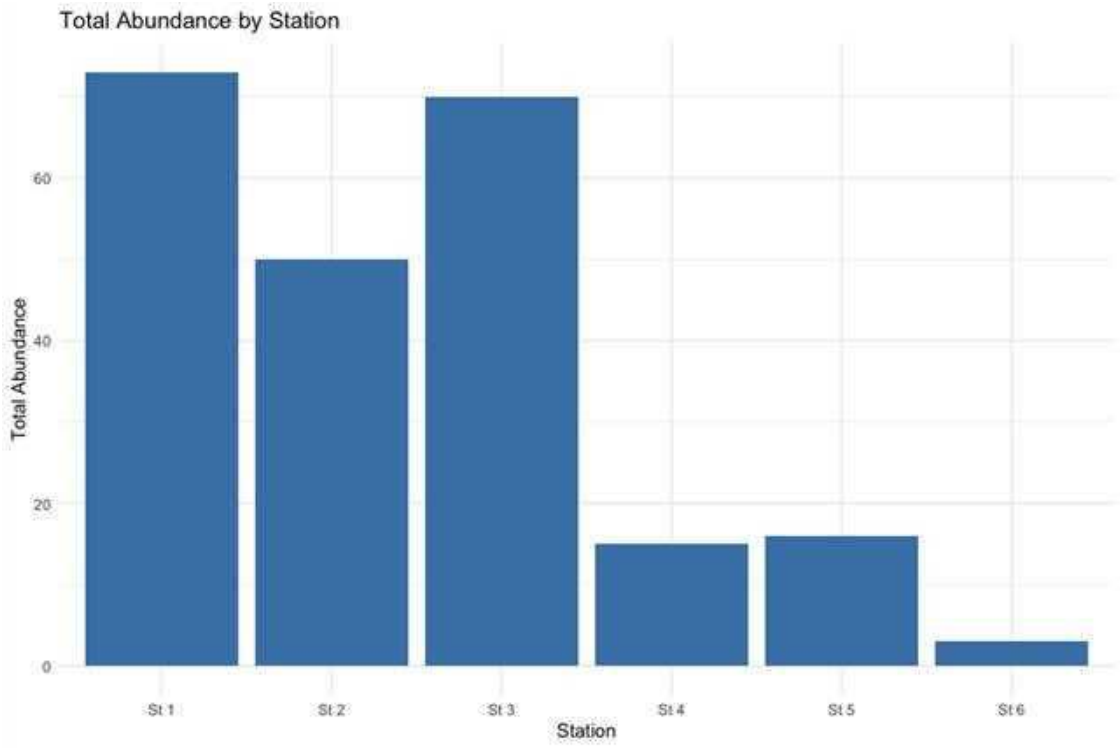

Figure 4: Total macroinvertebrate abundance by station

In contrast, Stations 4 and 6 exhibited significantly lower abundances, with only 15 and 3 individuals, respectively. These stations were characterized by the presence of predator species such as *Ambrysus mormon*and *Curicta sp.* The reduced abundance and presence of predators suggest ecological conditions that might limit prey availability or habitat suitability for macroinvertebrate colonization.

Relative Abundance

Relative abundance analysis highlighted substantial compositional differences between stations. For instance, *Tubifex tubifex* dominated Stations 1, 2, 3, and 5, reflecting its adaptability to a variety of conditions and possible tolerance to low dissolved oxygen levels. Conversely, Station 4 exhibited a more diverse composition, with contributions from multiple taxa, including *Ambrysus mormon, Pholcus phalaugioides* (Araneae, Pholcidae), and *Dytiscus verticalis* (Cleoptera, Dytiscidae). This suggests a more balanced ecosystem with a mix of predators and prey.

Station 6 was unique in hosting representatives of aquatic orders such as Ephemeroptera (*Stenonema exiguum*, Heptageniidae) and Decapoda (*Palaemonetes paladusus*, Palaemonidae), indicating a habitat with better water quality or distinct ecological conditions.

Table 2: Macroinvertebrate composition, abundance, and relative abundance

Station	Order	Family	Genus Species	Count	Relative Abundance
St 1	Haplotaxida	Tubificidae	Tubifex tubifex	47	64.383562
St 1	Prosobranchiata	Viviparidae	Vivipurus subpurpureus	12	16.438356
St 1	Unionoida	Unionidae	Anadonda cygneae	8	10.958904
St 1	Prosobranchiata	Thairidae	Melanoides tuberculata	6	8.219178
St 2	Haplotaxida	Tubificidae	Tubifex tubifex	41	82.000000
St 2	Prosobranchiata	Viviparidae	Vivipurus subpurpureus	2	4.000000
St 2	Unionoida	Unionidae	Anadonda cygneae	3	6.000000
St 2	Prosobranchiata	Thairidae	Melanoides tuberculata	4	8.000000
St 3	Haplotaxida	Tubificidae	Tubifex tubifex	58	82.857143
St 3	Unionoida	Unionidae	Anadonda cygneae	12	17.142857
St 4	Hemiptera	Naucoridae	Ambrysus mormon	8	53.333333
St 4	Areneae	Phalcidae	Pholcus phalaugioides	4	26.666667
St 4	Cleoptera	Dytiscidae	Dytiscus verticalis	3	20.000000
St 5	Haplotaxida	Tubificidae	Tubifex tubifex	16	100.000000
St 6	Hemiptera	Nepidae	Curicta sp	1	33.333333
St 6	Ephemeroptera	Heptageniidae	Stenonema exiguum	1	33.333333
St 6	Decapoda	Paleomonidae	Paleomonetes paladusus	1	33.333333

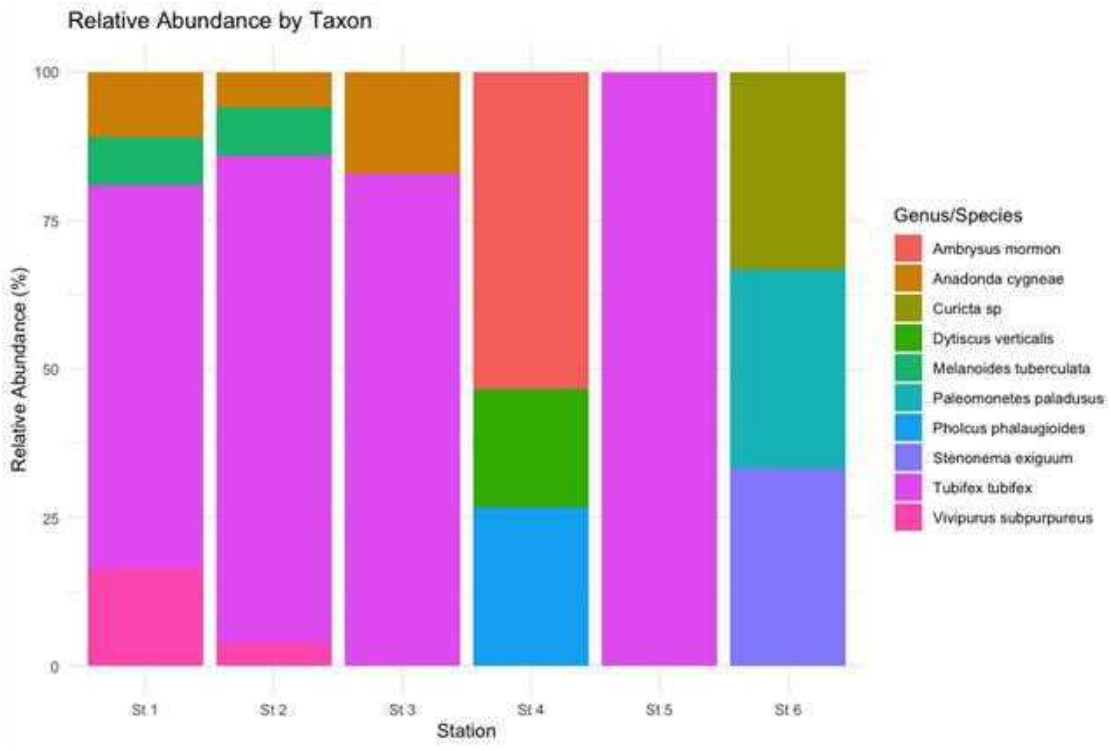

Figure 5: Relative abundance of macroinvertebrate taxa

Biodiversity Indices

Biodiversity indices further underscored ecological differences among stations. The Shannon-Wiener Index (H') ranged from 0.00 at Station 5, where a single taxon dominated, to 1.39 at Station 4, reflecting higher diversity and evenness. Similarly, Simpson's Diversity Index (D) was highest at Station 4 (0.71), indicating reduced dominance of any single taxon and a relatively even distribution of individuals across taxa.

Stations 1, 2, and 3 displayed intermediate diversity levels, with H' ranging from 0.69 to 0.97. These values, combined with moderate D indices, suggest environments dominated by tolerant taxa but supporting limited additional diversity.

Table 3: Total abundance and biodiversity indices

Station	Total abundance	Shannon_H	Simpson_D
St 1	73	1.03	0.54
St 2	50	0.67	0.31
St 3	70	0.46	0.28
St 4	15	1.01	0.60
St 5	16	0.00	0.0000000
St 6	3	1.10	0.67

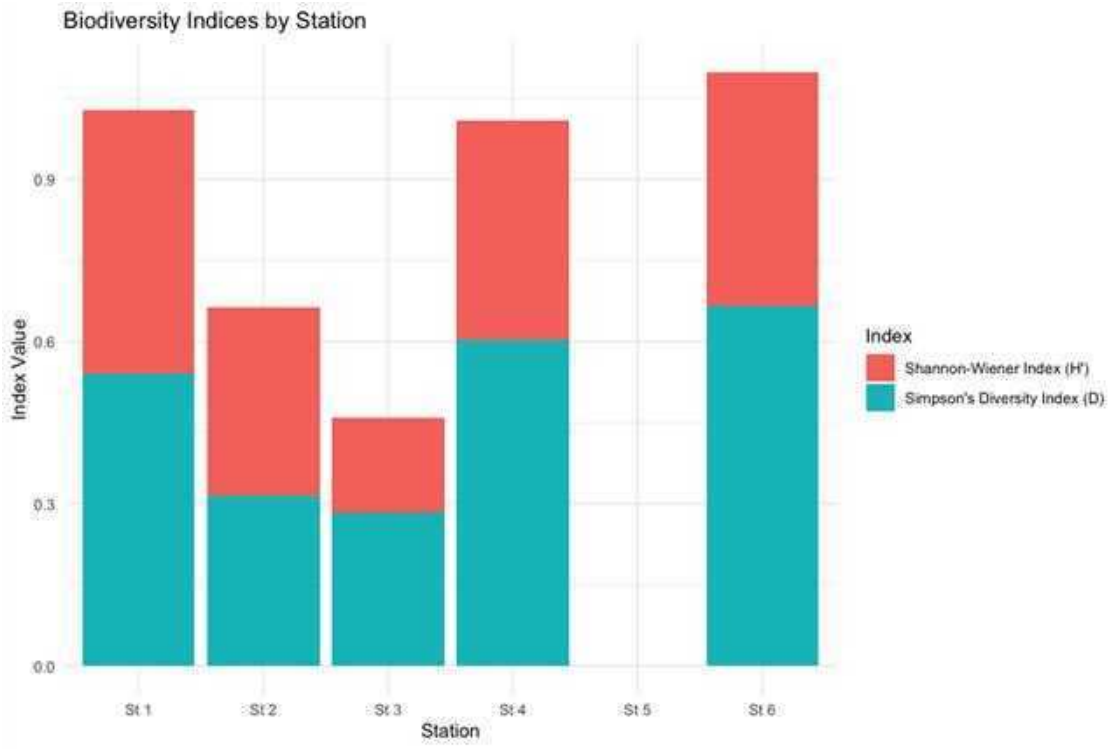

Figure 6: Total abundance and biodiversity indices

Ecological Implications

The observed abundance and biodiversity patterns highlight the interplay of environmental factors influencing macroinvertebrate communities. Stations dominated by *Tubifex tubifex* likely represent areas impacted by organic enrichment and reduced oxygen availability, conditions that favor pollution-tolerant species. Conversely, the higher diversity and evenness observed at Station 4 suggest a relatively healthy and balanced ecosystem, possibly benefiting from lower anthropogenic impacts and better water quality.

The presence of specific taxa such as *Stenonema exiguum* (Ephemeroptera) at Station 6 further supports the idea of localized habitats with good ecological conditions, as members of this order are often sensitive to pollution.

4.2.4.2 Zooplankton

Order-Level Abundance

The total and average abundance of zooplankton orders revealed a dominance of Copepod, followed by Cladocera. These taxa are key players in aquatic food webs, acting as primary consumers and prey for higher trophic levels. The relatively high abundance of copepods indicates their adaptability and ecological significance, while the presence of cladocerans suggests favorable conditions for their growth, such as sufficient algal availability.

Taxa and Station-Level Abundance

The taxa and station-level analysis highlighted significant spatial variability in zooplankton abundance. For instance, stations with higher total individuals for taxa like *Cyclopoida* and *Diaphanosoma excisum* suggest localized environmental factors, such as nutrient influx or predator-prey dynamics, influencing their distribution. This spatial heterogeneity underscores the importance of considering station-specific characteristics in ecological assessments.

Diversity Indices

The Shannon and Simpson diversity indices provided insights into the zooplankton community structure across depths and stations. Depth-wise, diversity peaked at intermediate depths, indicating optimal environmental conditions such as light penetration and oxygen levels. In contrast, diversity decreased at the shallowest and deepest sampled depths, possibly due to higher predation or stratification effects.

Station-wise, the diversity indices varied significantly, reflecting heterogeneity in zooplankton community composition. Stations with higher Shannon indices had a more even distribution of taxa, while lower Simpson indices suggested reduced dominance by a single group. This variation may be driven by site-specific conditions, including water quality and human activities.

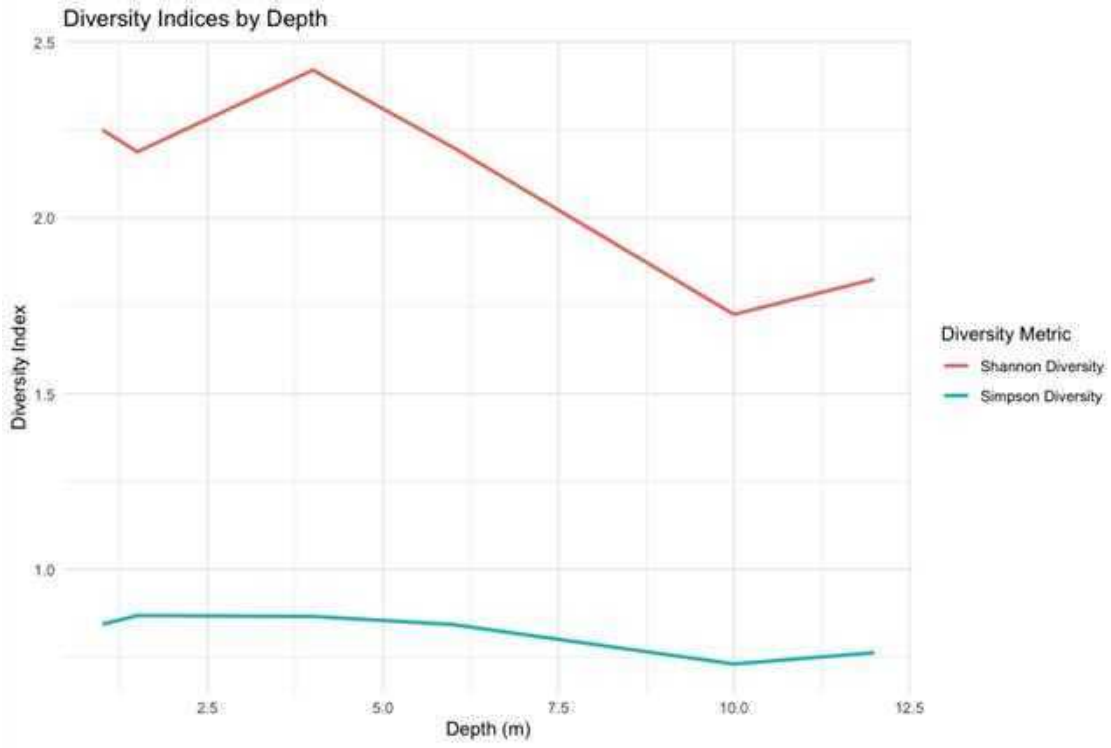

Figure 7: Diversity indices

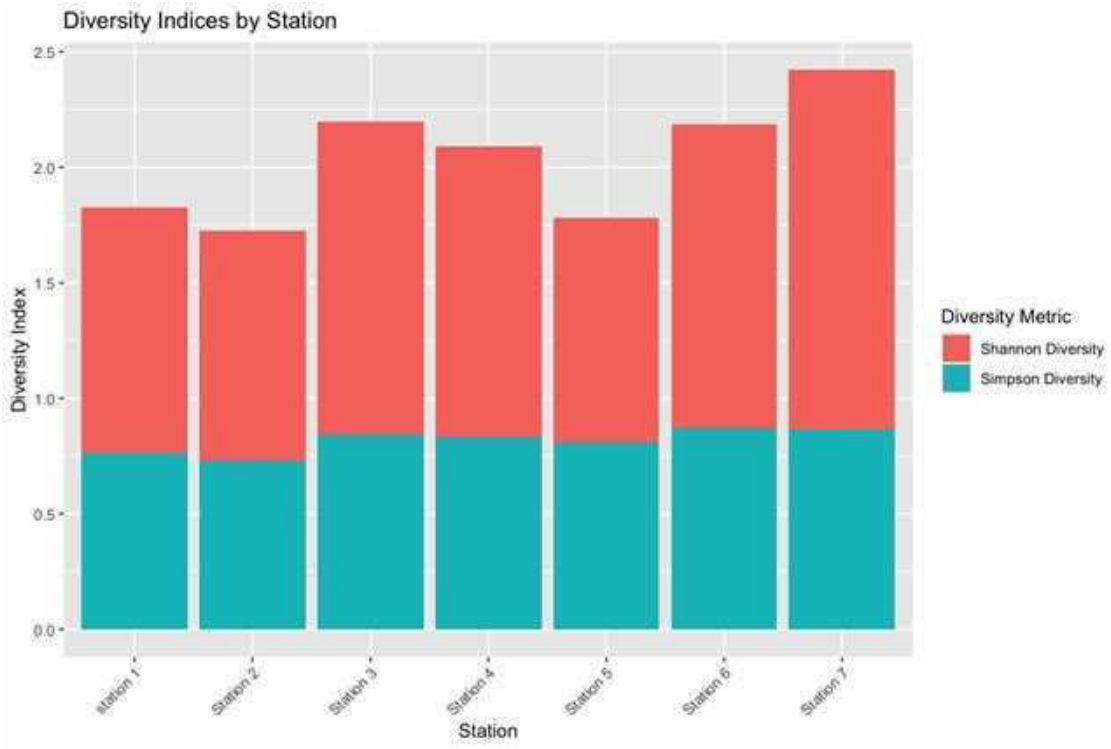

Figure 8: Shannon and Simpson diversity indices by station

4.2.4 Fisheries

4.2.4.1 Fish Larvae abundance and distribution

The abundance and distribution of fish larvae, sampled using Seine gear, exhibited distinct spatial patterns. The highest abundance was observed in the lake (offshore station), followed by the shoreline station, while no larvae were recorded at the river mouth. This distribution suggests that the lake provides critical nursery habitats that support fish recruitment. These areas likely offer optimal conditions for spawning, including favorable temperatures, abundant food resources, and shelter from predators. The relatively lower abundance at the shoreline may reflect transitional conditions, while the absence of larvae at the river mouth could indicate less suitable environmental factors or the impacts of anthropogenic activities, such as increased turbidity or habitat degradation. Protecting areas with high larval abundance is essential to sustain fish stocks and ensure successful recruitment, emphasizing the importance of targeted conservation measures in these zones.

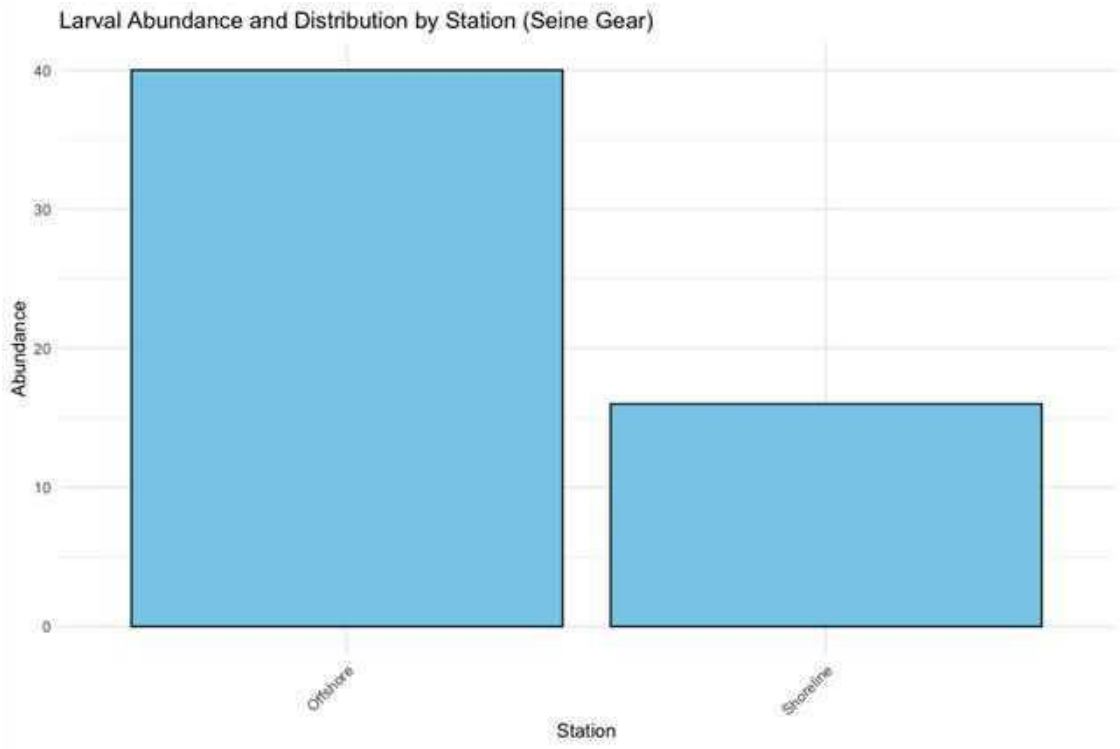

Figure 9: Larval abundance and distribution across stations

4.2.4.2 Fish species diversity and abundance

The analysis of species diversity, indicated by Shannon and Simpson indices, revealed significant differences across stations. High Shannon diversity values reflect ecosystems with rich species interactions and even distribution, highlighting their ecological stability. Stations with low Simpson diversity, however, suggest dominance by a few species, possibly caused by overfishing or environmental stressors.

4.2.4.3 Fish feeding habits

Feeding habits analysis identified the diversity and occurrence of prey items among fish species. The figure below highlights dietary preferences and trophic relationships, showing the distribution of prey items across species. Species with diverse diets demonstrate greater ecological flexibility, potentially allowing them to adapt to environmental changes. Conversely, species with specialized diets may be more vulnerable to shifts in prey availability. The preservation of prey diversity and habitat complexity is essential for maintaining food web stability and supporting diverse fish populations.

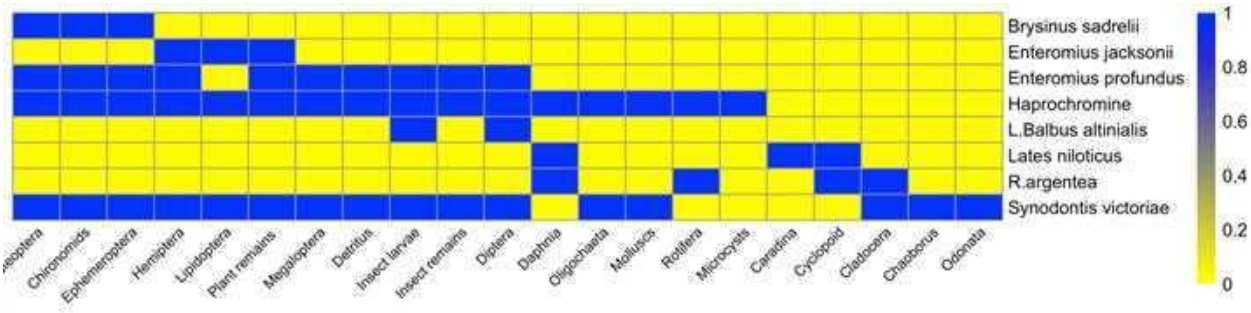

Figure 10: Dietary preferences of fish species

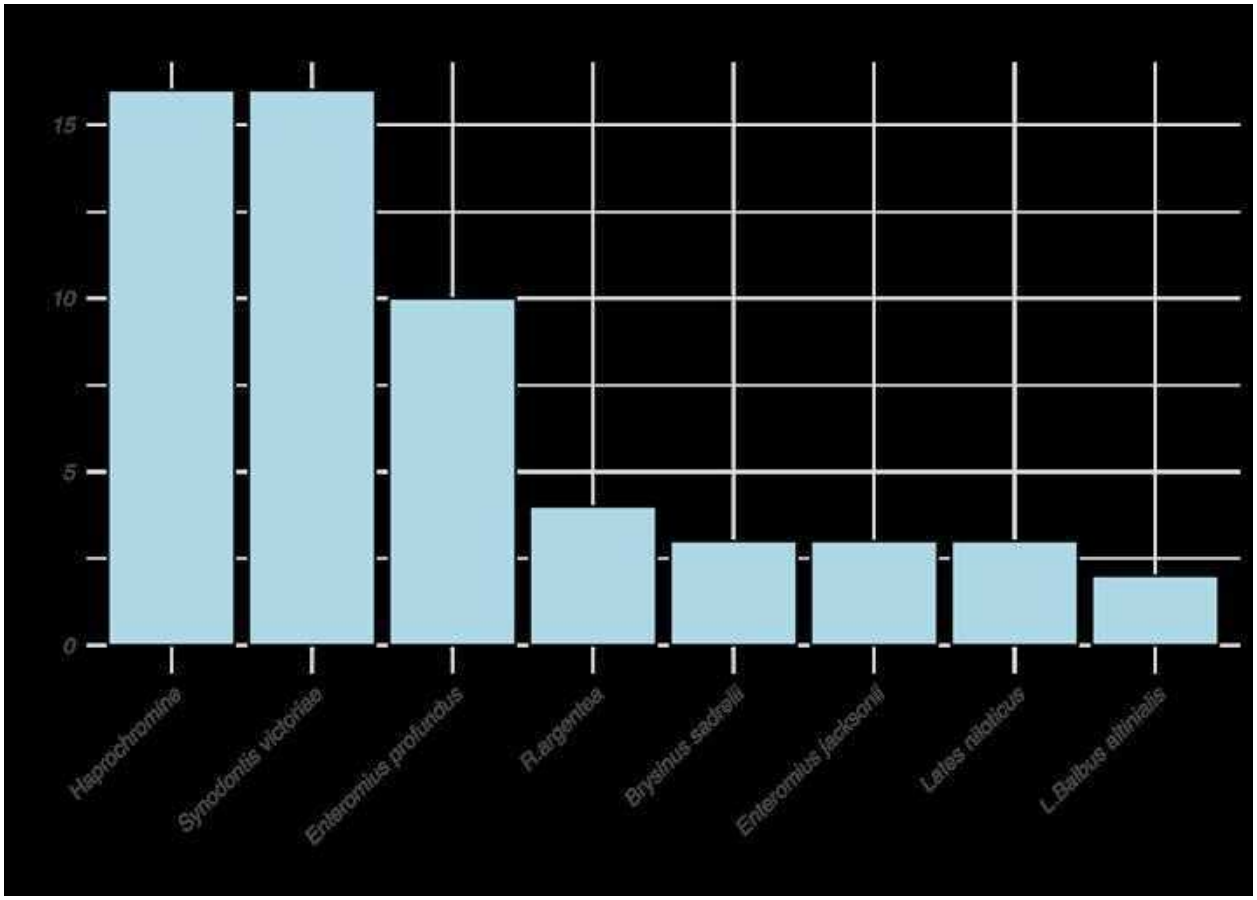

Figure 11: Frequency of prey items consumed by different fish species

4.2.4.4 Shoreline characteristics and existing risks

The river mouth towards the offshore direction was dominated by free-floating water hyacinth macophyte (*Potederia crassipes*), while *Vossia cuspidata* dominated the left flank of the lower edge of the bank (Plate 1) and *Phragmites kaka* dominated the right side of the bank. However, typical macrophytic plants were found between 30 and 40 metres from the riverbank. In general, the river mouth was the most disturbed, owing to continual beach seine fishing activity that hampered macrophyte development. The river bank was also characterized by a number of emergent macrophytes, such as the Cyperaceae family, which lived along the upper margin.

Plate 2: The shoreline showing turbid river plume waters within the interface

It was also noted that the recent (ongoing) lake level increase has led to recession in shoreline and inundation of land areas previously covered by macrophytes.

During the sampling phase, there was a noticeable presence of continuous vigorous fishing activity, primarily using the beach seining method. Several fleets of beach seine nets were deployed over wide areas of the estuary zone by local fishermen in paddled Sesser canoes and then manually brought ashore by complementary teams operating from the beach/ shoreline. The beach seining method involves encircling a shallow bay or onshore region with a long, often single-panel seine net with bottom sinkers stretching it to the lake bed and sweeping the water column, gathering every single fish and object along the way. This type of fishing is not only unlawful, but also detrimental to aquatic habitat and riparian wetlands. Sand mining has the ability to deepen the river mouth, making it impossible to deploy and operate beach seines.

Plate 3: Ongoing beach seining activity observed during the sampling expedition

4.3 Population and Household Characteristics

The total population of Migori County is 1,116,436, of which 48% is male and 52% is female; the youth (aged 15 to 30 years) make up 36% of the population (KNBS, 2019). The county has a population growth rate of 3.1%, higher than the national rate of 2.3%. The population is

projected to reach 1,680,450 people by 2030. The average household size in the county is 4.6 persons, compared to the national average of 3.9. The county's average population density is 427 persons per km^2. Of the total population, 85% reside in rural areas while 15% is urban (KNBS, 2019).

4.3.1 Demographic Characteristics

The population and density distribution for Sub counties in Migori County is given in the table below.

Table 4: Population and Density Distribution by Sub County

Subcounty/ County	Male	Female	Total	Land Area (Km^2)	Density/Km^2
Awendo	56,348	60,939	117,290	255	459
Kuria East	46,969	49,894	96,872	188	516
Kuria West	101,090	107,417	208,513	396	527
Nyatike	83,989	92,164	176,162	677	260
Rongo	59,257	65,329	124,587	213	584
Suna East	58,977	63,694	122,674	205	598
Suna West	61,430	67,459	128,890	288	448
Uriri	68,127	73,318	141,448	392	361
Migori County	**536,187**	**580,214**	**1,116,436**	**2,613**	**427**

Source: Kenya Population and Housing Census (2019)

4.3.2 Education

4.3.2.1 Education Infrastructure in Migori County

As at 2017, the county had 817 primary schools comprising 616 public and 201 private primary schools with a combined enrolment of more than 254,000. The total number of teachers over the same period was 5918. Teacher shortage stood at approximately 904 teachers. The County had 816 ECD centres, 670 and 1174 ECDE teachers employed by the county government and community respectively as at 2017. Total enrolment stood at 109, 990 with a gender parity of 1:1pupils over the same period. The Teacher –Pupil ration and literacy levels stood at 1:60 and 87.6% respectively.

There are over 217 secondary schools in the county with an enrolment of 73,907 of 100,000 secondary school going population. This represents an average enrolment of 74% of the children eligible for secondary school education. According to MICS report 2017, the average net attendance at secondary school stood at 11.8 per cent with gender parity index of 2:0. With 56 per cent of the married having got married at between 15 and 17 years and with 49.4 per cent of the children who attend school being involved in some form of child labour, it is

imperative that challenges of child marriages and child labour are addressed as a matter of priority.

The county had a total of 23 Vocational Technical Training Institutions with a student population of 1200 and108 teachers as at the start of 2017 respectively. However, most of these institutions recorded low enrolment due to the following factors: Inadequate provision and relevant technical skills that are responsive to the labour market, inadequate facilities, training tools and training materials. The lack of training facilities compromises the relevance of T.T.I taught skills necessary to meet skill needs in industries and business organizations. There is 1 university college, 4 university campuses, 10 ECDEs training colleges,1 public and 2 private teachers training colleges in the county.

4.3.2.2 Literacy Level

The county's literacy level currently stands at 89%. About 17% of heads-of-household have no education while 62% have attained primary education and 21% have attained secondary education

4.3.3 Infrastructure Development

4.3.3.1 Information, Communication and Technology (I.C.T)

According to the Basic Report on Well Being in Kenya 2015/2016 (source KNBS), mobile phone coverage, use of radio, use of computer, access to internet and use of TV were at 78.6%,91.1%, 7.4%, 12.2% and 35.5% respectively. It is evident from the above statistics that whereas mobile phone and radio usage is satisfactory, the other avenues of ICT usage require to be boosted and as such, the County needs to invest more in provision of internet services which the residents can access from their phone or computers since ICT is a major enabler in the transformation of the county.

4.3.3.2 Energy Access

Available statistics indicate that there is over dependence on non-renewable hydro -electric power within the county as the main source of energy leading to exploitation of forest resources and low industrial productivity.

Over 82% of households in the county rely on firewood as their main source of cooking fuel, while 10% use charcoal, 4% use kerosene, 4% use liquid propane gas, and 0.5% use electricity. The use of electricity is more common in male-headed households (6%), compared to female-headed households (4%). For lighting, 10.2% of households use electricity from the main grid, 29.7% use solar power, 12.8% use lanterns, 0.75% use torches, and 0.2% use candles (County Government of Migori, 2018). There is need to encourage improved and efficient use of alternative sources of energy other than firewood as the potential for harnessing solar, biogas and wind energy are available within the county. In addition, there is potential for generation of electricity from locally available resources such as biomass from agricultural wastes and biogas from sugar cane to supplement the existing production from Gogo falls.

4.3.4 Housing Conditions

Approximately 90% of the county's population live in rural areas with mud walled structures being the most predominant mode of housing. According to the Basic Report on Well Being in

Kenya 2015/2016, 71.5%, 6%, 4.1%, 6.7% and 4.8% of the county population live in mud/cow dung-walled houses, brick walled houses; cement blocks walled houses, houses with cement finishing and use corrugated iron sheets for walling respectively. Further, for roofing, 92.6% of the population use corrugated iron sheets whereas 5.5% use grass. For flooring, 12.2 % of the population use earth, 52.7% use mud/cow dung and 33.5% use cement. The low usage of cement is attributed to high poverty levels. Appropriate infrastructure for housing development is still lacking in the county and it is therefore imperative for the county government in collaboration with the national government and other development partners to modernize housing through appropriate support mechanisms such as mortgage guaranteeing, urban regeneration, appropriate building technologies and housing subsidies.

4.3.5 Access to Water and Sanitation

4.3.5.1 Water Resources

The major water resources in the county comprise of surface, ground and rain water. Surface water consists of Lake Victoria with a total water mass of 475 km^2 and several rivers with the major ones being Kuja, Migori, Sare, Oyani, Riana, Tebesi, Misadhi and Ongoche. All these rivers drain into Lake Victoria. Ground water resources comprise of boreholes, shallow wells and springs.

The quality of water from these sources – especially surface water is however relatively poor and usually requires treatment prior to domestic use.

4.3.5.2 Water Supply Schemes

The County has six urban water supply schemes – Migori Water Supply, Awendo Water Supply, Rongo Water Supply and Kehancha Water Supply. Other water supply schemes in the county are Macalder Water Supply in Nyatike Sub County and Uriri Water Supply in Uriri Sub County. The County Government with support from the Water Sector Trust Fund (WSTF) is currently under-taking completion works for Kegonga Water Project in Kuria East Sub County. Improvement works are also ongoing for Gogo Macalder Water Supply in Nyatike Sub County by World Vision (K) Ltd.

Other piped water schemes include Sony Sugar Company Water Supply in Awendo Sub County, Nyasare Water and Sanitation Company Ltd in Suna East Sub County, Nyaduong C WUA in Suna East Sub County, Nyaprosony Community Water Project in Nyatike Sub County and Rapogi Community Water Project in Uriri Sub County among others.

The main water sources in the county are piped schemes, boreholes, shallow wells, springs and water dams with access ranging between 200m and 500m. However, in the rural areas due to lack of developed water supply system people are walking for longer distances to fetch water.

4.3.5.3 Improved Water Sources

Improved sources of water comprise protected springs, protected wells, boreholes, piped into dwellings and rain water collection while unimproved sources include ponds, lake, stream/river, unprotected spring, unprotected well, water vendor and others. Access to clean water is extremely limited, given that less than 1% of county households have piped water, and less than 3,000 households have access to potable water. Of the county residents, 52% use improved sanitation: about 0.2% use piped sewers, 15.3% use pit latrines with slabs, and 52.6%

use pit latrines without slabs (KNBS, 2014). Improved sanitation is marginally higher in male-headed households at 54%, compared to female-headed households at 48% (ASDSP, 2019). Rongo and Awendo constituencies have the highest share of residents using improved sources of water at 35%. Isibania ward has the highest share of residents using improved sources of water at 75% each.

4.3.5.4 Sanitation

The county lacks access to any form of sewerage system and is therefore highly prone to diseases brought as a result of poor hygiene standards. This contributes heavily to acute respiratory infection, diarrhoea, malaria among other diseases that are common in the county. A total of 52% of residents in Migori County use improved sanitation, while the rest use unimproved sanitation. Use of improved sanitation is slightly higher in male headed households at 54% as compared with female headed households at 48%. Rongo constituency has the highest share of residents using improved sanitation at 68%. Central Kamagambo ward with the highest share of residents using improved sanitation at 85%.

4.3.6 Agriculture

4.3.6.1 Food Crops

The main livelihood activity in the county is agriculture. About 63% of the total land area in the county is devoted to agriculture, of which 60% is under food crops and 40% is under cash crops. The main food crops produced in the county include cereals (maize, sorghum, rice, millet); pulses (beans, cow peas, green grams, soya beans), roots and tubers (sweet potatoes, cassava). Due to availability of rainfall and favourable climatic conditions, the county has the potential to produce enough for its population and export the excess to the surrounding market if sufficient measures shall be instituted to address challenges farmers face in the production of these crops i.e., pests, marketing and poor harvest. The main factors hindering food production in Migori include rapid urbanisation, water shortages, pest and diseases, climate change and the ever-growing population.

4.3.6.2 Cash Crops

The main cash crops grown in the county includes sugar cane and tobacco. Sugarcane is majorly grown in Awendo, Rongo, Suna East and West sub-counties while Tobacco covers Kuria East and West and parts of Rongo sub-counties. However, other cash crops such as coffee and tea are grown but to a small scale.

4.3.6.3 Horticulture

The county has good climatic condition that is favourable for growing of horticultural crops such as fruits, vegetables, flowers and ornamental plants. Already approximately 7,500 ha is under horticultural cultivation where cabbages, capsicum and tomatoes are majorly produced.

4.3.6.4 Livestock keeping

Majority of the livestock farmers in the county rear traditional breeds such as Zebu, a few exotic breeds mainly cross of Friesian and Ayrshire, East African goat, indigenous chicken and bees. Capture and aquaculture fisheries form the main fishing activities, undertaken primarily in Nyatike subcounty (County Government of Migori, 2018).

Most of these livestock are bred for their sentimental value and are used only in emergencies to cover medical and transport costs, pay school fees, entertain guests and pay dowry. As a result, production of major livestock products has continued to remain low resulting in importation of the deficits from the surrounding counties to meet the huge local demand.

4.3.7 Other Economic Activities

4.3.7.1 Markets

The county has more than 47 open air markets which are distributed across the county. They form the major sources of revenue to the county.

4.3.7.2 Industrial Parks (including Jua Kali sheds)

Sustainable development of industrial parks in Migori opens opportunities for creating new jobs, improving local productivity and maintaining county competitiveness. Currently there are three developed Jua Kali sheds located at Rongo, Migori and Awendo hosting more than three hundred artisans who are mostly tin smiths, carpenters, tailors, mechanics, food processors and welders.

4.3.7.3 Major Industries

The main formal industrial venture in the county is the Sony Sugar Company. However, other ventures like the milk cooling and fish processing plants at Rongo sub-county are still at their early stages of development. The county's cottage industry is still at infancy with over 5,000 artisans registered within the existing 200 Jua Kali registered associations. Most of these associations however are dormant and have therefore not been able to marshal sufficient capital to harness the creativity of the indigenous populations.

4.3.7.4 Blue Economy

Blue Economy means the sustainable use of the water-mass and its resources for economic growth, improved livelihoods and employment creation. It covers both aquatic and marine spaces including oceans, seas, coasts, lakes, rivers, and underground water. It encompasses a range of productive sectors, including fisheries, aquaculture, tourism, transport, shipbuilding and repair, energy, bio-prospecting, bunkering, sport fishing, port services, marine insurance, freight forwarding underwater mining and related activities. Migori County has a total water mass of 475 km^2 due to its proximity to Lake Victoria with several beaches along the 42-kilometre shoreline. The county also has several rivers the major ones being Kuja, Migori, Sare, Oyani, Riana, Tebesi, Misadhi and Ongoche.

4.3.8 Religion

The vast majority of Migori residents are Christians, with the Seventh-day Adventist, Anglican and Roman Catholic churches being the most established Christian denominations. Other well-established denominations include the African Inland Church and the Presbyterian Church of East Africa. In addition, there are a number of Evangelical churches and Independent African Christian churches. Islam is another major religion in Migori. Followers include both Sunni and Shi'ite Muslims.

The largest number of Muslims in Migori are found in Migori town centre and the neighboring regions. Many of the traditional African religions are no longer widely practiced. Some of the denominations considered as indigenous religions combine aspects of Christianity with traditional religious beliefs. Two of these denominations are Legio Maria and Roho Israel, found mostly in rural areas. The few Migorians who adhere to Hinduism and Sikhism are mostly Indians. They reside mostly in Migori Town.

4.3.9 Health Conditions

4.3.9.1 Disease Prevalence (Morbidity)

Most of the key health indicators in the county are below the national average The most common diseases in the county are Malaria at 53 percent prevalence, respiratory tract infections at 16 percent, diseases of the skin, diarrhoea at 7 percent, intestinal worms/typhoid at 3.2 percent, accidents/fractures and sexually transmitted infections.

4.3.9.2 Health Facilities

The health sector plays a pivotal role in economic growth and poverty reduction as exemplified in SDGs 1 and 3. The county currently has no Referral Hospital, 11 Sub- County Hospitals, 20 health centres and 95 dispensaries which are distributed as shown in the below. Besides the above public facilities, there are 8 faith-based health facilities, 10 private run hospitals, 9 Nursing homes and 56 private clinics.

Table 5: GOK Health Facility Distribution by Sub County

Sub County	County Referral Hospital	Sub County Hospital	Health Centre	Dispensary	Facilities
Awendo	0	1	2	9	12
Kuria East	0	1	3	12	16
Kuria West	***0***	***2***	***8***	***12***	***22***
Nyatike	0	2	1	25	28
Rongo	0	1	3	5	9
Suna East	0	1	1	8	10
Suna West	0	0	1	7	8
Uriri	0	3	1	17	21
County Totals	**0**	**11**	**20**	**95**	**126**

Source: Migori County CIDP 2018-2022

4.3.10 Community Challenges

4.3.10.1 Sexual Gender Based Violence

Sexual And Gender Based Violence Policy - 2019

The County Government of Migori has recognized that violence against boys, girls, men and women has hampered their socioeconomic development. In an endeavor to address these injustices, Migori County has developed this policy to address the challenges that promote the different forms of violence as well as cohesively manage responses to it.

According to UN WOMEN report 2015, Nyanza region where Migori County is, recorded 49.5% physical violence. This is higher than the national average of 19.4%. 72.6% of survivors in Nyanza were unwilling to pursue justice. In 2016, Ninety (90) cases of SGBV among adolescents aged 10-17 years presented to health facilities in Migori (DHIS2 2016). However, it is worth noting that there are many cases that go unreported and facility-based data is inadequate and may not reflect the magnitude of sexual and gender-based violence. The commonly reported cases of SGBV encompass threats of violence and coercion. They are of physical, emotional, psychological and sexual nature. In other cases, reported, it takes the form of denial of resources or access to services. It inflicts harm on women, girls, men and boys equally.

Available statistics indicate that SGBV cases reported are still high in Migori County ranging between 264 and 179 in 2016 and 2017 respectively, with cases of rape topping at 62% and 69% respectively (source: DHIS).

4.3.10.2 Cases of Misconduct and Violence

The most prevalent types of crimes in the county include assault, stealing, stock theft, defilement and burglary. Cases of drug abuse especially bhang are most prevalent in Migori town. According to the annual crime report 2016 by the national police service, there were 1303 crimes reported in Migori in the year 2016 compared to 1282 cases reported in 2015 an increase of 2%. (Migori County CIDP 2018-2022).

5. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Several laws and regulations that govern environmental and social issues have been developed. The main legislation is the Environmental Management & Coordination (Amended) Act (EMCA) of 2015. The Act emphases that every person in Kenya is entitled to a clean and healthy environment in accordance with the Constitution and relevant laws and has the duty to safeguard and enhance the environment. It also empowers stakeholders to participate in sustainable management of the natural resources. It calls for Environmental and Social Impact Assessment (ESIA) to guide the implementation of environmentally and socially sound decisions. There are other relevant local laws and regulations that have been looked into. They include but not limited to, the Constitution, Mining Act, 2016, the Water Act of 2016, and The County Government Act 2012 among others.

An outline of the legislative, policy and regulatory framework that the proponent will need to observe when implementing this project in order to comply with the environmental and social requirements are mentioned below.

5.1 The Constitution of Kenya

The Constitution of Kenya has taken onboard various issues that are related to environmental management. Article 42 of the Bill of Rights contained in the 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.

The need to establish systems of environmental impact assessment, environmental audit and monitoring of the environment and public participation is provided in Article 69.

5.2 The National Policy Framework

The Republic of Kenya has a policy, legal and administrative framework for environmental and social management. The broad objectives of the policy are: -

- To ensure optimal use of natural resources while improving environmental quality.
- To conserve natural resources such that the resources meet the needs of the present without jeopardizing future generations in enjoying the same.
- To develop awareness that inculcates environmental stewardship among the citizenship of the country.
- To integrate environmental conservation and socio-economic aspects in the development process.
- To ensure that national environmental and social goals contribute to international obligations on environmental management and social integrity.

To achieve the above policy objectives, it is a policy directive that appropriate reviews and evaluations of all forms of developmental project plans and operations are carried out to ensure compliance with the environmental policy and legal frameworks.

The following section provides details on the relevant policies in the country.

5.2.1 Environment and Development (Sessional Paper No. 6 of 1999)

Kenya's policy paper on the Environment and Development was formulated in 1999. The policy defined approaches that will be pursued by the Government in mainstreaming environment into development. The policy harmonized environmental and developmental objectives with the broad goal of achieving sustainable development. The policy paper also provided guidelines and strategies for government action regarding environment and development. In regard to wildlife, the policy reemphasized government's commitment towards involving local communities and other stakeholders in wildlife conservation and management, as well as developing mechanisms that allow them to benefit from the natural resources occurring in their areas. The policy also advocated for the establishment of zones that allow for the multiple use and management of wildlife. This policy is relevant to the proposed development project in view of the potential impacts on the environment and involvement of the public in project planning.

5.2.2 Sessional Paper No. 10 of 2014 on the National Environment Policy

The policy seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. It recognizes the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the country but also recommends strong institutional and governance measures to support achievement of desired objectives and goals.

5.2.3 The National Biodiversity Strategy of 2000

The National Biodiversity Strategy and Action Plan (NBSAP) was formulated to enable Kenya address national and international commitments defined in Article 6 of the Convention on Biological Diversity (CBD). The strategy is a national framework of action for ensuring that the present rate of biodiversity loss is reversed, and present levels of biological resources are maintained at sustainable levels for posterity.

The general objectives of the strategy are to conserve Kenya's biodiversity; to sustainably use its components; to fairly and equitably share the benefits arising from the utilization of biological resources among the stakeholders; and to enhance technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation. The proposed project will need to comply with the requirements of this strategy since the project may lead to loss of biodiversity at the river mouth.

5.2.4 Sessional Paper No. 3 of 2009 on National Land Policy

The Land Policy in Kenya is guided by the environmental management principles which are aimed at restoring the environmental integrity through introduction of incentives and encouragement of use of technology and scientific methods for soil conservation, among others. The policy further requires fragile ecosystems to be managed and protected by developing a comprehensive land use policy bearing in mind the needs of the surrounding communities. The policy also requires zoning of catchment areas to protect them from degradation and establishment of participatory mechanisms for sustainable management of fragile ecosystems. The policy also called for development of procedures for co-management and rehabilitation of forest resources while recognizing traditional management systems and

sharing of benefits with contiguous communities and individuals. Lastly, all national parks, game reserves, islands, front row beaches and all areas hosting fragile biodiversity are declared as fragile ecosystems under the policy.

The policy recognizes that sustainable management of land based natural resources depends largely on the governance system that defines the relationships between people, and between people and resources. To achieve an integrated approach to management of land-based natural resources, all policies, regulations and laws dealing with these resources need to be harmonized with the framework established by the Environmental Management and Coordination Act (EMCA Cap 387).

The policy also addresses land management on ecosystem protection (including wetlands). Measures for protection are required for fragile ecosystems. The policy also calls for the protection of watersheds, lakes, drainage basins and wetlands. The policy prohibits settlement and agricultural activities in water catchment areas and calls for identification, delineation and gazettement of all water courses and wetlands.

5.2.5 Wildlife Policy of 2011

The wildlife policy is aimed at promoting protection and conservation of wildlife in Kenya, both in protected and non-protected areas. The policy is implemented by the Kenya Wildlife Service (KWS). The proposedSand harvesting project will need to be consistent with this policy. Where wild animals will be disturbed during sand harvesting within the river mouth, appropriate mitigation measures must be implemented to minimize disturbance to wildlife.

5.2.6 Wetlands Policy of 2013

The wetlands policy is intended to promote protection of wetlands in Kenya. The policy sets out strategic measures for the protection of existing wetlands in Kenya. The proposed project has potential of impacting the shoreline as a wetland Wetland (Kuja River mouth). It would be important to undertake appropriate mitigation measures to minimize or avoid degradation of wetlands.

5.2.7 Occupational Health and Safety Policy of 2012

This policy is intended to protect safety and health of workers in work places. The proposedSand harvesting sand harvesting project will provide employment opportunities to many workers in various categories. The proponent will be expected to comply with the requirements of this policy when engaging workers in various activities. The environmental management provides mitigation measures that can be undertaken to ensure compliance with the requirements of this policy.

5.2.8 The Kenya National Climate Change Response Strategy of 2010

This strategy provides measures that the Government of Kenya is taking to address issues related to the impact of climate change on various sectors of the economy. The proposedSand harvesting sand harvesting project will need to take onboard the effects of changing climate in the country and apply applied climate change mitigation measures.

5.3 Environmental Guidelines

In line with the Kenyan Constitution, NEMA has developed a number of guidelines which are part of a series of environmental management tools for environmental management under the Environmental Management and Coordination Act, CAP 387 of the Laws of Kenya. Below is a highlight of the key project relevant guidelines;

5.3.1 National Solid Waste Management Strategy, NEMA, 2014.

NEMA developed the National Solid Waste Management Strategy in 2014 as a framework for implementing the Vision 2030 flagship project. The Strategy establishes a common platform for action between stakeholders to systematically improve waste management. It introduces a new approach for improved waste management in Kenya to create wealth, employment and reduce pollution of the environment. The proposedSand harvesting sand harvesting project is anticipated to produce waste; the proponent will be required to manage waste as guided by this strategy but in line with Waste Management regulations of 2006 and other relevant legislative frameworks. In general, the project proponent should ensure waste management activities are 7R oriented, by Reducing; Rethinking; Refusing; Recycling; Reusing; Repairing and Refilling waste.

5.3.2 Technical guidelines on the management of used oil and oil sludge in Kenya (NEMA, 2014)

The main objective of the guidelines is to ensure effective and efficient collection and transportation systems for used oil. These guidelines target government agencies (responsible for decision making, formulating policies and enforcing health and safety aspects of used oil and oil sludge management in the country), small generators, bulk generators of used oil and oil sludge, garages, used oil treatment plants, recycling and disposal facilities, and other interested stakeholders. The Proponent is envisioned to use dredger machinery which will require servicing hence producing used oil. These guidelines provide direction on safe management of used oil and oil sludge in Kenya and are a main regulatory reference material for management of used oil in Kenya and hence will be used as a key reference point to create awareness on hazards associated with handling used oil and to provide guidance on infrastructure for management of used oil.

5.3.3 National sand harvesting guidelines, 2007

These Guidelines apply to all sand harvesting activities in Kenya. This is deemed key to ensure sustainable utilization of the sand resource and proper management of the environment.

a) The Guidelines establish the Technical Sand Harvesting Committee (TSHC) whose main mandate is to be responsible for the proper and sustainable management of sand harvesting within the County, designate sand harvesting sites, ensure that sand dams and gabions are constructed in designated areas, designate sand transportation roads, ensure EIA/EA are undertaken, undertake dispute resolution, fix minimum sand prices, monitor restoration of sites and allocate areas to the Riparian Resource Management Association (RRMA).

b) The Guidelines further establish a Riparian Resource Management Association (RRMA) which comprises community leaders with the mandate to require EIA before sand harvesting operations start, annual environmental audits, sustainable management, provide access to sites,

collection of revenues to be employed in rehabilitation of sites and revenue sharing with the community.

c) It places responsibilities on sand dealers and transporters to comply with the Guidelines and the law.

d) It identifies the social impacts of sand harvesting and bans child labour, requires fair wages, the organization of loaders for self-regulation and establishes a revenue sharing mechanism.

e) It requires sand harvesting to occur in designated areas only and under an environmental management plan.

f) The said guidelines provide for Farm, Lakeshore/Seashore and Riverbed sand harvesting as follows: it shall not exceed six (6) feet in depth, on-farm sand harvesting must be carried out at designates sites with a buffer zone of at least 50 metres from the riverbanks or dykes for, restoration will be undertaken concurrently with harvesting and under guidance from the Technical Sand Harvesting Committee, open-cast harvesting is recommended and underground tunneling must employ appropriate extraction technology to safeguard human safety.

g) Riverbed sand harvesting is banned on riverbanks, must be carried out in designated sites, must retain adequate reserves of sand to ensure water retention and maintain a buffer zone of 100 metres from any infrastructure.

h) The Guidelines require any person who wishes to remove and/or transport sand to obtain a written approval from the District Environment Officer, NEMA.

i) The Guidelines bar harvesting or transporting sand during the night.

It is expected that the Proponent's Sand harvesting activities will be conducted in line with respective legal requirements and guided by these sand harvesting guidelines.

5.4 National environmental legal framework

The Republic of Kenya has numerous statutes that guide environmental management and conservation in the country. Most of these statutes are sector specific and cover a wide range of issues including public health, soil conservation, protected areas conservation, endangered species, public participation, water rights, water quality, air quality, excessive noise control, vibration control, land use, among others. The relevant legislations are described in the following sections.

Table 6: Relevant legal and regulatory requirements

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
The Constitution of Kenya (2010)	• Provides for the protection of the right to private property • Provides for the sound conservation and protection of ecologically sensitive areas • Supports the settlement of land disputes through recognized local community initiatives • Gives powers to the state to regulate the use of land	• The proponent will ensure sound protection of the environment and any the Lake which is an ecologically sensitive receptor by ensuring activities do not result in pollution. • The proponent involved members of the public in the proposed development during public participation and shall be involved during operation in ensuring smooth operation, at the same time, safeguarding the environment
Environmental Management & Coordination Act, 1999 (Amended 2015) and Subsidiary Regulations	Ensure environmental protection during project implementation. • Environmental Impact Assessment EIA) • Environmental Audit and Monitoring, Environmental Quality standards, and issuance of environmental protection orders • Generation of sector related regulations • Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003 - Waste Management Regulations - 2024 - Water Quality Regulations - 2024 - Air Quality Regulations - 2024	• The proponent shall comply with EMCA and subsidiary regulations, including best international practices; • The proponent shall have an Environmental Policy in place and employ an environmental officer to oversee all environmental matters during the sand harvesting activities.
Environmental Management and Co-ordination (Waste Management) Regulations, 2024	5. A waste generator shall collect, segregate and dispose the waste in the manner provided in regulation 6 of these Regulations. 6. (1) In the discharge of their responsibility under regulation 5,	• The proponent shall contract a NEMA registered waste disposal agent to dispose of appropriately its solid waste, including hazardous wastes such as used oil and oil filters from the ship.

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	a waste generator shall minimise the waste generated by adopting the following cleaner production methods— (a) improvement of production process through— (i) conserving raw materials and energy; (ii) reducing toxic emissions and wastes; (b) monitoring the product cycle from beginning to end by— (c) monitoring the product cycle from beginning to end by— (i) identifying and eliminating potential negative impacts of the product; (ii) enabling the recovery and re-use of the product where possible; and (iii) reclamation and recycling; and (d) incorporating environmental concerns in the design and disposal of a product	
Environmental (Impact Assessment and Audit) Regulations, 2003	• No proponent shall implement a project if it is likely to have a negative environmental impact; or for which an environmental impact assessment is required under the Act or these Regulations unless an environmental impact assessment has been concluded and approved in accordance with these regulations. • No licensing authority under any law in force in Kenya shall issue a license for any project for which an environmental impact assessment is required under the Act unless the applicant produces to the licensing authority a license of environmental impact assessment issued by the Authority under these Regulations	• The proponent is carrying out the ESIA for NEMA review and licensing and shall carry successive Environmental Audits at the activities to identify new potential environmental impacts associated with the future operations of the sand harvesting.
EMCA (Water Quality) Regulations, 2024	• To provide for the prevention of land and water pollution by establishing standards for waste water management to	• The proponent shall ensure used oil do not pollute the water system.

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	ensure clean and healthy water resources as well as provision of standards for water for different uses. • The eleventh schedule on EDL fees for controlled facilities has been enhanced.	
EMCA (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009	A person shall not engage in any activity that may- • have an adverse impact on any ecosystem; • lead to the introduction of any exotic species; • lead to unsustainable use of natural resources, Without an Environmental Impact Assessment License issued by the Authority under the Act.	• The proponent shall ensure that no adverse impact is introduced in the Lake.
Environmental Management and Coordination (Air Quality) Regulations, 2024	• To provide for the prevention, control and abatement of air pollution to ensure clean and healthy ambient air. • This is an improvement of the 2014 Regulations and introduces various improvements including emission testing from mobile sources.	• The proponent shall also sponsor tree planting exercises within and around the sand holding site to counter air pollution as a result of the activities due to their operations.
Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009	• General prohibitions of the Act provide 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 in the environment. Of importance in determining nuisance, the time of day, proximity to a residential area, recurrence or intermittence of the noise, level and intensity of the noise, and whether the noise can be controlled without much effort or expense to the person making the noise. • The regulations also provide that no person shall cause or cause to be made excessive vibrations that annoy, disturb, injure, or endanger the comfort, repose, health, or safety of others in the environment, or cause to be made excessive	• The proponent shall strictly adhere to these regulations during the construction and operation phases, respectively. • The proponent shall not engage in activities that will generate noise without a license from the relevant office. • Annual environmental audit of the facility will also be carried out to monitor observation of these regulations.

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	vibrations that exceed 0.5 centimetres per second beyond any source property or 30 meters from any moving source. • Vibrations that annoy, disturb, injure, or endanger the comfort, repose, health, or safety of others in the environment or cause to be made excessive vibrations that exceed 0.5 centimeters per second beyond any source property or 30 meters from any moving source.	
The Sustainable Waste Management Act 2022	• Became operational on 23 July 2023 to transition waste management to the circular model. • Section 13 of the SWM Act 2022 directs all producers to implement mandatory extended producer responsibility (EPR) obligations to prevent pollution from their products or by waste arising therefrom. Every producer shall fulfill their extended producer responsibility obligations individually or collectively in a compliance scheme. • The producer is defined in the Act as an entity that introduces goods, products and packaging into the country using authorized means by manufacturing, importing, converting, filling, refilling, repackaging or rebranding.	• The proponent shall dispose of the waste through only licensed waste service providers • The proponent will enforce staff to segregate waste when disposing them in the properly labeled and colour coded receptacles and bins that will be located within the dredger
Land Act 2012	Promote Land Conservation including and need to prepare EMP: • Conservation of ecologically sensitive public land • Conservation of land based natural resources • Submit an EMP pursuant to existing law on the environment	• The proponent shall ensure that he complies with the current environmental laws in order to protect the sand holding site land from any form of pollution.
Physical and Land Use Planning Act, 2019	This Act makes provision for the planning, use, regulation and development of land and for connected purposes. Article 5 of the Act under Principles and norms of physical and land use planning notes that ‘every person engaged in physical and land use planning development activities shall be in a manner	• The proponent should comply with the provisions of this Act throughout the project cycle

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	that integrates economic, social and environmental needs of present and future generations.' Article 4 notes that major developments should be subjected to environmental and social impact assessment.	
The Public Health Act (Cap 242)	• No person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health. • It shall be the duty of every health authority to take all lawful, necessary and reasonably practicable measures for preventing or causing to be prevented or remedied all conditions liable to be injurious or dangerous to health arising from the erection or occupation of unhealthy dwellings or premises	• Housekeeping within the site shall be well maintained in all the operation areas. • Sanitary conveniences shall be provided to the employees during construction and operation of the sand holding site; • The proponent will sensitize the community on the importance of environmental management and carry out HIV/AIDS awareness programs within the community
The Occupational Safety and Health Act, 2007	• Provides that every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace • Provides that the architectural plans of the factory be approved by the Directorate of Occupational Safety and Health Services before construction activities commence. In approving the plans Directorate of Occupational Safety and Health Services will among other requirements ensure that: - Prescribed dimensions with regards to the distance of floor to ceiling of every workroom are upheld - Space defining machine layout for intended use by operators will be within statutory limits - Emergency exits are provided for and are designed to open in accordance to statutory requirements	• The dredger will carry out an occupational health and safety audit, fire safety audit, risk assessment and is in the process of implementing the recommendations. • The proponent shall ensure that firefighting equipment is present and strategically placed within the dredger; • Provision of PPEs shall be made mandatory within the vessel. • Application for site registration will be done as soon as construction commences and registration of the sand holding site shall follow when the facility starts operations. • Safety and health committee shall be formed when the sand holding site is operational

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	- Sanitary conveniences are provided for with adequacy as to the number of intended employees and are designed to have separate approaches - First aid facilities like first aid room(s) are provided for, - There is provision for accommodation for clothes not worn during working hours - There is provision for adequate ventilation - There is provision for storage of a firefighting water storage tank with a capacity of at least 10,000 litres • Provides that before any person occupies or uses any premises as a workplace, he shall apply for the registration of the premises • Provides that the workplace shall be of sufficient size for work to be carried out with ease and shall further have the necessary free space and, having regard to the nature of the work, an adequate amount of air for each employee, the minimum permissible being ten cubic meters per person • Provides that an occupier shall ensure that effective and suitable provision is made for securing and maintaining, by the circulation of fresh air in each workroom, the adequate ventilation of the room • Provides that an occupier shall ensure that effective provision is made for securing and maintaining sufficient and suitable lighting, whether natural or artificial, in every part of his workplace in which persons are working or passing • Provides that sufficient and suitable sanitary conveniences for the persons employed in the workplace shall be provided, maintained and kept clean, and effective provision shall be made for lighting the conveniences; and, where persons of	• Safety signs shall be erected and posted as appropriate when the facility is operational.

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	both sexes are or are intended to be employed (except in the case of workplaces where the only persons employed are members of the same family dwelling there), such conveniences shall afford proper separate accommodation for persons of each sex • Provides that every steam boiler, lifting appliance, air receiver, refrigeration plant, steam receiver and all its fittings shall be thoroughly examined by an approved person, so far as the construction of the plant permits at prescribed intervals. • Provides that where work has to be done inside a confined space in which dangerous fumes are liable to be present, a permit to work has to be issued and the confined space shall be provided with adequate means of egress and ingress. • Provides that in every workplace or workroom, there shall be provided and maintained, and conspicuously displayed and free from any obstruction so as to be readily accessible, suitable means for extinguishing fire. • Provides every workplace there shall be provided and maintained safe plants and systems during its operational phase. • Provides for every workplace there shall be ensured absence/elimination of risks. • Provide for every workplace to ensure provision of information to employees to ensure safety and health. • Provides that every factory stops any hazardous activities and is maintained in a safe and healthy state. • Provides that every workplace carries out workplace risk assessment and send a copy of the risk assessment to the	

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	Directorate of Occupational Safety and Health Services (DOSHS). • Provides for preparation of a safety & health policy and submission of a copy to the Directorate of Occupational Safety and Health Services • Provides for prevention of environmental pollution • Provides for notification of accident occurrence, cases of occupational diseases and dangerous occurrence to DOSHS • Provides that no employee is discriminated against by virtue of: - - Lodging a complaint about an unsafe condition at the workplace - Being an active member of a health safety committee. • Provides for establishment of a health and safety committee whose composition should be in accordance to the Factories (Health and Safety Committees) Rules L.N. 31of 2004. • Provides for carrying out workplace health and safety as well as fire safety audits on an annual basis.	
Safety & Health Committee Rules, 2004 Legal Notice No. 31	The Legal Notice provides for functions and duties of the health and safety committee, the purpose of meetings and recording minutes, and the roles of the office bearers. It further describes the duties of the occupier and those of the Health and Safety Adviser. Among other items, the rules provide that: • The occupier of every workplace shall establish a health and safety committee; • The committee shall consist of safety representatives from the management and the workers;	• Safety and health committee shall be formed and trained when the facility is operational

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	• The factory occupiers shall appoint a competent person from the management staff to be responsible for safety, health and welfare in the factory or workplace; and the person appointed shall be the secretary to the committee. • Every member of the Health and Safety Committee shall undertake a prescribed basic training course in occupational health and safety within a period of six months from the date of appointment or election, and thereafter further training from time to time; • The occupier of every factory shall cause a health and safety audit of the workplace to be carried out at least once in every period of twelve months by a registered health and safety adviser.	
Fire Risk Reduction Rules, 2007 Legal Notice No. 59	The Rules provides that an employer/occupier having flammable substances must have fire resistant facility. The occupier to store highly flammable substances in fixed storage tanks, closed vessels, cupboards except for vehicles transporting the same. Flammable materials have to be kept in separate labelled stores. In go-downs, the employer has to maintain a distance of at least 80 cm wall gangway between the walls and stack of goods. Every employer is required to maintain good ventilation to allow exit of flammable fumes, maintain good housekeeping, maintain good electrical fittings, provide and maintain fire exits, form and train firefighting teams, conduct fire drills yearly, designate an assembly point, provide and maintain first aid facilities, post fire safety notices, install fire detectors,	• Fire assembly points shall be marked where the visitors and employees can gather for briefing in case of a fire; • There shall be provided clear and demarcated emergency exits within the sand holding site; • The sand holding site shall carry out fire safety audit, risk assessment and implement the recommendations.

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	provide and maintain firefighting appliances, conduct an annual fire safety audit and formulate a fire safety policy.	
Hazardous Substances Rules, 2007 Legal Notice No. 60	The rules provide that where hazardous substances are handled, washing facilities be provided, protective clothing be kept separate from personal clothing, separate clean and dirty changing rooms be maintained, proper maintenance and testing of engineering controls be done after every 2 years and a report submitted to DOSHS, protection against radioactive, carcinogenic, mutagenic or teratogenic be provided, Material Safety Data Sheets (MSDS) be availed in respect of chemicals handled, correct disposal of hazardous chemical substances be done, containers of hazardous substances be labelled, workers be trained on hazards associated to hazardous substances handled and air monitoring and measurements be done after every 12 months by an air quality monitor.	• The facility will carry out an occupational hygiene measurements and surveys which inform the process of implementing the recommended measures.
First Aid Rules, 1977 Legal Notice No. 160	These rules provide for first-aid box content with respect to size of a workplace and under whose charge the first-aid box should be placed.	• First Aid kits shall be made available within the vessel and sand holding site;
Eye Protection Rules Legal Notice No. 44 of 1978	The rules provide for eye safety in workplaces. Processes where eye protection is required include blasting, cleaning, chipping, metal cutting, arc welding, abrasive wheel use (grinding).	• Provision of PPEs shall be made mandatory within the vessel. • Safe procedures and programmes will be provided to the workers

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
Electric Power (Special) Rules, 1979 Legal Notice No. 340	The rules provide for electrical safety with regards to electrical power installations, use and handling. These rules apply to generation, transformation, conversion, switching, controlling, regulating, distribution and use of electricity.	• Provision of PPEs shall be made mandatory within the vessel. • Only qualified personnel will be allowed to handle activities that involve electric power.
Noise Prevention and Control Rules, 2005. Legal Notice No. 25	The rules provide that 'No worker shall be exposed to noise level excess of the continuous equivalent of 90 dB(A) for more than 8 hours within any 24 hours duration'. They further protect from exposure to high noise levels.	• Provision of PPEs shall be made mandatory within the facility. • Medical examinations and surveillance will be implemented at the facility • Noise measurement and survey will be done at the vessel
Work Injury Benefits Act, No. 17 of 2007	This law provides for compensation to employees for work-related injuries and diseases contracted in the course of employment and for connected purposes.	• The employer will have an insurance cover for the facility to cater for compensation for injuries sustained by employees while at work
The Water Act, 2016 and The Water Resources Management Rules, 2007	• Protection of surface and groundwater resources; • Protection of water catchments; • Empower the Water Resources Authority (WRA) to impose management controls on land use falling under riparian land; • Provides that a permit shall be required for any use of water from a water resource, especially where there is abstraction and use of water with the employment of works.	• The mill shall install a water treatment plant that abstracts water from the borehole • The proponent shall obtain a dredging approval from WRA to carry out dredging/sand harvesting activities within the water body.
The County Governments Act 2012	• Enforcing the protection of trees and other vegetation in urban centers • Approval of development designs before construction can begin • Enforce orderly development in an urban setting	• The proponent shall liaise with the County Government to ensure compliance with and obtain the necessary licenses and permits.

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
Employment Act 2007	• The act stipulates that no person shall use or assist any other person in using forced labour. • No employer shall discriminate, directly or indirectly, against an employee or prospective employee or harass an employee or prospective employee on the following grounds: race, color, sex, language, religion, political or another opinion, nationality, ethnic or social origin, disability, pregnancy, mental status or HIV status. • An employer shall pay his employees equal remuneration for work of equal value.	• The proponent shall be a source of employment for many workers of both gender and diverse cultural backgrounds.
Sustainable Development Goals (SDGs)	• Sustainable Development goals which were initiated by world leaders in 2015 as an advancement of the Millennium Development Goals (MDGs) provide concrete, numerical benchmarks for tackling extreme poverty in its many dimensions. The SDGs also provide a framework for the entire international community to work together towards a common end making sure that human development reaches everyone, everywhere. If these goals are achieved, world poverty will reduce by half, tens of millions of lives will be saved, and billions more people will have the opportunity to benefit from the global economy. • Goals 6, 7, 13 and 15 of the SDGs revolve around ensuring Environmental Sustainability. The goals highlight on; ✓ Ensuring availability of sustainable management of water and sanitation for all ; ✓ Ensuring a clean and more sustainable supply of water within related watersheds; ✓ Ensuring access to affordable, reliable, sustainable and modern energy for all;	• The proposed project will contribute towards alleviating rural poverty by increasing means of livelihood and enhancing food security. The ESIA study will ensure that the proposed project reflects Environmental Sustainability especially during the time of implementation.

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	✓ Combating climate change through the reforestation of degraded and degrading landscapes where by reforestation helps in strengthening community resilience to climate change; ✓ Protecting, restoring and promoting sustainable use of terrestrial ecosystem, sustainably manage forests, and ✓ Combat desertification and halt and reverse land degradation, and halt biodiversity loss.	
The Wildlife Conservation and Management Act, 2013	• This Act guiding principles is the devolution of conservation and management of wildlife to landowners and managers in areas where wildlife occurs, through in particular the recognition of wildlife conservation as a form of land use, better access to benefits from wildlife conservation, and adherence to the principles of sustainable utilization. • The act in its sixth schedule list various animal and tree species that are nationally considered as critically endangered, vulnerable, nearly threatened and protected. It also lists in its seventh schedule, national invasive species for which control is required. • Section 48 restricts activities involving the above listed species without a permit from KWS. KWS can make recommendations to the responsible cabinet secretary, to prohibit carrying out of any activity which: is of a nature that may negatively impact on the survival of species listed in sixth schedule; or is specified in the notice or prohibit the carrying out of such activity without a permit issued by KWS.	• Any critically endangered, vulnerable, nearly threatened or protected species found within the project area will have to be managed in line with this Act. Further, management of any human-wildlife conflicts arising from the project implementation will also be guided by this act

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	• Part IX of the act deals with the management of human-wildlife conflicts. It provides for handling of problem animals by land owners/occupiers or their agents	
Sexual Offences Act (No. 3 of 2006)	• This Act aims to make provision about sexual offences, their definition, prevention and the protection of all persons from harm from unlawful sexual acts, and for connected purposes.	• The proponent shall put in place all mechanism to discourage unlawful sexual acts in the entire project life, these includes massive awareness
The Fisheries Management and Development Act, 2016	• The Fisheries Management and Development Act provides the framework for the development, management, exploitation, utilization and conservation of fisheries and for connected purposes. • The project area is located off the shores of Lake Victoria, which supports a thriving fishery and local livelihoods.	• The Proponent will have to implement measures to minimise pollution of the Lake by Sand harvesting activities which would degrade water quality and affect fisheries.
The Kenya Maritime Authority Act, 2012	KMA under the Incorporation Order is responsible for Port and Flag State implementation of various international instruments relating to maritime transport. The Regulatory role of KMA therefore aims to broaden and modernize the institutional and legal framework for the implementation of maritime safety, security and the preservation of the aquatic environment. These Sand harvesting works have safety implications on navigation at the water body as well as potential pollution which KMA has a direct oversight obligation as follows: • National maritime legislation i.e. the KMA and the Merchant Shipping Acts remain the primary tools for attaining international standards in safety and security and the preservation of the marine environment. Only through such regulations can the Government enforce international maritime conventions, especially those emanating from the International Maritime Organization (IMO). Such	• The proponent shall seek registration with the KMA

Legislation/Regulation/ Standard	Provisions	Compliance/Non-compliance
	rules and regulations are also relevant for the implementation of national maritime safety, security and marine environment conventions /programmes. • KMA is the designated national competent oil spill authority responsible for the development and provision of guidelines for the management of oil spills in the maritime environment. Under Section 5 (i) of the Act, KMA is required to enforce safety of shipping, including compliance with construction regulations, maintenance of safety standards and safety navigation rules.	

6. CLIMATE CHANGE VULNERABILITY ASSESSMENT, ADAPTATION AND MITIGATION ACTIONS

6.1 Introduction

Climate change impacts are increasingly recognized worldwide, prompting various sectors, including the education sector to assess vulnerability, adapt to changing conditions, and mitigate adverse effects. The Proponent must adhere to national climate obligations to protect the environment, enhance resilience, and minimize its carbon footprint. Conducting a vulnerability assessment is essential for developing adaptive management strategies that support sustainable human and natural systems amid extreme climatic events.

Effective climate services are essential for safety, economic growth, and environmental protection, supporting national and global goals like Kenya's Vision 2030, the SDGs, and the Sendai Framework. Kenya's National Framework for Climate Services (NFCS) enhances climate information delivery through regional and national outlook forums and participatory scenario planning, but data availability remains fundamental to improving these services.
This assessment will evaluate how the proposed project's operations may be adversely affected by environmental stressors and outline effective adaptive strategies to reduce climate vulnerability.

6.2 Climate Change Risks and Vulnerability Assessment

6.2.1Introduction

The climate of Kenya is highly variable both in time and space. Just like the rest of East Africa and other parts of the tropics, Kenya is prone to climate extremes such as floods, landslides, and droughts. In the last decade alone, the frequency and severity of climate extremes is increasingly evident as the climate continues to warm (Holden et al., 2022; IPCC, 2021; Lott et al., 2013)

6.2.2 Extreme Weather Events

Kenya has faced a series of extreme weather events, including prolonged droughts and severe flooding, which significantly impacted agriculture, infrastructure, and energy production.

6.2.3 Rising Temperatures

Kenya experienced above-normal temperatures across most regions in 2024, continuing a long-term warming trend in line with global climate change patterns. 2024 was the hottest year on record in Kenya. This upward trend in temperatures aligns with global patterns of climate change, reflecting the broader impacts of increasing greenhouse gas concentrations and other anthropogenic influences on the climate system. Dependence on river siltation in order to carry out dredging makes the operations vulnerable to fluctuations, particularly during extreme temperatures.

6.2.4 Rainfall Variability

Climate change has introduced greater variability in rainfall patterns, resulting in both droughts and floods that can disrupt river flows. Altered river flows and shoreline processes can lead to changes in sediment transport, requiring adjustments to dredging strategies. In 2024, the western and central highlands experienced above-normal rainfall, while most other regions saw drier-than-average conditions.

6.2.5 Severe Flooding

The March to May 2024 season brought above-average rainfall, with some areas receiving 111-200% of their long-term mean. Widespread flooding affected over 100,000 households, causing more than KSh 400 million in damages across coastal regions. Crop losses, infrastructure destruction, and livestock deaths further worsened food insecurity and economic losses.

6.2.6 Drought Conditions

The poor short rains led to a sharp increase in food insecurity, rising from 1 million people in July 2024 to 2.15 million by February 2025, with 265,900 in IPC Phase 4 (Emergency) and 1.88 million in IPC Phase 3 (Crisis).

6.2.7 Socio-economic Impacts

Extreme weather conditions have widespread socioeconomic impacts, particularly on agriculture and fisheries, exacerbating food insecurity and energy challenges. Floods affected 38 counties across Kenya in the year 2024, resulting in loss of lives, injuries, displacements, and destruction of key infrastructure. An increase in contaminated water also led to secondary effects, including vector and waterborne disease outbreaks.

6.2.8 Environmental Impacts and vulnerability

The environmental footprint of development projects can be substantial, involving energy consumption, water usage, waste generation, and disruption of local biodiversity.

To mitigate these impacts, facilities can adopt sustainable practices, such as implementing energy-efficient systems, promoting water conservation, and establishing comprehensive recycling programs. Engaging occupants, employees and tenants in sustainability initiatives can foster environmental stewardship and awareness, preparing them to contribute positively to their communities and the planet.

6.3 Adaptation/Mitigation and Optimization Strategies

The Proponent is committed to environmental assessments to monitor and reduce its ecological impacts and has implemented several measures to adapt to adapt to climate change risks through;

6.3.1 Sustainable Practices

- **Environmental Management:** The proponent will maintain an effective Environmental Management System to monitor resource use, implement waste management protocols, and conduct annual audits in compliance with the Environmental Management and Co-ordination Act (EMCA), 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003.
- **Sand Mining Regulation:** The Proponent to comply with sustainable sand mining practices and conduct regular environmental assessments to minimize habitat degradation.
- **Critical Habitat Protection:** The Proponent will avoid sand mining from fish breeding areas and designated high-biodiversity areas.

- **Community Engagement:** The Proponent through local leadership and BMU shall involve local communities in conservation through education and alternative livelihood programs.
- **Conservation Activities:** The proponent will incorporate tree planting, community clean-up initiatives and engagements with the employees and the local community thus promoting environmental stewardship.

6.3.2 Integrated Waste Management

The proponent will establish a comprehensive waste management program that include;

- Waste Separation: Waste will be sorted at the source with clearly labelled bins for recycling, composting, and disposal of different waste types.
- Reduced single-use plastics and chemical use: Biodegradable cleaning products will be utilized, minimizing harmful waste thus mitigate environmental degradation
- The wastes shall be collected by a NEMA Licensed water handler and disposal to designated dumpsite.
- Engaging the community in waste reduction initiatives which have also helped foster a culture of sustainability.

6.3.3 Carbon Footprint Reduction

- Transition to renewable energy sources: The proponent will explore renewable energy sources, such as solar options to reduce reliance on non-renewable sources, decreasing greenhouse gas emissions and enhancing energy security
- Green Spaces: The development of gardens and green areas within the sand holding site will enhance biodiversity and promote natural cooling.

6.3.4 Community Engagement

The proponent will ensure participation in local conservation activities, such as tree planting and clean-up campaigns, strengthening the facility's role in promoting environmental health.

6.3.5 Sustainable Procurement

The proponent will prioritize local suppliers for food and materials to reduce transportation-related emissions.

6.3.7 Compliance with National and International Climate Obligations

National Compliance

The proponent will adhere to EMCA, 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003 by conducting environmental audits and reporting findings to the National Environment Management Authority (NEMA).

International Commitments

The proponent will ensure the operations of the facility align with global climate commitments, contributing to Kenya's Nationally Determined Contributions (NDCs) under the Paris Agreement.

6.3.8 Monitoring and Evaluation

A robust monitoring and evaluation framework will track the effectiveness of the above measures through key performance indicators.

7. CONSULTATION AND PUBLIC PARTICIPATION

7.1 Overview

The need for public involvement in development projects is in the Constitution particularly pertinent in the context of Article 35 of the Constitution of Kenya which, provides that 'every citizen has the right of access to information held by the state; and information held by another person and required for the exercise or protection of any right or fundamental freedom'. This is further set out in EMCA 1999 (Amended 2015). Community consultation and participation ensures that project stakeholders are part and parcel of the proposed development and in so doing ensures the sustainable management of resources. Evidence shows that projects that are subjected to a consultative and public participation process acquire higher level of acceptance and accrue benefits to a wider section of the society.

7.2 Aim of the Stakeholder Consultations

The aim of the public consultation process was to:

- Inform all the stakeholders about the proposed project and carry out public sensitization on the project, provide information on the potential impacts and proposed mitigation measures to eliminate or reduce these impacts;
- Collect additional socio-economic baseline data/information on the project area environment;
- Provide an opportunity to all the stakeholders in the project area to give comments, raise issues and concerns pertaining to the proposed project and allow for the identification of project alternatives, mitigations and implementation strategies and recommendations;
- Emphasize the importance of having all stakeholders being involved in the project implementation process.

7.3 Consultation Methodology

Questionnaires were prepared and administered to the public and to institutions identified during mapping of stakeholders. Stakeholder consultations were carried on 5th February, 2025 and 6th February, 2025. Copies of the filled questionnaires are annexed to this report under **Appendix IV**.

The study employed three main methods of consultations to get the data presented in this report. These are:

- Meetings and discussions with Key Stakeholders;
- Questionnaire administration and interviews;
- Convening of Public Consultation Meeting within the project area.

7.4 Public Consultation Meetings (PCMs)

The venues of the meetings were identified around the project area; where a total of 1FGDs and 2 PCMs were carried out during the study process as shown in the table below:

Table 7: FGD's and PCM's schedule

#	Venue	County	Target Group	Date

1.	Kabuto	Migori	PCM for North Kadem Ward	Wed, 5th Feb 2025
2.	Aneko Centre	Migori	PCM for Got Kachola ward	Thur, 6th Feb. 2025
3.	Vanah Hotel	Migori	FGD for lead Agencies	Fri, 7th Feb 2025

The meetings were facilitated by the consultant, Sub County administrator Nyatike Sub-County, Chiefs and Assistant Chiefs of the area where the project was to be implemented.

Minutes of the discussions at the FGDs and PCMs were recorded and form part of this ESIA Study Report. During the meetings, the proposed project was elaborated to the participants through a presentation that was conducted in Kiswahili and the local language to ensure participants understood all the issues related to the project. An interactive questions and answers session took place during the PCM immediately after the presentation on the proposed project. Participants finally filled in feedback forms/questionnaires. The questionnaires have been included in **Appendix IV** while Minutes of Public Consultation Meeting and attendance register are provided in **Appendix III**.

Plate 4: Community engagement at Kao beach

Plate 5: Community participation at Aneko beach

Plate 6: Stakeholders engagement at Vannah Hotel

7.4.1 Consulted Parties

The respondents were identified through simple random sampling technique. Most of those interviewed were also victims of the perennial flooding within the lower Kuja River and had prior knowledge of the proposed project. The public survey focused around economic, social, safety, health, environmental and welfare issues. Those interviewed were welcoming of the

project since in their opinion, the project will create reduce the flooding of their lands currently experienced in the area in addition to improving their livelihood since most of them are fishermen and depend on access to the lake.

7.4.2 Summary of Responses

This section presents a brief compilation of the responses obtained from those interviewed.

7.4.3 Perceived Positive Impacts

Respondents acknowledged that the project will have some positive impacts which they enumerated as below:

- Improved navigation within the lake and the river;
- Control flooding in Kuja River Mouth;
- Improved social amenities i.e. schools and hospitals due to reduced flooding;
- Creation of temporary employment;
- Increased living standards through economic empowerment;
- Reduced deaths and water borne diseases;
- Improved education since students can now attend school during long rains;
- Economic empowerment from sand harvested;
- Farming and other economic activities can resume uninterrupted by floods; and
- Reduced flooding hence minimizing human wildlife conflict due to the migration of wildlife during flooding

7.4.4 Perceived Negative Impacts

Majority of the people whose opinion was obtained during the ESIA consultations had no objection to the implementation of the project but agreed that the project has potential gains and costs. The negative impacts perceived by respondents have been highlighted in the subsequent section.

- Increased oil spillages leading to water pollution during the servicing of the dredger;
- Increased cases of STIs due to increased interaction;
- Civil unrest-competition in sharing of revenue between the two counties;
- Increased water turbidity leading to extinction of certain animal and fish species;
- Foreign interference with the community members;
- The project will affect breeding sites and fish breeding patterns;
- Vibration from the machines will make fish travel far away this will reduce the daily livelihood of the area;
- Increased school drop outs due to availability of jobs;
- Interference with the natural habitats e.g. the catfish which thrive so well in muddy environment; and
- Air pollution from the smoke emitted from the Sand harvesting machine.

The respondents urged the proponent to look into the following issues to mitigate the negative impacts of the project:

- Ensure regular service of the dredger and the waste oil to be collected by a NEMA licensed oil transporter;

- Adhere with the fisheries Act;
- Adhere to Water Quality Regulations 2024
- Create a taskforce and work with key stakeholders;
- Use the silt dredged to fill in the galleys created during sand harvesting to reclaim back the land;
- Only operate during the day with minimal noise;
- Building dykes to act as a long-term solution to the floods;
- CSR of the road network and the affected schools from revenue that will be generated from sand;
- More sensitization to the community members about the proposed project;
- Ensure the fish breeding grounds are protected; and
- Sand harvested should be used to benefit the community

The table overleaf presents an analysis of some of the Key Stakeholder Questionnaires and PCM Feedback Forms. The Key Stakeholders and Feedback Forms filled in by PCM respondents are placed in **Appendix IV.**

Table 8: Analysis of Stakeholder and PCM Participant's Feedback

POSITIVE IMPACTS	NEGATIVE IMPACT	MITIGATION MEASURES	OTHER COMMENTS
1. Employment opportunities 2. Reduction in flooding 3. Increased depth of the river 4. Improved sand business 5. Backflow reduction along the shores of Lake Victoria and R. Kuja	Interference with aquatic ecology as a result of water quality deterioration due to dredging	Continued water quality monitoring during project cycle	-Full compliance to all existing laws -Comprehensive environmental monitoring plan -The organization should work with the BMUs to ease their operation of the sand harvesting -Have WIBA policy for the workers -Ensure risk assessment, OSH audits and first aid trainings conducted to the workers -The company to consider having a sand holding site in Migori. -Observing the existing regulations and environmental laws -Observing the agreements made with the locals especially on CSR
	Displacement and loss of livelihood of fishermen	Catchment conservation along River Kuja	
	Pollution to the environment especially oil pollution on water	Regular servicing of machines being used to avoid oil pollution	
	Loss of lives	Proper awareness creation of how deep the river is to avoid increased cases of drowning	
	Interference with breeding points	Liaise with the fishermen/BMU leaders to know the traditional breeding points	
	Riparian encroachment	Repair/rehabilitate riparian areas	

	Increased turbidity	Continuous information of the locals on the harvesting time when there will be increased turbidity	

8. IMPACT ANALYSIS AND PROPOSED MITIGATION MEASURES

8.1 Introduction

This section outlines the potential negative and positive impacts associated with the proposed sand harvesting.

8.2 Identification of environmental and social impacts

The potential environmental and social impacts identified as having significance effect was assessed using the methodology described below. First, the issues raised were described giving consideration to the associated activity and the aspect of that activity that is likely to result in an impact. The nature of the impact was also described. Once this has been undertaken the significance of the impact was determined. The following definitions apply:

- An **activity** is a distinct process or task undertaken by an organization for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organization.
- An **environmental aspect** is an element of an organization's activities, products and services which can interact with the natural or human environment. The interaction of an aspect with the environment may result in an impact.
- **Environmental and social impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. Receptors can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as aquifers, flora and paleontology. Impacts on the environment can lead to changes in existing conditions; the impacts can be direct, indirect or cumulative. Direct impacts refer to changes in environmental components that result from direct cause-effect consequences of interactions between the environment and project activities. Indirect impacts result from cause-effect consequences of interactions between the environment and direct impacts. Cumulative impacts refer to the accumulation of changes to the environment caused by the project and other ongoing or planned human activities.

8.2.1 Description of aspects and impacts

The accumulated knowledge and the findings of the environmental investigations form the basis for the prediction of impacts. Once a potential impact has been determined during the scoping process, it is necessary to identify which project activity that cause the impact, the probability of occurrence of the impact, and its magnitude and extent (spatial and temporal). This information is important for evaluating the significance of the impact, and for defining mitigation and monitoring strategies. The aspects and impacts identified were therefore described according to the definitions below:

a) Extent

The extent for each aspect, receptor and impact were defined. The geographical coverage (spatial scope) description took account of the following factors:

- The physical extent/distribution of the aspect, receptor and proposed impact; and
- The nature of the baseline environment within the area of impact.

For example, the impacts of noise are likely to be confined to a smaller geographical area than the impacts of atmospheric emissions, which may be experienced at some distance. The significance of impacts also varies spatially.

The **extent** of the impact was rated on the following scale:

Localized	1
Study area	2
Regional	3
National	4
International	5

b) Duration

Duration refers to the length of time that the aspect may cause a change either positively or negatively on the environment.

The environmental assessment distinguished between different **time periods** by assigning a rating to duration based on the following scale:

Very short (0 – 1 Years)	1
Short term (1 – 5 Years)	2
Medium term (5 – 15 years)	3
Long term (>15 years)	4
Permanent	5

c) Magnitude

The **magnitude** of an environmental or social aspect is determined by the degree of change to the baseline condition, and includes consideration of the following factors:

- The reversibility of the impact;
- The sensitivity of the receptor to the stressor;
- The impact duration, its permanency and whether it increases or decreases with time; Whether the aspect is controversial or would set a precedent; and
- The threat to environmental and health standards and objectives.

The magnitude of each of the impacts were rated on the following scale:

Small (will have no effect on the physical, biological or social environment)	0
Minor (will cause a minimal impact on physical, biological or social environment)	2
Low (will cause a slight impact on the physical, biological or social environment)	4
Moderate (will result in a physical, biological or social environment component or process continuing but in a modified way)	6
High (physical, biological or social environment or component or process is altered to the extent that they temporarily cease to exist or operate)	8
Very high (results in complete destruction of physical, biological or social environment components and permanent cessation of the processes)	10

d) Probability of impact

The **probability** or **frequency** of the impact occurring refers to how often the issue may impact either positively or negatively on the environment. After describing the frequency the findings were indicated on the following scale:

Highly improbable (<20% chance of occurring)	1
Improbable (20 – 40% chance of occurring)	2
Probable (>40% - 70% chance of occurring)	3
Highly probable (>70% - 90% chance of occurring)	4
Definite (>90% - 100% chance of occurring)	5

8.2.2 Method of assessing the significance of impacts

The purpose of impact evaluation is to assign relative significance to predicted impacts associated with the project, and to determine the manner in which impacts are to be avoided, mitigated or managed. The information presented above in terms of identifying and describing the aspects and impacts were summarized in a tabular form and significance was assigned with supporting rational. Significance was determined before and after mitigation, taking into consideration all the factors described above.

A definition of a "significant impact" for the purposes of the study is: "An impact which, either in isolation or in combination with others, could in the opinion of the specialist, have a material influence on the decision-making process, including the specification of mitigating measures."

8.2.3 Significance determination

The environmental significance rating is an attempt to evaluate the importance of a particular impact, the consequence and likelihood of which has already been assessed by the relevant specialist. The description and assessment of the aspects and impacts undertaken is presented

in a consolidated table below with the significance of the impact assigned using the process and matrix detailed below.

The sum of the first three criteria (extent, duration and magnitude) provides a collective score for the CONSEQUENCE of each impact. The last criteria determines the PROBABILITY of the impact occurring. The product of CONSEQUENCE and PROBABILITY leads to the assessment of the SIGNIFICANCE of the impact, shown in the significance matrix below.

Table 9: Significance Assessment Matrix

		CONSEQUENCE (Extent + Duration + Magnitude)																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
PROBABILITY	1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
	3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
	4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
	5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

In order to evaluate the mitigation threshold, the ratings in the table above are used.

Table 10: Mitigation Ratings Table

Low	<30	Where this impact would not have a direct influence on the decision to develop in the area
Medium	30-60	Where the impact could influence the decision to develop in the area unless it is effectively mitigated
High	>60	Where the impact must have an influence on the decision process to develop in the area

8.3 Potential Positive Impacts

8.3.1 Flood Control

The perennial flooding in the flood plain occurs due to heavy rains in the catchment as well as deforestation upstream as a result of poor land use practices, causing serious sedimentation and

forming river mouths at the river mouth. In the recent past however, flooding is also occurring due to backflow of the lake waters attributed to climate change.

Mitigation to the impact of flooding has been made to dredge and unblock the river mouth to ease the flow of water into the lake.

8.3.2 Availability of sand for construction industry

Development comes with growth of urban areas. Urban growth is achieved through sand and gravel mining for construction of modern, attractive and durable structures. Sand mining is important for economic development and to construct durable and modern structures.

8.3.3 Employment Opportunities

The proposed project will create employment opportunities for both skilled and unskilled personnel. The consulted stakeholders have urged the proponent to ensure that priority is given to the local community.

8.3.4 Gains in the Local and National Economy

Expected gains in the local and national economy from the sand harvesting/mining license from the government including levies by the county governments and income from business associated with the project.

8.3.5 Improved access by fishermen to the various landing beaches

Currently access to most beaches in the project area have been hampered by flooding of the area. Most beaches such as Kao are flooded making landing for fishermen boats challenging. The project will however reduce the impact of flooding that will cascade to benefit the local fishermen in accessing their fish landing sites.

8.4 Potential Negative Impacts

The following negative impacts are also associated with the proposed project.

8.4.1 Increased turbidity

Sand Harvesting will cause disturbance on the lake bed through extraction, rejection, and disposal of sediments which will result into increased turbidity and creation of sediment plumes. Sediment plumes can extend the impact of Sand harvesting to a wider area that was not affected physically. However, sediment plumes are short lived and they generally last for about five days, equivalent to four to five tidal cycles in marine environment (Hitchcock and Bell, 2004). This impact is mostly confined mainly to an area of a few hundred metres from the point of disturbance (Newell et al., 1998; Hitchcock and Bell, 2004).

8.4.1.1 Impact of increased turbidity and suspended sediments on phytoplankton bloom

Phytoplankton depend on conducive environmental conditions for grow. The transparency of lake water is an important parameter that promotes penetration of light that support growth of phytoplankton. Increased turbidity and suspended sediment in the open lake near the river mouth will adversely affect penetration of light hence poor establishment of phytoplankton, and low chlorophyll-a. Management of separated sediments from Sand harvesting activity would influence the magnitude of turbidity and suspended sediment in the water.

Unmitigated impacts of increased turbidity and suspended sediments on phytoplankton bloom survival during sand harvesting		
Extent of impact	Few hundred meters from the point of Sand harvesting	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from Sand harvesting	8
Duration of impact	Most of turbid water and suspended sediment settles in less than 5 days from each Sand harvesting day. Activity will run for 1-5 years	2
Probability of impact	Penetration of light will be affected by increased turbidity and suspended sediments ultimately affecting growth.	5
Risk = (Extent + Magnitude + Duration) x Probability		60
Mitigation Ratings		Moderate
Recommendation		Mitigate
Mitigation Dredged materials should not be dumped in the lake. It should be taken outside to the terrestrial area for reclamation of derelict sand harvesting sites		
Mitigated impacts of increased turbidity and suspended sediments on phytoplankton bloom survival during sand harvesting		
Extent of impact	Few hundred meters from the point of Sand harvesting	2
Magnitude of impact	Moderately high turbidity and suspended sediments are envisaged from Sand harvesting with mitigation in place	6
Duration of impact	Most of turbid water and suspended sediment settles in less than 5 days from each Sand harvesting day	2
Probability of impact	Penetration of light in water will be improved moderate increase in turbidity and suspended sediments to sustain growth of phytoplankton.	2
Risk = (Extent + Duration + Magnitude) x Probability		20
Mitigation Ratings		Low

8.4.1.2 Impact of increased turbidity and suspended sediments on fish survival

Response of fish to increased turbidity and suspended sediments have been studied in relation to potential effects of Sand harvesting. When fish encounter sediment plumes they always avoid the area for areas with low levels of turbidity and suspended sediments. Feeding response becomes highly sensitive in fish to increased suspended sediments partly due to irritation of gill tissues. Due to the stratification of suspended sediments in water bodies fish prefers the near surface of water where there is lighter and low amount of sediments (Servizi, 1990; McLeay et al., 1983). In higher turbidity and suspended sediment levels and longer exposure periods, loss of weight in fish and mortality has been observed. However, fisheries surveys conducted before and after Sand harvesting projects indicate the project have insignificant effect on the diversity of species and abundance. Effects of Sand harvesting commonly appear to be minor and local, but effects to vary widely among the aquatic habitats.

Unmitigated impacts of increase turbidity and suspended sediments on fish survival during sand harvesting		
Extent of impact	Few hundred meters from the point of Sand harvesting	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from Sand harvesting	8
Duration of impact	Most of turbid water and suspended sediment settles in less than 5 days. Activity will run for 1-5 years.	2
Probability of impact	Fish normally avoid areas with high turbidity and suspended sediments by horizontal or vertical movement	2
Risk = (Extent + Magnitude + Duration) x Probability		24
Mitigation Ratings		Low
Recommendation		N/A
Mitigation No mitigation measure required in regard to this potential impact		
Mitigated impacts of increase turbidity and suspended sediments on fish survival during and after sand harvesting		
Extent of impact	Few hundred meters from the point of Sand harvesting	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from Sand harvesting	8

Duration of impact	Most of turbid water and suspended sediment settles in less than 5 days	2
Probability of impact	Fish normally avoid areas with high turbidity and suspended sediments by horizontal or vertical movement	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low (<30)

8.4.1.3 Impact of increased turbidity and suspended sediments on fish breeding

The survival of fish eggs and larvae in elevated turbidity and suspended sediments is poorly recorded in experiments on effect of Sand harvesting. This is because the condition is associated with increase in other water quality parameters that goes beyond range of tolerance for fish eggs and larvae. The area of cover by sediment plumes generated by physical disturbance will likely to affect areas within a few hundred meters away. Very poor breeding and survival of fish eggs and larvae will occur within the affected areas. Breeding groups will avoid such places for waters with relatively low levels of suspended sediments and turbidity. However, with proper management of Sand harvesting activities, this impact can be reduced to a more sustainable level.

Unmitigated impacts of increased turbidity and suspended sediments on fish breeding during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	Few hundred meters from the point of Sand harvesting	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from Sand harvesting	8
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years. Turbidity and suspended sediment settles in less than 5 days	2
Probability of impact	The survival rates of fish eggs and larvae in very high turbidity and suspended sediments and longer exposure period is limited	5
Risk = (Extent + Magnitude + Duration) x Probability		60
Mitigation Ratings		Moderate
Recommendation		Mitigate

Mitigation

Sand harvesting near the fish breeding areas should be avoided during the long and short rains. Sand harvesting should be stopped from mid of March/April – May/June and October to December in these areas. Hence, Sand harvesting should be planned for 6 months in a year for fish breeding sites. However, Sand harvesting in the open lake can continue throughout the year.

Areas along the shoreline, 100m wide, should be avoided for Sand harvesting activities. Contact should only take place at the mouth of the river to the lake. Sand harvesting should focus only on the mouth of the river.

Mitigated impacts of increase turbidity and suspended sediments on fish survival during sand harvesting

Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	Few hundred meters from the point of Sand harvesting	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from Sand harvesting	8
Duration of impact	Sand harvesting takes place 5hr/day. Activity is proposed for 6 months staggering in a year near fish breeding sites. Activity will run for 1-5 years. Turbidity and suspended sediment settles in less than 5 days.	2
Probability of impact	The survival rates of fish eggs and larvae in very high turbidity and suspended sediments and longer exposure period is limited. However, with the avoidance of Sand harvesting near fish breeding sites during rainy seasons, survival rates for eggs and larvae will be relatively high.	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

8.4.1.4 Impact of increased turbidity and suspended sediments on ecological behaviours of *Labeo victorianus*

Labeo victorianus is a benthopelagic – potamodromous fish. It is Critically Endangered in the waters and is rarely caught by fishermen's net. It migrates upstream of the river in search of fresh clean waters for breeding. This behaviour implies it has to pass through the river mouth to move upstream for breeding at the onset of rainy seasons. Increased turbidity and suspended

sediments, together with physical disturbance might halt migration of this species when project activities are timed with their migration patterns. In order to control negative impact on their migration, a proper management action is required.

Unmitigated impacts of increased turbidity and suspended sediments on ecological behaviours of Labeo victorianus breeding during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	Few hundred meters from the point of Sand harvesting	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from Sand harvesting	8
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years. Turbidity and suspended sediment settles in less than 5 days	2
Probability of impact	The survival rates of fish eggs and larvae in very high turbidity and suspended sediments and longer exposure period is limited	5
Risk = (Extent + Magnitude + Duration) x Probability		60
Mitigation Ratings		Moderate
Recommendation		Mitigate
Mitigation Sand harvesting near the fish breeding sites and 100m from the shoreline should be avoided during the long and short rains. These are periods when migration of *Labeo victorianus* takes place. Sand harvesting near the breeding sites and 100m from the shoreline should be stopped from mid of March/April – May/June and October to December. Hence, Sand harvesting in these areas should be planned for 6 months in a year. However Sand harvesting in the open lake can continue throughout the year.		
Mitigated impacts of increased turbidity and suspended sediments on ecological behaviours of Labeo victorianus breeding during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	Few hundred meters from the point of Sand harvesting	2

Magnitude of impact	Very high turbidity and suspended sediments are envisaged from Sand harvesting	8
Duration of impact	Sand harvesting takes place 5hr/day. Activity is proposed for 6 months staggering in a year. Activity will run for 1-5 years. Turbidity and suspended sediment settles in less than 5 days.	2
Probability of impact	Movement of *Labeo victorianus* across sediment plumes for upstream migration will stopped. However, with the avoidance of Sand harvesting near the breeding sites and 100m from the shoreline during rainy seasons, migration will be occasioned.	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

8.4.2 Physical damage/injury or mortality

This impact is associated with physical movements of dredgers. Components that are likely to affect habitats and aquatic organisms are the drag-head or cutter-head, transportation, and separation of sediments and disposal of dredged materials.

8.4.2.1 Impact of entrainment by suction of pipeline dredger on fish eggs and larvae

Entrainment of sediment at the bottom of the lake and river mouth will likely to cause uptake of organisms by the suction field generated at the drag-head or cutter-head during Sand harvesting operations (Reine et al., 1998). Entrainment results in the localized by-catch of fish eggs, larvae and even mobile juveniles and adult fish. However, fish eggs and larvae are more vulnerable to entrainment as most of them get damaged physically in the process. Pipeline dredges, however, causes more damage and mortality to fish egg and larvae than hydraulic dredgers.

Unmitigated impacts of entrainment by suction of pipeline dredger on fish eggs and larvae during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur in the area for Sand harvesting which include along the river mouth	2
Magnitude of impact	Sediments at the bottom of the river mouth will be removed physically	6

Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	The pipeline Sand harvesting causes more damage and mortality of fish eggs and larvae	4
Risk = (Extent + Magnitude + Duration) x Probability		40
Mitigation Ratings		Moderate
Recommendation		Mitigate

Mitigation

Sand harvesting near the fish breeding sites and 100m from the shoreline should be avoided during the long and short rains. Sand harvesting near the breeding sites and 100m from the shoreline should be stopped from mid of March/April – May/June and October to December. Hence, Sand harvesting in these areas should be planned for 6 months in a year. However, Sand harvesting in the open lake can continue throughout the year.

Mitigated impacts of entrainment by suction of pipeline dredger on fish eggs and larvae during sand harvesting

Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur in the area for Sand harvesting which include along the river mouth	2
Magnitude of impact	Sediments at the bottom of the river mouth will be removed physically	6
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	The pipeline Sand harvesting causes more damage and mortality of fish eggs and larvae. With adoption of the proposed mitigation of avoiding Sand harvesting during rainy seasons, more fish eggs and larvae will survive to a stage in life where they can avoid areas under Sand harvesting.	2
Risk = (Extent + Duration + Magnitude) x Probability		20
Mitigation Ratings		Low

8.4.2.2 Impact of entrainment by suction of pipeline dredger on demersal fish species

The rates of entrainment of mobile pelagic fish are normally low but high for benthic (demersal) species (Drabble, 2012; Reine et al., 1998). The potential for entrainment of demersal species can be relatively high but the overall mortality rates may be low. Mortality rates of demersal fishes from pipeline dredges are estimated to be as high as 60% of total entrained. However, fish may avoid repeatedly being dredged (Appleby & Scarratt, 1989). About 9 species of fish in the river mouth and near open waters are demersal species. These include the *Marcusenius victoria, Clarias alluaudi, Clarias liocephalus, Mastacembelus frenatus,* and *Protopterus aethiopicus*. These species are likely to be affected within the project area by Sand harvesting.

Unmitigated impacts of entrainment by suction of pipeline dredger on demersal fish species during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur in the area for Sand harvesting which include along the river mouth	2
Magnitude of impact	Sediments at the bottom of the river mouth will be removed physically	6
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	The pipeline Sand harvesting entrain most of demersal fish species causing relative high mortality	4
Risk = (Extent + Magnitude + Duration) x Probability		40
Mitigation Ratings		Moderate
Recommendation		Mitigate

Mitigation

Sand harvesting near the fish breeding sites and 100m from the shoreline should be avoided during the long and short rains. Sand harvesting near the breeding sites and 100m from the shoreline should be stopped from mid of March/April – May/June and October to December. Hence, Sand harvesting in these areas should be planned for 6 months in a year. However, Sand harvesting in the open lake can continue throughout the year.

Vegetation at the edge of river mouth facing the lake should not be destroyed. These are refuge for the demersal fishes. Sand harvesting should focus on the mouth of the river, the near open lake waters and unblocking the old river mouth.

Sand harvesting should be conducted at the river mouth to allow displaced fish species with alternative channel route to the open lake water.		
Mitigated impacts of entrainment by suction of pipeline dredger on demersal fish species during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur in the area for Sand harvesting which include along the river mouth	2
Magnitude of impact	Sediments at the bottom of the river mouth will be removed physically	8
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	The pipeline Sand harvesting causes more damage and mortality to most of demersal fishes that are entrained. With adoption of the proposed mitigation of avoiding Sand harvesting during rainy seasons, high turnover will occur in this group.	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

8.4.2.3 Impact of physical damages on water bird population

Water birds are most found occurring on the fringing vegetation of the river mouth. These areas are foraging and breeding areas for the water birds. Hence destruction of the fringing vegetation will deprive these birds foraging grounds at the edge of the river mouth. Thus, prevention of Sand harvesting activities should be a priority inSand harvesting plan.

Unmitigated impacts of physical damages on waterbird population during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur at the river mouth and open water areas near the river mouth	2

Magnitude of impact	Physical disturbance of pipeline Sand harvesting. Sediments at the bottom of the river mouth will be removed physically	4
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Sand harvesting will temporarily deter movement of water birds along the river mouth fringes	3
Risk = (Extent + Magnitude + Duration) x Probability		24
Mitigation Ratings		Low
Recommendation		No mitigation
Mitigation No mitigation measure required		
Mitigated impacts of physical damages on water bird population during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur at the river mouth and open water areas near the river mouth	2
Magnitude of impact	Physical disturbance of pipeline Sand harvesting. Sediments at the bottom of the river mouth will be removed physically	4
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Sand harvesting will temporarily deter movement of water birds along the river mouth fringes	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

8.4.2.4 Impact of Sand harvesting on aquatic habitat

There are different habitats in the river mouth area; the open water, river and lake bed, and swamp. Sand harvesting is likely to affect the river and lake bed on spot of the activities than other habitats. The physical removal of the bottom sediment will destroy an already established benthic habitat. Even though pipelineSand harvesting reduces introduction of sediments and

turbidity in water, a relative amount is however released in water which potentially causes smothering effect on the adjacent benthic habitats. This assessment of impact is based on assumption that the river mouth vegetation or the swamp will not be dredged. The project will only focus on the river mouth bottom of the near open lake water.

Unmitigated impacts of Sand harvesting on aquatic habitat during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur at the river mouth and open water areas near the river mouth	2
Magnitude of impact	Sand harvesting will physically affect the river mouth	4
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Physical disturbance of benthic habitat will take place once the project starts. Smothering of benthic habitat by sediments in the near open waters	4
Risk = (Extent + Magnitude + Duration) x Probability		32
Mitigation Ratings		Moderate
Recommendation		Mitigate
Mitigation		
Mitigated impacts of Sand harvesting ***on aquatic habitat during sand harvesting***		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur at the river mouth and open water areas near the river mouth	2
Magnitude of impact	Sand harvesting will physically affect the river mouth.	4
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Physical disturbance of benthic habitat will take place once the project starts. Smothering of	2

	benthic habitat by sediments in the near open waters	
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

8.4.3 Impact of Oil spill on aquatic life and habitats

Accidental and/or operational oil spills from the vessel during Sand harvesting/dumping may affect aquatic life due to direct toxic effects and/or habitat alteration.

Unmitigated impacts of accidental and/or operational oil spills from the vessel during sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur around the Sand harvesting vessel within the project area.	2
Magnitude of impact	Potential killing of aquatic life due to limited oxygen supply	6
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	There will be instances where the vessel will handle oil during its operation. However, care will be taken to minimize oil spills. Most of the potentially affected organisms are widely distributed in the region	3
Risk = (Extent + Magnitude + Duration) x Probability		30
Mitigation Ratings		Moderate
Recommendation		Mitigate
Mitigation Seek to reduce probabilities of accidental and/or operational spills through enforcement of oil spill management systems.		
Mitigated impacts of accidental and/or operational oil spills from the vessel during sand harvesting		

Nature of Impact	Description of impact	Rating of impact
Extent of impact	This impact will occur around the Sand harvesting vessel within the project area.	2
Magnitude of impact	Most of the potentially affected organisms are widely distributed in the region	4
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	There will be instances where the vessel will handle oil during its operation. However, care will be taken to minimize oil spills.	3
Risk = (Extent + Duration + Magnitude) x Probability		28
Mitigation Ratings		Low

8.4.4 Impact of Noise during sand harvesting/dumping activities

Noise from the Sand harvesting / dumping activity may disturb some aquatic and land mammals. But in the worst-case scenario the noise impact has a potential radius of few hundred metres from the source.

Unmitigated impacts of Noise during sand harvesting/dumping activities		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur around the Sand harvesting vessel and is localised.	1
Magnitude of impact	Aquatic and land mammals have a wide distribution range and should move away from source of noise	2
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1 year	2
Probability of impact	Depends on whether any mammal may migrate towards the source of noise	3
Risk = (Extent + Magnitude + Duration) x Probability		15
Mitigation Ratings		Low

Recommendation	No Mitigation
Mitigation Not necessary due to low significance	

8.4.5 Impacts of sand harvesting on the community and livelihood

The affected persons by the Sand harvesting project may raise their grievances and dissatisfactions about actual or perceived impacts in order to find a satisfactory solution. These grievances, influenced by their physical, situational and/or social losses, can emerge at the different stages of the project cycle. Not only should the affected persons be able to raise their grievances and be given an adequate hearing, but also satisfactory solutions should be found that mutually benefit both the affected persons and the project.

Unmitigated impacts of sand harvesting on the community		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur during sand harvesting within the project area.	2
Magnitude of impact	Potential disruption of the Sand harvesting exercise	6
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Many grievances arise because of misunderstandings; lack of information; or delayed, inconsistent or insufficient information.	3
Risk = (Extent + Magnitude + Duration) x Probability		30
Mitigation Ratings		Moderate
Recommendation		Mitigate
Mitigation Provide sufficient and timely information to communities. Accurate and adequate information about the Sand harvesting project and its activities, plus an approximate implementation schedule, shall be communicated to the communities, especially affected parties, regularly. Meaningful community consultations shall be conducted. The proponent shall continue the process of consultation and dialogue throughout the implementation of the Sand harvesting project.		

Appropriately compensate the affected fishermen for temporary lose of their livelihood during the sand harvesting exercise.		
Mitigated impacts of sand harvesting on the community		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur during sand harvesting within the project area.	2
Magnitude of impact	Potential disruption of the Sand harvesting exercise	2
Duration of impact	Sand harvesting takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Many grievances arise because of misunderstandings; lack of information; or delayed, inconsistent or insufficient information.	3
Risk = (Extent + Duration + Magnitude) x Probability		18
Mitigation Ratings		Low

9. HEALTH AND SAFETY PROVISIONS

All occupational health and safety measures will comply with Government of Kenya regulations, and good practice. The Proponent will ensure as far as practicable that the health, safety and welfare of employees and all other persons on site are secured and are protected from hazards created by the Project. Such precautions include Environmental, Social, Health & Safety Management Plan that are reasonably to prevent unauthorized entry upon Sand harvesting site and to protect members of the public from any activities under the control of the Proponent.

9.1 General

9.1.1 Policy Statement

The Proponent recognizes the importance of Occupational Health and Safety for all employees and other stakeholders potentially affected by her operations and services. The proponent is committed to providing and maintaining a safe working environment for all her staff.

This policy informs the company employees and other stakeholders as to her objectives in ensuring a commitment to maintaining and improving on Health and Safety practices in the workplace. The primary means which the proponent employs to direct Health and Safety Policy are as follows:

- Using risk based objective analysis to set targets and improve Health and Safety Management that informs the overall strategic goals;
- Fostering a culture of Health and Safety awareness and proactive engagement by providing participatory training and open communication lines for all staff;
- Ensuring open and inclusive methods of working so all staff are aware of their responsibilities for their own and others' health and safety;
- Providing professional and financial resources to ensure a safe working environment which include; capacity building and supervision, monitoring and measuring of company own Health and Safety standards and records maintenance; and
- Implement and, where reasonably practicable, continuously improve effective health and safety standards which reflect the best industry practice.

The proponent is committed to adopt all necessary measures to reduce the Health and Safety risk to all involved in this project.

9.2 Emergency Response plans

9.2.1 Emergency Preparation

The proponent shall:

- Establish an emergency preparation unit and make sure number of personnel involved;
- Train the personnel to deal with emergency regularly and make sure the emergency reaction program carried is out smoothly;
- Avail the equipment for emergency at site, checked and tested regularly; and
- Train the workers to prevent and protect themselves in case of emergency.

9.2.2 Emergency Times

The proponent shall not work in times of emergency. Emergency scenarios at the worksites are mainly accidents, injuries to staff or public, property damage, community unrest, public disturbances, fuel leakage and other disasters. In the case of no warning emergencies, the proponent proposes to implement the following reactive emergency action plans to avoid fatalities, injuries and property damage:

Communications:

- All Emergency situations shall be immediately reported to the PM of the proponent by phone. The emergency telephone numbers will be displayed on notice board at all site offices; and
- Emergency situations and the reactive measures instituted by the proponent shall be recorded and reported immediately (within 24 hours of occurrence) to the relevant authorities.

Medical Services and First Aid:

- The proponent shall maintain at all active sites completely equipped and clean first aid kits accessible to all works at all times and to all staff.
- The content of first aid kits shall be well labeled in language readable and comprehensible to the users.
- A trained first aider shall be on site with knowledge on the proper usage of the first aid kits, emergency telephone numbers and emergency procedures.
- Minor injuries shall be treated with the first aid kits and later to the nearest Government hospital/clinic; major injuries must be referred directly to the nearest Government hospital/clinic.

9.2.3 Fire Prevention, Fighting and Equipment

The proponent shall:

- Store flammable material in approved areas having adequate fire protection systems;
- Display sufficient warning signs;
- Train selected personal on how to use these fire extinguishers and inspect the fire extinguishers regularly and have replacements done where required;
- Contract a fire extinguisher servicing company to periodically inspect the fire extinguishers;
- Install fire alarm wherever required and test them regularly.

9.2.4 Incident and Accident Investigations

- Carry out incident/accident investigations as quickly as possible;
- Check all the log books, stock registers, issue registers, movement registers, on site safety regulation parameters, traffic signals and signal men activities, signage, as well as other field positions and keep a record of all investigations through audio visual electronic medium for presentation an evaluation of the incidents
- After completion of investigation and enquiry a summary of the facts recorded, sequence of happening, persons in charge, persons examined, equipment and machineries tested,

follow of action as per legal requirements, copy of station diary entry, hospital entry, safety regulations to be prepared with a comparative analysis for proper assessment.

9.2.5 First Aid Facilities, Equipment and Materials

- The proponent will provide and maintain fully stocked and staffed first aid stations throughout the extent of the works; the first aid personnel shall have valid certificates.
- The proponent will be responsible for all work and site welfare arrangements and requirements to the satisfaction of the Engineer.
- It is pertinent to provide first aid facilities for all Sand harvesting workers, at site office and at all workplaces;
- Adequate transport facilities for moving the injured persons to the nearest hospital will also be provided in readiness at strategic locations to move at the call of emergency;
- The proponent will provide portable fire Safety Equipment to be installed at places of inflammable materials, site office, to douse any accidental fire that may occur at any time and at any place; and
- The notice boards at site office, and work places will have the telephone numbers of the nearest police station, PM, headquarters hospitals, fire stations and ambulance supply units for immediate contact in case of emergency.

9.3 Personal Protective Equipment (PPE)

The following minimum protective clothing shall be made available to all workers at the project's sites: Life jackets, Hand gloves, Safety boots, Reflective vest, Nose mask and Helmet.

The proponent shall consider the provision of personal protect equipment only after all measures for elimination, removing or controlling safety hazards have been proved reasonably impractical. The proponent shall ensure that appropriate and sufficient personal protective equipment is provided and that they are readily available for every person who may need to use them and that all persons make full and proper use of the personal protective equipment provided. The proponent shall provide instruction and training in the proper use and care of any specific protective equipment where necessary.

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

10.1 Scope and Objectives of the Proposed ESMP

10.1.1 Scope

The Proposed ESMP identifies the potential impacts of the proposed project on the environment and proposes how to mitigate the adverse impacts. The mitigation measures have been devised in line with various legal and regulatory requirements that are relevant to the project. This ESMP is a dynamic document that can be updated with changing project conditions.

10.1.2 Objectives of the Proposed ESMP

The objectives are to:

- Enable detection of changes in environmental conditions by highlighting anticipated impacts;
- Prescribe preventive measures that the proponent should institutionalize to mitigate adverse environmental and social impacts;
- Respond to adverse changes during the Sand harvesting process through monitoring and control programmes in consultation with NEMA;
- Ensure that corrective actions are implemented appropriately and in a timely manner;
- Bring the project into compliance with applicable legal environmental policies and procedures, more so EMCA, 2015;
- Outline the mitigating and monitoring measures required to enhance the positive project impacts;
- Prescribe procedures that cause minimum environmental degradation, especially implementation of best environmental practice in the sector;
- Spell out practices to ensure all personnel engaged in the works comply with the prescriptions of the ESMP;
- Ensure that no change is made to the ESMP without the prior written permission of West Kenya, or its nominated representative(s);
- To ensure environmental mainstreaming during the implementation of the project;
- To enable for a systematic and proactive approach to addressing environmental and social issues during the project's implementation;
- Ensure compliance with, among others: NEMA regulations, County By-laws; and
- Provide guidelines for record keeping on site.

This ESMP framework constitutes attendant sub-plans that will be responsive to the prevailing environmental and social circumstances during the Sand harvesting process. The ESMP will therefore remain an active document that can be continuously upgraded.

10.2 Implementation and Monitoring of the ESMP

In executing its responsibilities during sand harvesting, the Proponent remains committed to environmental management. The proponent and any sub contactors are bound to comply with legal and regulatory environmental requirements of Kenya.

This ESMP implementation covers sand harvesting. Even though other parties may be brought on board to attend to various project aspects, the oversight and responsibility for implementation of this ESMP in accordance with best industry practices as well as workplace health, safety and environmental (HSE) standards still remains with the proponent.

The proponent will allocate adequate budget and a proper implementation schedule for all mitigation measures specified in the ESMP. In addition, the specific roles and responsibilities will be assigned to project personnel, such as safety and health management roles.

10.3 Implementation of Corrective Action(s)

There are several mechanisms for implementing corrective action during sand harvesting. The main mechanisms to address non-conformances include verbal instruction (in the event of minor deviation from established procedure, usually following a site inspection); written instruction (identifying sources of problems, usually following an audit) and issuance of contract notice (following possible breach of contract).

10.4 Environmental and Social Management Plan Matrix

This matrix presents the proposed measures comprising individual sub-plans to address specific environmental and social concerns. The information provided in this chapter and summarized in the matrix constitutes the ESMP. The implementation of this ESMP should be carried out within the provisions of the law and for the ultimate benefit of all project stakeholders. The effectiveness of this ESMP shall be monitored and assessed during periodic checks, inspections and at the end of the Project when an overall audit shall be carried out.

Table 11: Environmental and Social Management Plan Matrix

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
Environmental and Safety Aspects					
Increased turbidity	Reduced phytoplankton bloom	- Avoid dumping of harvested sand inside the lake; - Recycle sand as building material.	Proponent	Sand harvesting period	Part of Sand harvesting costs
	Effects on fish survival	- Carry out spot sand harvesting to allow fish to move from high turbidity and suspended sediments areas by horizontal or vertical movements	Proponent	Sand harvesting period	Part of Sand harvesting costs
	Effects on fish breeding	- Avoid Sand harvesting near the fish breeding areas during the long and short rainy period; - Avoid sand harvesting activities in areas along the river mouth and 100m wide from the shoreline; and - Limit the Sand harvesting on the mouth of the river.	Proponent	Sand harvesting period	Best Environmental Practice
	Impact on ecological behaviours of *Labeo victorianus*	- Avoid sand harvesting near the fish breeding areas during the long and short rainy period; - Avoid sand harvesting activities in areas along the river mouth and 100m wide from the shoreline; and - Limit the Sand harvesting on the mouth of the river.	Proponent	Sand harvesting period	Best Environmental Practice
Physical damage/injury or mortality	Impact on fish eggs and larvae	- Avoid Sand harvesting near the fish breeding areas during the long and short rainy period; - Avoid Sand harvesting activities in areas along the river mouth and 100m wide from the shoreline; and - Limit the Sand harvesting on the mouth of the river.	Proponent	Sand harvesting period	Best Environmental Practice

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
	Impact on demersal fish species	- Avoid conducting Sand harvesting near the fish breeding areas during the long and short rainy period; - Avoid sand harvesting activities in areas along the river mouth and 100m wide from the shoreline; - Vegetation at the edge of river mouth facing the lake should not be destroyed; and - Limit the Sand harvesting on the mouth of the river.	Proponent	Sand harvesting period	Best Environmental Practice
	Impact on aquatic habitat	- Limit the Sand harvesting on the mouth of the river.	Proponent	Sand harvesting period	Best Environmental Practice
Oil Spill Hazards	Pollution of water resources	- Collect the used oils and re-use or dispose of appropriately using expertise from licensed waste handlers; and - Seek to reduce probabilities of accidental and/or operational spills through enforcement of oil spill management systems.	Proponent	Sand harvesting period	500,000 Best Environmental Practice
Occupational Health and Safety	Health and Safety risks	- Ensure the dredger is licensed by the IMO and KMA; - Create awareness among Lake users on the presence of the dredger and its activities as well as the require safety precautions; - Dredger should have an early warning system for local fishermen within the river mouth to prevent navigational accidents and loss of life in case of potential collision with the fishing boats; - Hire qualified and well-trained personnel for the Sand harvesting works;	Proponent	Sand harvesting period	1,000,000

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
		- The proponent to obtain insurance cover for employees of the dredger site and ensure appropriate compensation in the event of accidents; - Provide Personal Protective Equipment (PPE) for ship crew, workers and visitors to the Sand harvesting site; - Contractor to recruit qualified and experienced Occupational Safety Officers to train and enforce compliance with safety measures; - Comply with the Occupational Safety and Health Act, 2007; and - All accidents should be reported, investigated and corrective action taken to prevent reoccurrence.			
Socio-Economic Aspects					
Social Grievances	Misunderstandings; lack of information; or delayed, inconsistent or insufficient information	- Provide sufficient and timely information to communities about the Sand harvesting project and its activities, plus an approximate implementation schedule; - Employ locals in liaison with local leaders and administration in unskilled and semi-skilled duties; and - Carry out regular meaningful community consultations and dialogue throughout the implementation of the Sand harvesting project.	Proponent, community liaison officers and local administrators	Sand harvesting period	2,000,000

11. CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusions

The perennial flooding at Kuja River flood plain occurs due to heavy rains in the catchment as well as deforestation upstream as a result of poor land use practices and other anthropogenic activities, causing serious sedimentation at the river mouth. The sand harvesting project should therefore be undertaken to forestall human suffering during floods among other things such as building of dykes to reduce siltation and flooding.

Views gathered from stakeholders point to the anticipation that the Sand Harvesting Project will help to control flooding within the Kuja River Mouth while reducing displacements, water borne diseases and deaths. In addition, the project will also improve navigation within the lake and the river and resuscitate livelihoods such as farming and other economic activities that were previously been interrupted by floods. In spite of the consulted parties airing a few concerns and suggestions over how certain aspects of the project should be handled, they indicated support for the proposed development and look forward to its implementation.

The adverse elements notwithstanding, the benefits that will be realized from the proposed sand harvesting outweigh most of the inconveniences and negative impacts that have been categorized in this ESIA Study as temporary, moderately significant and limited to the project area. The ESIA Study determined that if the project is implemented with due attention to the mitigation and monitoring measures entailed in this document, most if not all, adverse environmental and social impacts will be manageable. Overall, the Proposed Sand Harvesting Project is deemed timely, highly beneficial and should therefore be allowed to proceed within the given framework.

11.2 Recommendations

It is recommended that for the prevention and mitigation of potentially adverse environmental and socio-economic impacts, the following should be done:

- The operation and maintenance of the proposed project must comply with the best management practices and the principles of environmental management including the principles of sustainability, intergenerational equity, prevention and precaution;
- Ensure the views expressed by the public during the consultation exercise are integrated in the design and implementation plan of the project, especially where aspects of social interest are concerned;
- Regular environmental and social safeguard monitoring and auditing should be undertaken and any identified shortcomings addressed. This will ensure that all projects are in conformance with established laws and regulations for the management of environment, safety and health;
- Institute effective communication, education and awareness raising for project workers and neighbours for enhanced acceptability and social harmony;
- The proponent should ensure the local community benefits from employment opportunities during the implementation of the project that is being executed and adequate compensation to

the affected fishermen who may temporarily lose their livelihoods during the sand harvesting exercise.

REFERENCES

1. Appleby, J., & Scarratt, D. J. (1989). Physical effects of suspended solids on marine and estuarine fish and shellfish with special reference to ocean dumping: A literature review (pp. 33). Canadian Technical Report of Fisheries and Aquatic Sciences, No. 1681, Department of Fisheries and Oceans, Halifax, Nova Scotia.
2. Drabble, R. (2012). Projected entrainment of fish resulting from aggregate dredging. Marine Pollution Bulletin, 64, 373–381.
3. IFC, 2012. International Finance Corporation's guidance note: Performance standards on environmental and social sustainability. International Finance Corporation.
4. FishBase team RMCA & Geelhand, D. 2016. Labeo victorianus. The IUCN Red List of Threatened Species 2016: e.T60318A47182908. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T60318A47182908.en.
5. Brunn, P., Gayes, P. T., Schwab,W. C., and Eiser, W. C. 2005. Dredging and offshore transport of materials. Journal of Coastal Research, (Special Issue) No. 2: 453–525.
6. EUDA. 2014. Types of dredger. European Dredging Association.
7. Hitchcock,D. R., and Bell, S. 2004. Physical impacts of marine aggregate dredging on seabed resources in coastal deposits. Journal of Coastal Research, 20: 101–114.
8. KMD. 2025. State of the Climate Kenya 2024
9. Newell, R. C., Seiderer, L. J., and Hitchcock, D. R. 1998. The impact of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. Oceanography and Marine Biology: an Annual Review, 36: 127–178.
10. Reine, K. J., & Clarke, D. G. (1998). Entrainment by hydraulic dredges – A review of potential impacts, Technical Note DOER-E1 (pp. 1-14). U.S. Army Corps of Engineers, Engineer Research and Development Center, Vicksburg, MS.
11. Republic of Kenya, (2010). Constitution of Kenya. National Council for Law Reporting, Nairobi.
12. Republic of Kenya, (2005). The Forest Conservation and Management Act No. 34 of 2016. National Council for Law Reporting, Nairobi.
13. Republic of Kenya, (2016). Water Act, 2016. National Council for Law Reporting, Nairobi.
14. Republic of Kenya, (1999). Environmental Management and Coordination Act, 1999 Amended. National Council for Law Reporting, Nairobi.
15. Republic of Kenya, (2013). The Wildlife (Conservation and Management) Act, Cap 376, Revised Edition 2013. National Council for Law Reporting, Nairobi.
16. Republic of Kenya, Public Health Act, Cap 242. National Council for Law Reporting, Nairobi.
17. Servizi, J.A. 1990. Sublethal effects of dredged sediments on juvenile salmon. In: Simenstad, C.A., ed., Effects of dredging on anadromous Pacific coast fishes, pp 57-63. Workshop Proceedings, University of Washington and Washington Sea Grant Program.

18. Stefan C. I., Robichaud C., Knopff K., Nielsen D., Carveth Corissa, Derek Melton4 and Richard Novy, 2012. Critical Habitat Assessment using IFC PS6 Criteria. 'IAIA13 Conference Proceedings' Impact Assessment the Next Generation 33rd Annual Meeting of the International Association for Impact Assessment 13 – 16 May 2013, Calgary Stampede BMO Centre | Calgary, Alberta, Canada.
19. Thomsen, F., McCully, S., Wood, D., Pace, F., and White, P. 2009. A generic investigation into noise profiles of marine dredging in relation to the acoustic sensitivity of the marine fauna in UK waters with particular emphasis on aggregate dredging: phase 1 scoping and review of key issues. Cefas MEPF RefNo. MEPF/08/P21. 59 pp.
20. UNEP-ACTS, (2001). The Making of a Framework Environmental Law in Kenya. ACTS press, Nairobi.

APPENDICES

APPENDIX I: APPROVED TERMS OF REFERENCE

TOR 837

TERMS OF REFERENCE

FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY.

DECEMBER 2024

Prepared for:

MANGO TREE MARINE LTD

P.O. Box 3300-40100

Kisumu, Kenya

Prepared by:

Gomake Consultancy Co. Ltd

Firm of Experts No. 8511

P.O. Box 5540-00100

Nairobi

E-mail: info@gomakeltd.co.ke

Approved with conditions
J. Makau

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
RECEIVED
03 DEC 2024
IMPACT ASSESSMENT
P.O. BOX 67839 - 00200, NAIROBI

TOR 837

TERMS OF REFERENCE

FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY.

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Nairobi

E-mail: info@gomakeltd.co.ke

Approved with conditions
J. Makau

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
RECEIVED
03 DEC 2024
IMPACT ASSESSMENT
P.O. BOX 67389 - 00200, NAIROBI

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Mobile Lines: 0724 253 398, 0723 363 010, 0735 013 046
Telkom Wireless: 020-2183718, 020-2101370
Incident Lines: 0786 101 100, 0741 101 100

P.O. Box 67839 - 00200
Popo Road, Nairobi, Kenya
Email: info@nema.go.ke
Website: www.nema.go.ke

REF: NEMA/TOR/5/2/837 **DATE: 5th December, 2024**

The Director,
Mango Tree Marine Limited,
P.O. BOX 3300-40100,
KISUMU.

RE: TERMS OF REFERENCE (TOR) FOR ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED SAND HARESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH IN MIGORI COUNTY.

We acknowledge the receipt of your TOR for the above proposed project.

Pursuant to the Environmental Management and Coordination Act, 1999, the Environmental (Impact Assessment and Audit) Regulations 2003 and Legal notice 31 & 32 of 2019, your terms of reference for the Environmental Impact Assessment (EIA) for the **PROPOSED SAND HARESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH IN MIGORI COUNTY** has been approved with the following conditions:

1. You shall undertake detailed baseline hydrogeological survey, water quality, soil/ river bed sediments quality and biodiversity (aquatic) survey of the extend coverage of the proposed project in Lake Victoria and the recipient downstream aquatic ecosystem.

2. You shall undertake an inclusive and detailed stakeholder engagement and public participation with the Project Affected Persons (PAPs) in full compliance to Regulations 17 of EIA/EA Regulations, 2003 and provide evidence of Published Notices for the meetings, dully signed minutes and attendance lists of at least three consultation meetings.

3. You shall obtain user rights authorization to set-up such a project in a lake that is environmentally sensitive and of national strategic interest from the Water Resources Authority, the National Land Commission, Directorate of Mines and County Government of Migori.

You shall submit ten (10) copies of the EIA study report accompanied by the above specialized assessment reports upon payment of the applicable EIA processing and monitoring fees being 0.1% of the total project cost, a soft copy of the summarised ESMP in **WORD** format for preparation of public notice and one electronic copy of the report prepared by the team of experts to the Authority.

You are advised to comply accordingly.

JOSEPH MAKAU
FOR: DIRECTOR GENERAL

APPENDIX II: PROPONENT DOCUMENTS

No. PVT/2016/000058

CERTIFICATE OF INCORPORATION

I hereby CERTIFY, that -

MANGO TREE MARINE LIMITED

is this 25th day of January, 2016 Incorporated under the Companies Act, 2015 and that the Company is PRIVATE LIMITED BY SHARES.

F. M. O. KADIMA
ADVOCATE
AND
COMMISSIONER
FOR OATH
P.O. Box 90716 MOMBASA

Registrar of Companies

I Certify that this is the true likeness of the applicant

F. M. O. KADIMA
P. O. Box 90716 - Mombasa

KENYA REVENUE AUTHORITY

PIN Certificate

Contact KRA Call Centre
Tel: +254 (020) 4999 999
Cell: +254(0711)099 999
Email: callcentre@kra.go.ke

www.kra.go.ke

Certificate Date : 14/08/2019

Personal Identification Number

P051761043W

This is to certify that taxpayer shown herein has been registered with Kenya Revenue Authority

Taxpayer Information

Taxpayer Name	MANGO TREE MARINE LIMITED
Email Address	MANGOTREEAFRICA@GMAIL.COM

Registered Address

L.R. Number :	**Building** N/a
Street/Road Kisumu West	**City/Town :** Kisumu
County : Kisumu	**District** Kisumu West District
Tax Area Kisumu West	**Station** Kisumu
P. O. Box 3300	**Postal Code** 40100

Tax Obligation(s) Registration

Sr. No.	Tax Obligation(s)	Effective From Date	Effective Till	Status
1	Income Tax - PAYE	12/06/2019	N.A.	Active
2	Value Added Tax (VAT)	12/06/2019	N.A.	Active
3	Income Tax - Company	08/02/2019	N.A.	Active

The above PIN must appear on all your tax invoices and correspondences with Kenya Revenue Authority. Your accounting end month is December unless a change has been approved by the Commissioner-Domestic Taxes Department. The status of Tax Obligation(s) with 'Dormant' status will automatically change to 'Active' on date mentioned in "Effective Till Date" or any transaction done during the period. This certificate shall remain in force till further updated.

E. M. O. KADIMA
ADVOCATE
AND
COMMISSIONER
FOR OATH
P.O. Box 90716, MOMBASA

I Certify that this is the true likeness of the applicant

E. M. O. KADIMA
P. O. Box 90716 - Mombasa

Disclaimer : This is a system generated certificate and does not require signature.

APPENDIX III: PCM MINUTES AND ATTENDANCE REGISTERS

MEETING MINUTES OF THE PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY IN KABUTO AREA, MIGORI COUNTY ON 5/2/2025 AT KAO BEACH.

MEMBERS PRESENT

See the attendance list attached

AGENDA

PROPOSED SAND HARVESTING

MIN 1: IDENTIFICATION OF THE PROJECT

The meeting began by a word of prayer from one of the participants at 11.10am.

The area chief thereafter welcomed community members and welcomed a representative of Mango tree who gave a brief of the project description which was Sand harvesting from River Kuja by use of a dredger which has a sanction pipe. The sand would then be taken to the existing sand holding site in Mbita where it will be used for commercial purposes.

MIN 2: ISSUES RAISED

Q1: What duration will the project take?

Q2: What benefit will the community get?

Q3: Will there be employment opportunities to the local community?

Q4: Where is the sand holding site?

Q5: Will breeding sites for fish be affected?

Q6: Is there a solution for the bursting/overflowing river?

Q7: Will dredging be up to the mouth of the river?

Q8: Will the vibration of the dredger affect the movement of fish?

MIN 3: RESPONSES

Q1: The project will take 1 year from the date of NEMA licensing. The proponent might wish to renew upon the company's' discretion

Q2: Through the formed sand harvesting committees, the community is able to come up with different projects that can be funded by the developer/proponent

Q3: Sand mining using a dredger is mechanized. The proponent is only able to provide internships to marine students. In case there will be a sand holding site in Migori, the site is able to have a minimum of 100 people tipping the sand.

Q4: Currently the sand holding site will be in Mbita. This is due to the depth of the lake at the shores in Migori. However, the proponent will explore deeper areas within Migori County for the community members to have direct benefit in employment.

Q5: Biodiversity survey was conducted by the Kenya Marine and Fisheries Research Institute. In the survey, the breeding sites for fish will not be affected and so the economic livelihood of the fisher folk community will be intact.

Q6: Dredging of the river is the solution to the back flowing river which is as a result of increased siltation.

Q7: Dredging will take place from inside the lake. Where the river meets the lake. Those sand mining from the river will not be affected.

Q8: Dredging will take place only for 3 hrs. Either at night or during the day depending on the agreement with the community and the fishermen

MIN 4: SUGGESTIONS

- ✓ The developer to make the road to Nyakweri or Luanda
- ✓ The BMU to be given 2 floating bandas under CSR in the 2 beaches;
- ✓ The developer to first have a solution to the back flowing river.
- ✓ The area chief led by the sub county administrator to fast track the formation of sand harvesting committee

MIN 4: CONCLUSION.

Community members thanked the proponent for bringing such a project since this was going to increase the growth of the beach and create employment for the youths around the village if a sand holding site was to be in Migori. The proponent promised to have another meeting when they receive the NEMA license and before works star.

MINUTES CERTIFICATION PAGE

Signed by:

1. ADMINISTRATION REPRESENTATIVE:

DATE: 05/02/2025

SIGNATURE and STAMP:

OFFICE OF SENIOR CHIEF
LOWER CENTRAL KADEM LOCATION
P. O. BOX 93 KARUNGU
DATE 05/2/25 SIGNATURE

2. CONSULTANT REPRESENTATIVE:

KENNEDY KUJANA

DATE: 05/2/2025

SIGNATURE and STAMP:

GOMAKE CONSULTANCY COMPANY LTD.
05 FEB 2025
P. O. Box 5540-00100, NAIROBI-KENYA
TEL: 0720 964 333
Email: info@gomakeltd.co.ke

3. COMMUNITY REPRESENTATIVE:

DATE: 5/02/2025

AUSTINE ORWA ADERA

SIGNATURE:

ttendance Register

Project Name: Environmental And Social Impact Assessment Study for the Proposed Sand Harvesting Project.

Meeting Venue: Kao beach, lower Central Kadem location, Kakelo Kathoth **Date:** 5th February 2025.

No.	Name	Village/ Organization	Position	Mobile No.:	E-mail	Signature
1.	Kennedy Amara	KABUTO	Common	0706736574		
2.	ROSE A AGUKO	KABUTO	Ass/CHIEF	0720546314	Roseagukoagmail.com	
3	Jotto Otuo	NYORA	community member	0740388122		
4.	Kennedy Ochola	ANGUNGO	Community member	0704526689		
5.	CHRISTINE ACHIENG	NYORA	Member	0714119259		
6.	DUSTINE OKINYI ABICH	NYORA	COMMUNITY MEMBER	0790057867		
7.	Kenaz Omare	NYORA	Member.	0723329 23	kenaz.omare.@com	
8	Brenter Atieno Peter	NYORA	Member	0792837518		
9.	Sarah Anyango	NYORA	Member	0111452030		
10.	Molly Akinyi	NYORO	member			
11.	JACK OUMA	KABUTO				
12.	LILIAN AOKO	NYORA	member	0708368911		
13.	PAMELA AUMA	NYORA	MEMBER	0798571192	OFFICE OF SENIOR CHIEF LOWER CENTRAL KADEM LOCATION P. O. BOX 90 KISUMU DATE 5/02/2025	
14.	ROSE ANYANGO	NYORA	MEMBER	0790911197		
15.	Velma AKINYI	NYORA	MEMBER	0711962988		

ttendance Register

Project Name: *Environmental And Social Impact Assessment Study for the Proposed Sand Harvesting Project.*

Meeting Venue:

Date:

No.	Name	Village/ Organization	Position	Mobile No.:	E-mail	Signature
16	IVON AKINYI	NYORA		0705647162	✓	
17	Tobias Olambo	NYORA		0703143194		[signature]
18	ERICK OTIENO	NYORA		0794666068		8
19	SIMITA OHYANGO	NYORA		"		[signature]
20	ANYURA OKELLO	NYORA		0717749807		[signature]
21	JOHN OTIEN BUNDE	NYORA		0715559486		[signature]
22	SIMKO			0726045150		
23	VOG			071588902		[signature]
24	YALA BEN PETER	NYORA	MEMBER	0746205884	yala Peter17@gmail	[signature]
25	JANE OCHIENG	KABUTO	MEMBER	0791692020		[signature]
26	EPPY OKINYI	NYORA		0757445400		[signature]
27	John Ojowi	Kanyagalo		0795920084		[signature]
28	ANDREW OSEWE	NYURA	MEMBER	0717717429		[signature]
29	OBIERO TOBIAS	NYORA	MEMBER	0716439918		[signature]
30	ALLE KEVIN	NYORA	member	0108734168		[signature]

OFFICE OF SENIOR CHIEF LOWER CENTRAL KASGUNGA (?) P.O. BOX 93 KA... DATE 5/2/25

Attendance Register

No.	Name	Village/ Organization	Position	Mobile No.:	E-mail	Signature
Project Name: *Environmental And Social Impact Assessment Study for the Proposed Sand Harvesting Project.*						
	Meeting Venue:			**Date:**		
31	Salin Odhiambo	Nyoro		074811083		[signature]
32	Brian Ochieng	Nyora	Member	0748627854	[illegible]	[signature]
33	AUSTINE ORWA ADERA	NYORA	MEMBER	0790434229	AustinAdera.com	[signature]
34	LEONARD ONYANGO	NYORA	MEMBER	0713160454		
35	APOLLO ODHIAMBO	Kabuto	Member	0790180435		[signature]
36	MARTIN OGENGA	NYORA	member	0736538619		[signature]
37	EVANS YALA AUKO	SIDOK . A.	V. ELDER	0713661447	OFFICE OF SENIOR CHIEF CENTRAL KADEM LOCATION P.O. BOX 93 DATE 5/2/2025	[signature]
38	RICHARD ORWA OKOKO	NYORA	V. ELDER	0710386200		[signature]
39	DAVIS Makoyo	Nyora	CHP	0723912909		[signature]
40	Leonard Ogiemo	Nyora	V. ELDER	0710133829		[signature]
41	PHILIP OPOLO ORWA	NGAO	SNR CHIEF	0710840249	philiporwa@gmail.com	[signature]
42	PETER OCHARU	COUNTY GOVERNMENT	SUB-COUNTY ADMINISTRATOR	0725842453	Ocharo098@gmail.com	[signature]
43	OLUOCH. S. ACHOLA	MIGORI COUNTY GVT.	SCEO	0721889966	[illegible]	[signature]
44	JULIUS MASIGA	NYORA	FISHERMAN	0722980019	[illegible]	[signature]
45	John A. Bonyo	Kabuto		0714895444	[illegible]	
46	SALINE AKINYI	NYORA	B.M	07156[illegible]		[signature]

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study for the Proposed Sand Harvesting Project.*

Meeting Venue:

Date:

No.	Name	Village/ Organization	Position	Mobile No.:	E-mail	Signature
47	Mary O	Ngora A		7081971214		[signature]
48	Justus Mjiwcimbo	Sexe		0797963719		[signature]
49	Phelix Ongola	Manyanda		0715800056		[signature]
50	Gordon Okinyi	Nyora		0111940845		[signature]
51	Godfrey Kajira	Kabuto		07015390444		[signature]
52	DANIEL OKEYO	NYORA		0114585459		[signature]
53	KENNEDY OCHIENG	MANYANDA		0745627245		[signature]
54	SILVINI OUMA	MANYANDA		0701845453		[signature]
55	Vincent Wanyanchu	Sidika		0790867773		[signature]
56	Kennedy Olhim	Sidika		0103877169		[signature]
57	Washington Anega	Sidika		0116812363		[signature]
58	OTIENO ALEX	Manywanda		0799865983		[signature]
59	John Okonga	Opollo		0711451411		[signature]
60	mark omondi	Nyora		0712775016		[signature]
61	KENNEDY OTIENO	OJUKU		0702022066		[signature]
62	MOSES OTIENO	NYORA		0795232690		[signature]
63	Ouko PETER	NYORA		0743783610		[signature]
64	Kennedy Kijana	Gonnako		0720964333		[signature]

OFFICE OF SENIOR CHIEF LOWER CENTRAL KARUNGU P. O. BOX 93 DATE 05/2025 [signature]

MEETING MINUTES OF THE PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY ON 6/2/2025 AT ANEKO CENTER.

MEMBERS PRESENT

See the attendance list attached

AGENDA

PROPOSED SAND HARVESTING

MIN 1: IDENTIFICATION OF THE PROJECT

The meeting began by a word of prayer from one of the participants at 11.10am.

The area chief thereafter welcomed community members and welcomed a representative of Mango tree who gave a brief of the project description, which was Sand harvesting from River Kuja by use of a dredger, which has a sanction pipe. The sand would then be taken to the existing sand holding site in Mbita where it will be used for commercial purposes.

MIN 2: ISSUES RAISED

Q1: What duration will the project take?

Q2: What benefit will the community get?

Q3: Will there be employment opportunities to the local community?

Q4: Where is the sand holding site?

Q5: Will breeding sites for fish be affected?

Q6: Is there a solution for the bursting/overflowing river?

Q7: Will dredging be up to the mouth of the river?

Q8: Will the vibration of the dredger affect the movement of fish?

Q9: What grade of sand is the proponent interested in?

Q10: Where else has this kind of mining been done?

Q11: Distance from where the sand will be taken

from **Q12**: At what stage is the CSR?

Q13: Will the activity lead to oil and water pollution?

Q14: Why is the focus on the river?

MIN 3: RESPONSES

Q1: The project will take 1 year from the date of NEMA licensing. The proponent might wish to renew upon the company's' discretion

Q2: Through the formed sand harvesting committees, the community is able to come up with different projects that can be funded by the developer/proponent

Q3: Sand mining using a dredger is mechanized. The proponent is only able to provide internships to marine students. In case there will be a sand holding site in Migori, the site is able to have a minimum of 100 people tipping the sand.

Q4: Currently the sand holding site will be in Mbita. This is due to the depth of the lake at the shores in Migori. However, the proponent will explore deeper areas within Migori County for the community members to have direct benefit in employment.

Q5: Biodiversity survey was conducted by the Kenya Marine and Fisheries Research Institute. In the survey, the breeding sites for fish will not be affected and so the economic livelihood of the fisher folk community will be intact.

Q6: Dredging of the river is the solution to the back flowing river which is as a result of increased siltation.

Q7: Dredging will take place from inside the lake. Where the river meets the lake. Those sand mining from the river will not be affected.

Q8: Dredging will take place only for 3 hrs. Either at night or during the day depending on the agreement with the community and the fishermen

Q9: The proponent is interested in 0.3mm sand

Q10: Mango tree marine limited has dredged Kisumu port and Mbita causeway

Q11: Harvesting will take place 100m from the shores of the lake

Q12: Once NEMA has given the proponent the license, the developer will come back for another public participation where the community members will now state the projects they would wish under CSR

Q13: The proponent has contracted a licensed oil waste transporter. When regular servicing is done, the used oil is stored in drums awaiting transportation

Q14: The focus is in the river since it is the one with the right size of particle, which is needed by the proponent's client.

MIN 4: SUGGESTIONS

- ✓ The proponent to give the community more time for them to meet and discuss more about the project.

MIN 4: CONCLUSION.

Community members thanked the proponent for bringing such a project since this was going to increase the growth of the beach and create employment for the youths around the village if a sand holding site was to be in Migori. The proponent promised to have another meeting when they receive the NEMA license and before works start.

MINUTES CERTIFICATION PAGE

Signed by:

1. ADMINISTRATION REPRESENTATIVE:

LWERO DAVID OKUTH

DATE: 6/2/2025

CHIEF'S OFFICE
DATE 6/2/2025
ANEKC – LOCATION

SIGNATURE and STAMP:

2. CONSULTANT REPRESENTATIVE:

Kennedy Kinyanya

DATE: 6/2/2025

GOMAKE CONSULTANCY COMPANY LTD.
05 FEB 2025
P.O. Box 5540-00100, NAIROBI-KENYA
TEL: 0720 964 333
Email: info@gomakeltd.co.ke

SIGNATURE and STAMP:

3. COMMUNITY REPRESENTATIVE:

DATE: 6/1/2024

ONGIANGO FELIX OCHOLA

SIGNATURE:

ttendance Register

Project Name: *Environmental And Social Impact Assessment Study for the Proposed Sand Harvesting Project.*

Meeting Venue: Aneko location, aneko sub location | **Date:** 6th February 2025.

No.	Name	Village/ Organization	Position	Mobile No.:	E-mail	Signature
1	KEVIN OCHENG OMAO	GOT KABWANA	A/CHIEF	0727736609	Kerinomao[illegible]@gmail.co	[signature]
2	LWERO DAVID OKOTH	MIRIWI	CHIEF	0729096684	lwerodavid@gmail.co	[signature]
3	ELISHA AKOTH OMOKA	SEMBO	OKERE	0711402931	—	[signature]
4	JARED OCHIENG	KAMBI	VILLAGE ELDER		—	[signature]
5	ATIENO OTTOMA	DUKA (A)	CLAN HEAD	0769211192	—	[signature]
6	JACKSON ODIRA	SOKO	CLAN ELD	0718183601	—	[signature]
7	RAFAEL ODIRA	MIKEI	CLAN ELD	07696868852	—	[signature]
8	ISAAC NYANGUR	KOTO	NYUMBAKUMI	0719843792	—	[signature]
9	DAVID ONTONA	MIKEI	MEMBER	0758250456	—	[signature]
10	FANUEL AMADI .M.	KAMBI	MEMBER	0743204682	—	[signature]
11	OSINDI JAHNES O.	GOT-KOJWANG	MEMBER	0704127086	—	[signature]
12	JOHN O CHACHA	NYASARIA	MEMBER	0728365670	—	[signature]
13	ENOS O. MAKENDE	BONGU	MEMBER	0791718160	—	[signature]
14	SAMWEL JENGE	SOKO	CLAN ELDER	0797796565	—	[signature]
15	SAMWEL ODOYO	NYATHE	MEMBER	0769039595		[signature]

CHIEF'S OFFICE
DATE 6/2/2025
ANEKO-LOCATION

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study for the Proposed Sand Harvesting Project.*						
	Meeting Venue:			**Date:**		
No.	**Name**	**Village/ Organization**	**Position**	**Mobile No.:**	**E-mail**	**Signature**
16	Phillimon Adera Obonyo	Nyangoma	member	—	—	
17	OTIENO BENARD OCHALI	DUKA B	CLAN ELDER	0740951285	—	
18	DALMAS AWINO	NYASARIA	MEMBER	0718593728	—	
19	JARED AWINO	SIANY	MEMBER	0715103365	—	
20	DAVID HADHOGA	SEMBO	Member	0758635738	—	
21	DAN OUKO	DUKA (A)	MEMBER	0715192644	—	
22	ELVIS omondi	DUKA (A)	MEMBER	0745152273	—	
23	TIMON GMONGA	MIKEI	MEMBER	0706766737	—	
24	Edwin ojodo	Kambi	member	0741874040	—	
25	FELIX OMONDI	SEMBO	member	0769950055	—	
26	ERASTUS Oyuku	SEMBO (B)		0721819113	[illegible].com	
27	ODOYO FRANCIS	Miriu	Member	0726601656		
28	OUS DAN	DUKA B	MEMBER	0768778372		
29	JOHANES ORINDA	NYAGWETIEB	MEMBER	0751156574	Johaonnda@gm	
30	PETER OTIENO	NYAGWETHER B	MEMBER	0706724222		

SHIELD
DATE 6/2/2025
SUB-LOCATION

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study for the Proposed Sand Harvesting Project.*						
	Meeting Venue:			**Date:**		
No.	**Name**	**Village/ Organization**	**Position**	**Mobile No.:**	**E-mail**	**Signature**
31	SAMSON OSINDI	NYACWE		0745055451	—	[signature]
32	CHRISTINE ERICK	NYAGWETHE	TEARING	0112952079	—	[signature]
33	MILLICENT ATIETO	DUKA B	MEMBER	—	—	P-M
34	Eunice Auma	nyangwethe	Sukuma	0768091969	—	[signature]
35	ASKA OUMA	MASARIA	MEMBER	0711993899	—	[signature]
36	MARTHA ADHIAMBO	GOT KONJWA	MEMBER	0726334292	—	[signature]
37	HELLEN AKOTI	GOO-BWANA	MEMBER	0712259625	—	[signature]
38	CONSILATA AUMA	GOT KONTYANG	MEMBER	0710905645	—	[signature]
39	Jujine Akoth	DUKA B	MEMBER	0790695886	—	[signature]
40	LILIAN ACHIENG	DUKA A	MEMBAR	0708568574	—	[signature]
41	Ouma Otelo	DUKA A	—	0746354588	—	[signature]
42	Jossy Awino	nyangwethe	—	0110578974	—	[signature]
43	DICK ALEK	DUKA A	—	~~0710~~ 0707163146	—	[signature]
44	Zamalek Otieno	Sembo	member	0719779453	—	[signature]
45	Joshua Abich	Kambi	member	0798844324	—	[signature]
46	OLUOCH. S. ACHOLA	MCA	SUB-COUNTY EDUCATION OFFICER	0721887966	—	[signature]

CHIEF'S OFFICE … DATE 6/2/2025 … NEKO-LOCATION

MEETING MINUTES OF THE PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY AT VANNA HOTEL ,MIGORI COUNTY ON 7/2/2025 .

MEMBERS PRESENT

See the attendance list attached

AGENDA

PROPOSED SAND HARVESTING

MIN 1: IDENTIFICATION OF THE PROJECT

The meeting began by a word of prayer from one of the participants at 10am.

The lead environmental expert thereafter welcomed the technical stakeholders to the meeting and gave a presentation of what Mango Tree Marine Ltd intends to do.

Presentation highlights

- Key findings reveal that the river mouth is heavily influenced by upstream activities, including agricultural runoff, artisanal mining, and deforestation, which contribute to elevated nutrient and sediment loads
- Critical fish nursery habitats were identified in the lake, emphasizing its importance for recruitment and species sustainability. Conversely, the river mouth's suitability as a nursery area is limited due to turbidity and habitat degradation
- The analysis of sediment core samples collected from various stations revealed distinct variations in texture, grain size, and color, reflecting the underlying environmental and depositional characteristics of the lake bottom
- Clay sediments were predominant with a fine grain size of approximately 0.03 mm. This texture indicates deposition in low-energy environments where fine particles settle out of suspension. In contrast, sand sediments were found where the river meets the lake, characterized by a coarser grain size of 0.5 mm. The sandy texture at these areas suggests deposition in higher-energy settings, such as areas with stronger water currents or wave action
- The abundance and distribution of fish larvae, sampled using Seine gear, exhibited distinct spatial patterns. The highest abundance was observed in the lake (offshore), followed by the shoreline area, while no larvae were recorded at the river mouth.
- During the sampling phase, there was a noticeable presence of continuous vigorous fishing activity, primarily using the beach seining method. Several fleets of beach seine nets were deployed over wide areas of the estuary zone by local fishermen in paddled Sesse canoes and then manually brought ashore by complementary teams operating from the beach/ shoreline. The beach seining method involves encircling a shallow bay or onshore region with a long, often single-panel seine net with bottom sinkers stretching it to the lake bed and sweeping the water column, gathering every single fish and object along the way. This type of fishing is not only unlawful, but also detrimental to aquatic habitat and riparian wetlands. Sand mining has the ability to deepen the river mouth, making it impossible to deploy and operate beach seines
- Enforce sustainable mining practices and conduct regular environmental assessments to minimize habitat degradation

- Involve local communities in conservation through education and alternative livelihood programs

MIN 2: ISSUES RAISED

Q1: Have local experts opinion been considered?

Q2: Where will the sand be deposited/held and can one be in Migori?

Q3: Is the harvesting purely sand and what is the end use?

Q4: Are there programs for livelihood restoration?

Q5: What CSR activities will be undertaken?

Q6: What is the duration for mining?

Q7: Will there be interference with the fish hatcheries?

Q8: How will the community in the lake benefit?

Q9: Will there be continuous monitoring of water quality?

Q10: Has risk assessment, noise survey and training of employees on OSH been done? will the company do compensations for injuries?

MIN 3: RESPONSES

Q1: Two community meetings have been held with the Beach management units being in that composition to give their local opinion

Q2: Currently the sand holding site will be in Mbita. This is due to the depth of the lake at the shores in Migori. However, the proponent will explore deeper areas within Migori County for the community members to have direct benefit in employment.

Q3: Mango Tree Marine Ltd is solely interested in sand harvesting with the end use being commercial sale

Q4:Yes.through education and awareness creation

Q5: Once NEMA has given the proponent the license, the developer will come back for another public participation where the community members will now state the projects they would wish under CSR

Q6: The project will take 1 year from the date of NEMA licensing. The proponent might wish to renew upon the company's' discretion

Q7: The abundance and distribution of fish larvae, sampled using Seine gear, exhibited distinct spatial patterns. The highest abundance was observed in the lake (offshore), followed by the shoreline area, while no larvae were recorded at the river mouth.

Q8: Through the formed sand harvesting committees, the community is able to come up with different projects that can be funded by the developer/proponent

Q9:Yes.During the operational phase, there will be continuous monitoring of water quality. This will include sampling of heavy metals.

Q10: Risk assessment is under process and so is noise survey. The employees are rained in matters OSH and they have insurances.in cases of activity-based injury to any community member, Mango Tree Marine Ltd will take full responsibility.

MIN 4: CONCLUSION.

The proponent to ensure they get permit from Water resource authority as per schedule 1 of WRA Regulations 2021. Once NEMA licenses the project, the proponent to ensure continuous consultations and community engagement with the fisher folk community.

Attendance Register

Project Name: Environmental And Social Impact Assessment Study for the Proposed Sand Harvesting Project.

Meeting Venue: County stakeholders ; Vanna Hotel, Migori. **Date:** 7/2/2025

No.	Name	Village/ Organization	Position	Mobile No.:	E-mail	Signature
1.	SAMUEL OCHIENG	ANEKO BMU	CHAIRMAN	0708333768		[signature]
2.	OLUOCH-S. ACHOLA	MCG	SCEO NYATIKE	0721889966		[signature]
3.	MUTAHI NJARA	WRA	SBAC	0722465759	zakayonjara@gmail.com	[signature]
4.	JOSEPH OMULLO OUGO	SWA-NTC MCG	SWA-NORTH KADEM	0728148292	gugarlio@gmail.com	[signature]
5.	LWERO D. OKOTH	NGAO	CHIEF	0729096684	Daniel okoth@...	[signature]
6.	PHILIP O. ORWA	NGAO	SNR CHIEF	0710840249	philiporma@gmail...	[signature]
7.	GEORGE OCHOLA	MCG	CCO	0722526592	ocholag@gmail.com	[signature] 0722526592
8.	REU E. ANDATI	DOSHS	DIRECTOR	0718008605	r.andati@labour.go.ke	[signature]
9.	KENNEDY O. OMBOGO	MCG	Director	0722961226	ndongakennedy@gmail...	[signature] 0722961226
10.	MARK OWINO MALOBA	MIGORI COUNTY BMU NETWORK CHAIRMAN	CHAIRMAN	0729395517	Malobamo@gmail.com	[signature]
11.	BENARD OPOLO	MODI/NGWENA BMU	SECRETARY	0792869887		[signature]
12.	BYRONE PHILIPS JACK	KAO BMU	SECRETARY	0721656971	byronejack@gmail.com	[signature]
13.	JOEL ODHIAMBO KAGENDA	KIMAMBRA BMU	SECRETARY	0727728424		[signature]
14.	KEVIN OCHIENG OMAO	NGAO	ACHIEF	0727736609	kevinomao01@gmail.com	[signature]
15.	Daniel Omukoko	NGAO	DCC	0717170219	domukoko.do@gmail	[signature]

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study for the Proposed Sand Harvesting Project.*

No.	Meeting Venue: / Name	Village/ Organization	Position	Date: / Mobile No.:	E-mail	Signature
16.	BONFACE EMADAN DKONA	CC'S OFFICE	DRIVER	0721156236	emadanbonface@gmail.com	
17.	SYLVIA CHITERE OMWAKA	AO1 CC's office	AO1	0710762711	sylviachitere@gmail.com	
18.	FLORA MITCHEL	Gomake	Environmentalist	0701393729	floramitchel1994@gmail.com	
19.	ROSE A. AGUKO	MIGORI COUNTY GOVERNMENT	ASS/CHIEF	0720946214	roseagukoo@gmail.com	
20.	PAUL OCHIENG	COUNTY PSM	MCN Member	0723727124	oketchpaul45@gmail	
21	PETER OTG OCHARO		SUB-COUNTY ADMINISTRATOR NYATIKE	0725842453	Ochiro098@gmail.com	
22	MORGAN AJWANG	MANGO TREE MARINE LIMITED	MANAGER	0791909987	mangotreekenya@gmail.com	
23	Mercy Achieng	Migori County Govt	HRH	0111665542	mercykizah@gmail.com	
24.	VICTOR O. OSOO	Migori county Gov. Dept of Env	Environment Officer	0723563665	osovictor1988@gmail.com	
25.	CALVINCE OCHIENG	Migori county Gr Dept. of Env.	AST. DIRECTOR	0726171452	jcatien@gmail.com	
26	OTIENO OGANGO	NYATIKE COUNTY OFFICE	PA TO HON. TOM OBEGE	0721458546	jacobous@yahoo	
27.	NAOMI ROOSEVELT	MOH	COUNTY PUBLIC HEALTH OFFICER	0722 114773 roosenath@gmail.com	0722-114773	
28	LINUS A. ODERA	Gomake	Environmentalist Expert	0725528748	linuspalodiach77@gmail.com	
29.	Kennedy Kijana	Gomake	Lead Expert	0720964333	kijanakennedy@gmail.com	

APPENDIX IV: FILLED QUESTIONNAIRES

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA) STUDY QUESTIONNAIRE

PROPOSED SAND HARVESTING PROJECT

To be filled by Key Stakeholders in the Project area.

Mango Tree Marine Limited is proposing to carry out alluvial sand harvesting activities within the Lake Victoria next to the mouth of River Kuja within Migori County for commercial construction purposes. Pursuant to Section 58 of the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya, the Company is carrying out Environmental and Social Impact Assessment (ESIA) Study for the Proposed Sand Harvesting Project under NEMA approved Terms of Reference (TOR) NEMA/TOR/5/2/837.

The ESIA Study process requires stakeholder involvement in providing views, comments and suggestions on the Proposed Sand Harvesting Project activities

You have been identified as a key stakeholder pursuant to the requirements of section 17-1 of the Environmental Impact assessment and audit regulations, 2003 which require an EIA should "seek the views of any persons who may be affected by or interested in the project".

Name of Stakeholder: OTIENO JACOBUOS OBANGO

Tel No: 0721458596

Organisation and/or Designation: NYATIKE CONSTITUENCY OFFICE
DATA TO MEMBER OF NATIONAL ASSEMBLY

1. Has the proposed sand harvesting project been mentioned to you before?
   NO

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?
   Flood Control & reduction.

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.
   ⇒ Destruction of fish breeding sites
   ⇒ Increased water flow (river)
   ⇒ Interference with the livelihood of the locals who are majorly fishermen

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?
   ⇒ Safeguarding the breeding sites
   ⇒ Maintain the safety of water drainage system
   ⇒ Observing the existing regulations and Environmental laws

5. Any other relevant comments related to the proposed sand harvesting project?
   The Company should honour all the agreements it will make with locals.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder [signature] Date: 7/2/2025

ID No /Rubber Stamp of Stakeholder: 23413465

End - Thanks

Name of Stakeholder: Daniel Omuloko

Tel No: 0717170219

Organisation and/or Designation: Interior (DCC)

1. Has the proposed sand harvesting project been mentioned to you before?

   Yes

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   Reduce back flow of ~~lake~~ lake Victoria thus helps reduce flooding

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   - loss of economic and livelihood of fishery force
   - Destruction of fish breeding areas

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   Further research on how not to interfere with

5. Any other relevant comments related to the proposed sand harvesting project?

   Win the trust of the local people

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder _____ Date: 07/02/2025

ID No /Rubber Stamp of Stakeholder: _____

End - Thanks

Name of Stakeholder: VICTOR OSOO

Tel No: 0723 563 665

Organisation and/or Designation: ENVIRONMENT OFFICER

1. Has the proposed sand harvesting project been mentioned to you before?

   Yes

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   Job creation will improve livelihood through increased income levels

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   (i) Interference with aquatic ecosystem
   (ii) Pollution of the lake
   (iii) Increased turbidity

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   Implement the environmental Management plan

5. Any other relevant comments related to the proposed sand harvesting project?

   Concerns raised should be looked at Comprehensively

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes ☐ No ☐

Signature of Stakeholder [signature] Date: 07/02/25

ID No /Rubber Stamp of Stakeholder:

End - Thanks

Name of Stakeholder: NAOMI ROOSEVELT ALUOCH

Tel No: 0722 114773

Organisation and/or Designation: COUNTY PUBLIC HEALTH OFFICER

1. Has the proposed sand harvesting project been mentioned to you before?

NO.

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

- Reduction in flooding incidences upstream
- Employment opportunity

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

- More drowning incidences
- Interruption of fishing

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

- Intermittent harvesting

5. Any other relevant comments related to the proposed sand harvesting project?

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes ☐ No ☐

Signature of Stakeholder [signature] Date: 7/2/2025

ID No /Rubber Stamp of Stakeholder: 24947250

End - Thanks

Name of Stakeholder: Calvince Ochieng

Tel No: 0726171452

Organisation and/or Designation: Migori County Govt - Dept. of Environment & NRM.

1. Has the proposed sand harvesting project been mentioned to you before?

   Yes.

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   Back-flow flood reduction along the shores of L. Victoria & R. Kuja banks.

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   Lake water | river water pollution.
   Riparian encroachment.

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   Repair encroached riparian | riverine areas.

5. Any other relevant comments related to the proposed sand harvesting project?

   The company to consider setting up a landing site within the project area (with Migori).

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes ☑ No ☐

Signature of Stakeholder [signature] Date: 07/02/2025

ID No /Rubber Stamp of Stakeholder: 28318353.

End - Thanks

Name of Stakeholder: BENARD OPOLO

Tel No: 0792 869887

Organisation and/or Designation: MODI/NGWENA BMU SECRETARY

1. Has the proposed sand harvesting project been mentioned to you before?

   Yes

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   employed the local People

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   cause loss to some fishermen

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

5. Any other relevant comments related to the proposed sand harvesting project?

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder BOpolo Date: 7/2/2025

ID No /Rubber Stamp of Stakeholder: 10577468

End - Thanks

Name of Stakeholder: REV ELONDANGA ANDATI

Tel No: 0718008605

Organisation and/or Designation: Directorate of occupational safety & Health services
Director

1. Has the proposed sand harvesting project been mentioned to you before?

   Yes

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   Job creation
   Improved bussiness for sand

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   - Injuries
   - Death

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   - WIBA policy (insurance cover for workers)
   - Traing for wokers on Work injurie prevention.

5. Any other relevant comments related to the proposed sand harvesting project?

   Ensure - Risk assessment, OSH audits
   Traing - OSH/First aid

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes ☑ No ☐

Signature of Stakeholder [signature] Date: 7/02/2025

ID No /Rubber Stamp of Stakeholder: 28247332

End - Thanks

Name of Stakeholder: BYRONE PHILIPS JACK

Tel No: 0721656971

Organisation and/or Designation: KAO BMU · SECRETARY.

1. Has the proposed sand harvesting project been mentioned to you before?

   Yes.

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   — Creation of employment to the local.

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   → May Cause loss of livelihood to the local.
   → May Sometimes interferes with the breeding Zone of the fish.

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   → Provision of life Saving gears e.g life jackets
   → Provision of Patrol Boats for the Operational Beaches.

5. Any other relevant comments related to the proposed sand harvesting project?

   → The Organization should Work With the BMU's to easen their Operation of the Sand haversting.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder [signature] Date: 07/02/25

ID No /Rubber Stamp of Stakeholder: 24306530

End - Thanks

Name of Stakeholder: JOEL ODHIAMBO KATIENDA

Tel No: 0727728424

Organisation and/or Designation: BMU SECRETARY (KINAMBRA)

1. Has the proposed sand harvesting project been mentioned to you before?

   YES

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   - The depth of the river shore will be OK

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   - Fishmans may be displaced
   - It can also minish the quantity of fish.
   - It can also some los of life if not take care of.

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   - Have Proper Managent.

5. Any other relevant comments related to the proposed sand harvesting project?

   I can only to tell the organisation to Specific to the people of that are.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes ☒ No ☐

Signature of Stakeholder _____ Date: _____

ID No /Rubber Stamp of Stakeholder: _____

End - Thanks

Name of Stakeholder: SAMUEL OCHIENG

Tel No: 0708333768

Organisation and/or Designation: BMU chairman ANEBO

1. Has the proposed sand harvesting project been mentioned to you before?

   Yes

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   It will bring or creat job orpotunity to the entire Communities living around the area where, the opperation or activities is going to take place.

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   It is going to interferes with aquatic animals especially fish & fishermen ingeneral.
   Banks & accident might be occuring which is personally.

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   - Insure that life lives of the fisherman around the area well protected.
   - Using the machines which are less pollutant to the environment.
   - Providing life saving equipment to the ppls especially life Jackets

5. Any other relevant comments related to the proposed sand harvesting project?

   Creat more job oppotunities to the ppls living around the area

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder _____ Date: 7/2/25

ID No /Rubber Stamp of Stakeholder: 32567506

End - Thanks

Name of Stakeholder: ZAKAYO MUTAHI NJARA

Tel No: 0722465759

Organisation and/or Designation: WATER RESOURCES AUTHORITY

1. Has the proposed sand harvesting project been mentioned to you before?

   NO

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   1. Employment opportunities
   2. Reduction in flooding due to improved river flow
   3.

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   1. Interference with aquatic ecology as a result of water quality deterioration due to dredging
   2. Displacement and loss of livelihood of fishermen.

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   1. Continued water quality monitoring during Project cycle
   2. Catchment Conservation along Kuja River

5. Any other relevant comments related to the proposed sand harvesting project?

   1. Full Compliance to all existing laws
   2. Comprehensive EMP

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder [signature] Date: 07/02/2025

ID No /Rubber Stamp of Stakeholder: 9856671

End - Thanks

Name of Stakeholder: PHILIP OPOLO ORWA

Tel No: 0710840249

Organisation and/or Designation: SNR CHIEF – LOWER CENTRAL KADEM

1. Has the proposed sand harvesting project been mentioned to you before?

   YES

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   – Income from selling harvested sand.
   – It deepens the river when sand is harvested and reduces flooding
   – It is likely to reduce migration/displacement of people as overflow is reduced
   – Livelyhood lucely to improve due to income from sand harvesting

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   – Destruction of pathways/feeder roads by sand harvesting trucks
   – Fear on effects of oils and lubricants used by harvesting machines to the environment.

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   – Rehabilitation and Construction of pathways in the sand harvesting areas
   – Introducing Social/Co-operate benefits eg initiating projects in the sand harvesting areas.

5. Any other relevant comments related to the proposed sand harvesting project?

   Need for rehabilitation of areas damaged by flood.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder [signature] Date: 05/02/2025

ID No /Rubber Stamp of Stakeholder: OFFICE OF SENIOR CHIEF LOWER CENTRAL KADEM LOCATION P. O. BOX 93 KARUNGO DATE: 5/2/25 PHILIP O-ORWA

End - Thanks

Name of Stakeholder: ROSE A. AGUKO

Tel No: 0720546314

Organisation and/or Designation: ASSISTANT CHIEF

1. Has the proposed sand harvesting project been mentioned to you before?

YES

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

- It will interfere with the breeding sites of fish/Reduce fishing activity which helps many families.
- It will create employment/flood control

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

- Kae beach fishing activity will be greatly interfered with as some methods/Materials used need sand "dry" for drawing/promote flood and people's displacement
- Lowering of water table

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

- construction of dykes to prevent water flash backs from the lake.
- Find an alternative way of operation that cannot destroy breeding sites of fish.

5. Any other relevant comments related to the proposed sand harvesting project?

Sand harvesting proposed should improves the living standard of the community.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder [signature] ASST CHIEF Date: 05-02-025

ID No /Rubber Stamp of Stakeholder: 26426933

[illegible] DATE.....

End - Thanks

Name of Stakeholder: OLUOCH. S ACHOLA.

Tel No: 0721889966 / 0785640075.

Organisation and/or Designation: SUB-COUNTY EDUCATION OFFICER

1. Has the proposed sand harvesting project been mentioned to you before?

   YES.

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   WILL MAKE THE RIVER DEEP HENCE ALLOWING FREE FLOW OF WATER INTO THE LAKE. HENCE REDUCING FLOODING DUE TO BACK FLOW FROM THE LAKE.

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   AFFECT FISHING ACTIVITIES ALONG THE PROJECT AREA

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   COMPENSATE THE AFFECTED FISHERFOLK

5. Any other relevant comments related to the proposed sand harvesting project?

   NEED TO PUT UP DYKE IN THE PROJECT AREA AS CSR.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder [signature] Date: 05/02/2025.

ID No /Rubber Stamp of Stakeholder: 11186506.

End - Thanks

Name of Stakeholder: MARK OWINO MAHOBA

Tel No: 0729393517 / 0762388603

Organisation and/or Designation: KOMO BMU / MIGORI COUNTY BMU SECRETARIAT CHAIRPERSON.

1. Has the proposed sand harvesting project been mentioned to you before?

— Never that heard of it.

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

— Create job opportunities

— Wider Connections with the County govt. and other agencies.

— It shall benefit the BMUs at large.

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

— Being that it shall be done along the river mouth, it shall interfere with the breeding zone and the working gate of the fisher folks.

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

— Job opportunities

— It should befit those who are Canning the area.

— Safety roads.

5. Any other relevant comments related to the proposed sand harvesting project?

— Being that it will be done along the BMUs, the bmu leaders should be given last phone.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder A Mark. Date: 05/02/2025.

ID No /Rubber Stamp of Stakeholder: 31372517.

End - Thanks

Name of Stakeholder: Andrew Osewe

Tel No: 0717717429

Organisation and/or Designation: Community Flood management chair.

1. Has the proposed sand harvesting project been mentioned to you before?

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

Desilting / Dredging of River Kuja
Community members are able to gain from the sand.
Increased revenue for county government of Migori.

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

N/A

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

N/A.

5. Any other relevant comments related to the proposed sand harvesting project?

Develop / construct river backflow & lake backflow
No riparian land existing near the R. Kudisa (kuja disaster)

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes ☐ No ☐

Signature of Stakeholder: [signature] Date: 5/2/2025

ID No /Rubber Stamp of Stakeholder: 7837312

End - Thanks

Name of Stakeholder: PETER O.K. OCHARO

Tel No: 0725842453 / 0754893081

Organisation and/or Designation: SUB-COUNTY ADMINISTRATOR NYATIKE.

1. Has the proposed sand harvesting project been mentioned to you before?

   Yes. A number of times.

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   - promotion of sustainability and reduction of waste.
   - Reduction of water run offs

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   - Reduction of fish production. Human wildlife conflict eg. hippos and human beings

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   - Conservation of all the Marine plants e.g Reeds
   - Making of dykes to prevent overflow of water run-offs

5. Any other relevant comments related to the proposed sand harvesting project?

   This is a good project that should be implemented but based on the Acts and laws of the constitution of the land.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder [signature] Date: 5/1/2025

ID No /Rubber Stamp of Stakeholder: 9540325

End - Thanks

Name of Stakeholder: KEVIN OCHIENG OMAO

Tel No: 0727736609

Organisation and/or Designation: A/CHIEF / NHAO

1. Has the proposed sand harvesting project been mentioned to you before?

   YES

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   - They will protect development to communities
   - It will bring interaction between Community

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   The community members are worried about the sand project and will interfered them poor economically.

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   It will minimize the income of the communities

5. Any other relevant comments related to the proposed sand harvesting project?

   The project was good to the community

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder [signature] Date: 06/02/2025

ASST. CHIEF'S OFFICE
ANEKO SUB LOCATION
BOX 80 [illegible]
DATE 06/02/2025

ID No /Rubber Stamp of Stakeholder: 27503908

End - Thanks

Name of Stakeholder: LWERO DAVID OTOTH

Tel No: 0729096684

Organisation and/or Designation: CHIEF

1. Has the proposed sand harvesting project been mentioned to you before?

   YES

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   - Road network will be improved.
   - Youth will get employment.

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   - More farms might be flooded due to backflow from the lake (victoria)

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   Dykes to be built to contain more water hence reduced backflow.

5. Any other relevant comments related to the proposed sand harvesting project?

   - More community to be involved in the project.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder _____ Date: 6/2/2025

ID No /Rubber Stamp of Stakeholder: 24514592

CHIEF'S OFFICE DATE 6/2/2025 AMEKO-LOCATION

End - Thanks

Name of Stakeholder: MIFUONGO MICHAEL OTIENO

Tel No: 0111705105

Organisation and/or Designation: COMMUNITY MEMBER

1. Has the proposed sand harvesting project been mentioned to you before?

YES

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

1. It lead to youths employment.
2. Selfication of the ginyoline at the the river

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

1. The rate of decades will be high due to the depth of the lake.

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

The rate of the working hours at the lake should be not more than five hours for the fishermen to work for their right time of fishing.

5. Any other relevant comments related to the proposed sand harvesting project?

The rate of the working hours at the lake should be not more than five hrs.

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [✓] No [ ]

Signature of Stakeholder [signature] Date: 6/02/2025

ID No /Rubber Stamp of Stakeholder: 39804113

End - Thanks

Name of Stakeholder: ONGANGO FELIX OCHOLA

Tel No: 0708351533

Organisation and/or Designation: COMMUNITY MEMBER

1. Has the proposed sand harvesting project been mentioned to you before?

   YES

2. What positive ecological, environmental and social impacts do you think the proposed sand harvesting project will bring to the people of the Project area?

   THE PROJECT CAN SUPPORT THE LESS-PREVILAGED IN THE COMMUNITY LIKE WIDOWS

3. What are the negative ecological, environmental and social impacts do you anticipate the proposed sand harvesting project will bring? Please explain.

   IT WILL NEGATIVELY AFFECT THE COMMUNITYS SOURCE OF INCOME, BY TAKING LONGER HOURS DURING HARVESTING

4. What mitigation measures should the proposed sand harvesting project implementers include to reduce or minimize the ecological, environmental and social impacts to the people, if the development is to continue?

   i) THE HARVESTING SHOULD BE DONE DURING NIGHT HOURS OR THE REDUCE THE WORKING HOURS

5. Any other relevant comments related to the proposed sand harvesting project?

   i) THE COMMUNITY SHOULD GET MOVE INVOLED IN THE HARVESTING PROJECT TO INCREASE THIR BENEFITS

6. In your opinion should the development of the proposed sand harvesting project be allowed to continue? Yes [—] No [ ]

Signature of Stakeholder: [signature] Date: 6/1/2024

ID No /Rubber Stamp of Stakeholder: 33586335

End - Thanks

APPENDIX V: ESIA EXPERT LICENSE

EAE 2 3061837

FORM 7 (r.15(2))

nema
Mazingira Yetu | Uhai Wetu | Wajibu Wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/20775

Application Reference No: NEMA/EIA/EL/27670

M/S **Gomake Consultancy Company Ltd**
(individual or firm) of address
P.O. Box 5540 - 00100 Nairobi

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts** registration number **8511**

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

Issued Date: **2/8/2024** Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

Tel: +254 20 6005522/3/7, 6001945
Wireless: +254 20 210370
Mobile: 0724 253 398, 0733 600 035
Email: dgnema@nema.go.ke

Popo Road, Off Mombasa Road
P.O Box 67839-00200
Nairobi, Kenya
Website: www.nema.go.ke

NEMA/EIA/EL/30213 2025-01-10

Gomake Consultancy Company Ltd

P.O. BOX 5540 - 00100 NAIROBI.

RE: ACKNOWLEDGEMENT OF EXPERTS LICENSE APPLICATION.

The National Environment Management Authority (NEMA) acknowledge receipt of your application for license as **Firm of Experts** Environmental (Impact Assessment/ Audit) expert.

The application reference is **NEMA/EIA/EL/30213.** The Authority will review and communicate the record of decision in due course through the email address provided in the online system.

Annastacia Vyalu

HEAD OF EXPERT SECTION

EAE 23061833

FORM 7 (r.15(2))

nema
Mazingira Yetu | Uhai Wetu | Wajibu Wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/20776

Application Reference No: NEMA/EIA/EL/27671

M/S **Kennedy Kijana**
(individual or firm) of address
P.O. Box 254720964333 Nairobi

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**

General

registration number **1254**

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

Issued Date: **2/8/2024** Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

Tel: +254 20 6005522/3/7, 6001945
Wireless: +254 20 210370
Mobile: 0724 253 398, 0733 600 035
Email: dgnema@nema.go.ke

Popo Road, Off Mombasa Road
P.O Box 67839-00200
Nairobi, Kenya
Website: www.nema.go.ke

NEMA/EIA/EL/30214 2025-01-10

Kennedy Kijana

P.O. BOX 254720964333 NAIROBI .

RE: ACKNOWLEDGEMENT OF EXPERTS LICENSE APPLICATION.

The National Environment Management Authority (NEMA) acknowledge receipt of your application for license as **Lead Expert** Environmental (Impact Assessment/ Audit) expert.

The application reference is **NEMA/EIA/EL/30214.** The Authority will review and communicate the record of decision in due course through the email address provided in the online system.

Annastacia Vyalu

HEAD OF EXPERT SECTION

APPENDIX VI: BILL OF QUANTITIES

PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

GRAND TENDER SUMMARY PAGE

ITEM	DESCRIPTION	AMOUNT (KSHS)
1	PRELIMINARIES AND GENERAL ITEMS	99,000.00
2	CASHIERS/LOADERS BAY	1,617,250.00
3	PIT LATRINES CONSTRUCTION	869,280.00
4	FENCING WORKS	2,463,600.00
	TOTAL CARRIED TO FORM OF TENDER INCLUSIVE OF VAT @ 16%	**5,049,130.00**

FRANCIS MBURU MBUGUA REGISTERED QUANTITY SURVEYOR No. Q1163 P. O. BOX 75773 - 00200 NAIROBI

19/03/2026

CONTRACT COMPLETION TIME : ..... WEEKS

Contractor's Name .....

Signature: .....

Address: .....

Date:.....

Witnes's Name:.....

PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

HCASHIERS/LOADERS BAY

ITEM	DESCRIPTION		AMOUNT (KSHS)
1	SUBSTRUCTURES	From Page 4	510,150.00
2	WALLING	From Page 7	488,600.00
3	ROOFING	From Page 10	540,600.00
4	DOORS	From Page 11	77,900.00
	TOTAL CARRIED TO GRAND TENDER SUMMARY PAGE		**1,617,250.00**

PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

PIT LATRINE CONSTRUCTION

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	SUBSTRUCTURES WORKS				
	Digging and leveling work - All provisional				
A	Excavate for making level on a sandy soil, load, transport and spread on site as directed by the Engineer	m^3	11	600.00	6,600.00
B	Excavate earth for strip foundation and compress the bottom surface (8MPa) according to the technical regulations for this activity. Load, transport and spread on site as directed by the Engineer In price are includes also compressing. (Remark: All expenses for testing of compressing need to included in price)	m^3	15	600.00	9,000.00
C	Extra over excavation for excavation in rock (All classes)	m^3	3	3,000.00	9,000.00
D	Return fill and ram selected soil materials. Where the selected materials are not suitable, the contractor will use imported and approved imported materials	m^3	6	450.00	2,700.00
E	Selected imported backfill well watered and compacted in layers not exceeding 150mm thick to Engineer's approval	m^3	8	1,800.00	14,400.00
	Carried to collection				**41,700.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	SUBSTRUCTURES WORKS - CONTINUED				
A	Allow for keeping all excavations free from spring, subterranean or flood water	Item			3,000.00
B	Allow for all necessary planking and strutting sides of all types of excavation	Item			3,000.00
	Hardcore backfill				
C	Supply, transport, deliver and handpack gravel 300mm thick below foundation slab, this includes watering and compressing gravel according to standards for this activity	m^2	25	900.00	22,500.00
D	50mm thick quarry dust blinding to hardcore (measured separately)	m^2	25	150.00	3,750.00
E	Supply, transport, deliver, spread on site an Environmentally friendly and approved quality insecticide treatment to surfaces applied in accordance with manufacturer's instructions and with minimum ten (10) years manufacturer's guarantee. The insecticide shall only contain amitraz, cypermethrin, deltamethrin or pyrethrins	m^2	25	250.00	6,250.00
	Damp proof Membrane				
F	Two layers 1000 gauge polythene sheeting with minimum 300mm side and end laps	m^2	25	260.00	6,500.00
	Concrete class 1:3:6 (40mm aggregate)				
G	50mm thick blinding to foundation in trenches	m^2	10	600.00	6,000.00
	Supply and put in place vibrated reinforced concrete class 25 (20mm aggregate) in:-				
H	Strip footing	m^3	2	13,000.00	26,000.00
I	150mm thick ground floor slab	m^2	16	1,950.00	31,200.00
	Carried to collection				**108,200.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	SUBSTRUCTURES WORKS - CONTINUED				
	Supply and construct formwork to the sides of the concrete surfaces. The formwork shall comprise acceptable timber or steel shutters with and including mould oil, putting in place and striking off. Where the surface of concrete is disturbed by the striking off, it shall be repaired at the Contractor's cost				
A	Formwork to sides of strip foundation	m^2	11	600.00	6,600.00
B	Formwork to sides of ground floor slab 150mm wide	m	17	120.00	2,040.00
	Supply, transport, deliver, cutting, bending and installing of steel rods Hot rolled deformed reinforcement bars with and including bends, hooks, tying wire, distance blocks, and spacers				
C	Assorted reinforcement bars 8 - 12mm diameter	Kgs	200	150.00	30,000.00
	Supply, transport and install mesh fabric reinforcement				
D	Fabric mesh reinforcement BRC type A142 weighing 2.22Kg/m^2 with minimum 300mm side and end laps	m^2	16	400.00	6,400.00
	Construction of natural stonework walling; roughly squared; bedded and jointed in 1:4 cement and sand mortar and reinforced with 20 gauge hoop iron wall ties every alternate course. The stone crushing strength to be minimum 7N/mm^2				
E	200mm thick	m^2	34	1,800.00	61,200.00
	Cement and sand screed (1:4) one coat screed backing wood floated				
F	32mm thick, average wood flooted finish to receive river rock cladding (measured separately)	m^2	5	450.00	2,250.00
	Carried to collection				**108,490.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	SUBSTRUCTURES WORKS - CONTINUED				
	Supply, transport, deliver and fit in place river rock cladding on concrete or masonry surface. Where the Architect requires the pembles to be polished, the contractor shall include it in the rate				
A	River rock cladding with average thickness of 50mm. The particles to be select quality and to be fixed on masonry/concrete with and including cement and sand mortar	m^2	5	2,500.00	11,250.00
	Carried to collection				**11,250.00**
	COLLECTION				
	Brought forward from page 1				41,700.00
	Brought forward from page 2				108,200.00
	Brought forward from page 3				108,490.00
	Brought down from above				11,250.00
	TOTAL FOR SUBSTRUCTURES CARRIED TO SUMMARY PAGE				**269,640.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	WALLING				
	EXTERNAL AND INTERNAL WALLING				
	The quantity is calculated as gross, including the edges, the necessary corners.The openings will be deducted where the walls will be filled with other materials other than masonry/blockwork				
	Supply, transport, deliver selected quality concrete blocks for walling. The wall will be bedded and jointed in 1:4 cement and sand mortar and reinforced with 20 gauge hoop iron every alternate course. The concrete blocks should have a minimum crushing strength of $7N/mm^2$				
A	150mm thick	m^2	49	1,600.00	78,400.00
	Supply, transport, delver and install dump proof courses under masonry or concrete block walling				
B	150mm wide with and including all necessary laps	m	22	200.00	4,400.00
	Supply, transport, deliver and install approved precast concrete coping bedded with and including cement and sand mortar (1:3). All coping shall be straight and in line with the masonry/concrete block walling				
C	250mm wide precast concrete coping twice weathered and twice thorated	m	22	1,000.00	22,000.00
	CONCRETE WORKS				
	Supply and put in place vibrated reinforced concrete class 25 (20mm aggregate) in:-				
D	Ring beams	m^3	2	13,000.00	26,000.00
	Supply and construct formwork to the sides of the concrete surfaces. The formwork shall comprise acceptable timber or steel shutters with and including mould oil, putting in place and striking off. Where the surface of concrete is disturbed by the striking off, it shall be repaired at the Contractor's cost				
E	Formwork to sides and soffits of ring beam	m^2	26	600.00	15,600.00
	Carried to collection				**146,400.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	Supply, transport, cutting, bending and installing of steel rods Hot rolled deformed reinforcement bars with and including including bends, hooks, tying wire, distance blocks, chairs and spacers				
A	Assorted reinforcement bars 8 - 12mm diameter	Kgs	200	150.00	30,000.00
	Carried to collection				**30,000.00**
	COLLECTION				
	Brought forward from page 5				146,400.00
	Brought down from above				30,000.00
	TOTAL FOR WALLING CARRIED TO SUMMARY PAGE				**176,400.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	ROOFING				
	Flat roof construction				
	CONCRETE WORKS				
	Supply and put in place vibrated reinforced concrete class 25 (20mm aggregate) in:-				
A	150mm thick suspended roof slab	m^2	16	1,950.00	31,200.00
	Supply and construct formwork to the sides of the concrete surfaces. The formwork shall comprise acceptable timber or steel shutters with and including mould oil, putting in place and striking off. Where the surface of concrete is disturbed by the striking off, it shall be repaired at the Contractor's cost				
B	Formwork to soffits of suspended slab	m^2	16	600.00	9,600.00
C	Form or leave holes not exceeding 200mm diameter for connecting water pipes to the sanitary fittings (measured separately)	No.	3	100.00	300.00
	Supply, transport, cutting, bending and installing of steel rods				
	Hot rolled deformed reinforcement bars with and including including bends, hooks, tying wire, distance blocks, chairs and spacers				
D	Assorted reinforcement bars 8 - 12mm diameter	Kgs	300	150.00	45,000.00
	Carried to collection				**86,100.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	ROOFING - CONTINUED				
	Roof drainage				
	Gutters and downpipes				
A	Supply, transport and install in place 100mm diameter medium duty uPVC halfround gutters. The gutters to include all necessary steel fixing brackets	m	4	560.00	2,240.00
B	100mm diameter medium duty uPVC downpipe fixed to the wall with and including all necessary steel brackets at 600mm centres	m	5	1,000.00	5,000.00
C	Extra over for swan neck bends, 100mm diameter medium duty uPVC 750mm long	No.	2	1,000.00	2,000.00
D	Extra over for horse shoe bends, 100mm diameter medium duty uPVC 750mm long	No.	2	1,000.00	2,000.00
E	Extra over for opening from the gutter to the downpipe. The opening will be water tight and firmly fitted to the gutter and the downpipe	No.	2	500.00	1,000.00
	Carried to collection				**12,240.00**
	COLLECTION				
	Brought forward from page 7				86,100.00
	Brought down from above				12,240.00
	TOTAL FOR ROOFING CARRIED TO SUMMARY PAGE				**98,340.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	OPENINGS				
	DOORS				
	Wrot mahogany or approved equivalent. Supply, transport, deliver cut the required sized and install				
A	100 x 50mm frame with three labours	m	13	750.00	9,750.00
B	75 x 25mm architrave with two labours	m	13	285.00	3,705.00
C	15 x 15mm quadrant beading	m	13	75.00	975.00
	Supply, transport, deliver and install solid core flush door well finished and ready for painting				
D	50mm thick single door; overall size 800 x 2100mm high to Architect's approval	No.	2	12,600.00	25,200.00
	The contractor shall apply undercoat, primer and two finishing coats of gloss paint. The engineer shall select the colour shade and code of the paint				
E	Gloss paint to wooden door surfaces	m^2	7	300.00	2,100.00
	Knot, prime and stop, apply three coats polyurethane varnish to wood:				
F	Wooden surfaces 200 - 300mm girth	m	39	90.00	3,510.00
	Supply and fix the following ironmongery complete with furniture and matching screws as per 'UNION' catalogue made in England or approved equivalent:				
G	Two lever mortice lock	No.	2	3,000.00	6,000.00
H	100mm brass butt hinges	Prs	3	400.00	1,200.00
I	Approved handle to match lock	No.	2	2,000.00	4,000.00
J	38mm diameter rubber door stop plugged to wall or floor as appropriate	No.	2	200.00	400.00
	Carried to collection				**56,840.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	OPENINGS - CONITNUED				
	WINDOWS				
	Supply, transport, install and test to the approval of the Engineer steel casement windows. The window shall include all support mechanism, opening mechanism and all necessary iron mongery				
	The following in steel casement windows; standard casement section in large panes complete with and including permanent ventilators comprising `T'- bar, gauze and metal hood to full width of window, coupling mullions, approved ironmongery and one coat primer by manufacturer complete with all necessary steel angle sections or RHS for fixing to concrete or masonry, clips and bolts				
A	Window overall size 900 x 600mm high with two openable top hung 450 x 600mm high	No.	2	6,480.00	12,960.00
	Supply, transport, deliver and install obscure sheet glass to metal windows (measured separately). The glazing will be in small panes not exceeding 0.3m^2				
B	5mm thick glazing with and including putty and other compounds as directed by the Engineer	m^2	2	2,200.00	4,400.00
	Supply, transport, deliver and install window sills. The contractor shall make good any masonry or concrete surfaces disturbed during sill installation at his own cost. The sill shall be of continuous length norminal 600mm long and no broken piece will be accepted				
C	230 x 50mm thick (extreme) precast concrete throated and weathered windows sills bedded and jointed to masonry walling in matching 1:4 cement and mortar	m	2	500.00	1,000.00
	Carried to collection				**18,360.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	OPENINGS - CONITNUED Supply, transport, prepare and apply gloss paint to plastered general surfaces. The paint shall comply with the specifications supplied alongside with these Bills of Quantities The contractor shall apply undercoat, primer and two finishing coats of gloss paint. The engineer shall select the colour shade and code of the paint				
A	Gloss paint to window surfaces	m^2	4	300.00	1,200.00
	Carried to collection				**1,200.00**
	COLLECTION Brought forward from page 9				56,840.00
	Brought forward from page 10				18,360.00
	Brought down from above				1,200.00
	TOTAL FOR OPENINGS CARRIED TO SUMMARY PAGE				**76,400.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	FINISHES **EXTERNAL WALL FINISHES** The contractor shall provide all necessary and strong scafolding to enable workers access the top part of walling while carrying out finishing works Gauged render comprising of lime, cement and sand (1:2:9) respectively. The render shall have a neat vertical finish. The contractor shall hack the surface of concrete/masonry where necessary in order to provide a surface where the render/plaster will hold strongly and permanently.				
A	Supply, mix and apply render of average thickness of 20mm to masonry or concrete surfaces	m^2	73	400.00	29,200.00
	Supply, transport, prepare and apply 'Rock and Tuff' paint or any other approved exterior paint to plastered general surfaces. The paint shall comply with the specifications supplied alongside with these Bills of Quantities The contractor shall apply undercoat, skimming and two finishing coats of 'Rock and Tuff' or textured exterior paint. The engineer shall select the colour shade and code of the paint. The application method will be selected by the Engineer				
B	'Rock and Tuff' or other approved textured external paint to plastered surfaces	m^2	73	800.00	58,400.00
	INTERNAL WALL FINISHES The contractor shall provide all necessary and strong scafolding to enable workers access the top part of walling while carrying out finishing works Gauged plaster comprising of lime, cement and sand (1:2:4) respectively. The plaster shall have a neat vertical finish. The contractor shall hack the surface of concrete/masonry where necessary in order to provide a surface where the render/plaster will hold strongly and permanently				
C	Supply, mix and apply plaster of average thickness of 15mm to masonry or concrete surfaces	m^2	3	400.00	1,200.00
	Carried to collection				**88,800.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	INTERNAL WALL FINISHES - CONTINUED				
	Cement and sand screed (1:4) one coat screed backing wood floated				
A	32mm thick, average wood flooted finish to receive ceramic wall tiles (measured separately)	m^2	23	450.00	10,350.00
	Ceramic wall tiles; as manufactured by Messrs. Saj Ceramics or other equal and approved; bedding and jointing in cement mortar (1:4); grouting joints with matching cement				
B	6mm thick ceramic tiles (the Engineer will choose the other dimensions of the ceramic tiles)	m^2	23	1,800.00	41,400.00
	Supply, transport, prepare and apply silk vinyl emulsion paint to plastered general surfaces. The paint shall comply with the specifications supplied alongside with these Bills of Quantities				
	The contractor shall apply undercoat, skimming and two finishing coats of silk vinyl emulsion paint. The engineer shall select the colour shade and code of the paint				
C	Silk vinyl emulsion paint to plastered surfaces	m^2	3	300.00	900.00
	CEILING FINISHES				
	Gauged plaster comprising of lime, cement and sand (1:2:4) respectively. The plaster shall have a neat vertical finish. The contractor shall hack the surface of concrete/masonry where necessary in order to provide a surface where the render/plaster will hold strongly and permanently				
D	Supply, mix and apply plaster of average thickness of 15mm to masonry or concrete surfaces	m^2	16	400.00	6,400.00
	The contractor shall apply undercoat, skimming and two finishing coats of silk vinyl emulsion paint. The engineer shall select the colour shade and code of the paint				
E	Silk vinyl emulsion paint to plastered surfaces	m^2	16	300.00	4,800.00
	Carried to collection				**63,850.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	FINISHES - CONTINUED				
	FLOOR FINISHES				
	Cement and sand screed (1:4) one coat screed backing wood floated				
A	32mm thick, average wood flooted finish to receive ceramic floor tiles (measured separately)	m^2	16	450.00	7,200.00
	Ceramic wall tiles; as manufactured by Messrs. Saj Ceramics or other equal and approved; bedding and jointing in cement mortar (1:4); grouting joints with matching cement				
B	400 x 400 x 8mm thick or any other approved sizes ceramic floor tiles fitted with and including matching coloured grout	m^2	16	1,800.00	28,800.00
	Carried to collection				**36,000.00**
	COLLECTION				
	Brought forward from page 12				88,800.00
	Brought forward from page 13				63,850.00
	Brought down from above				36,000.00
	TOTAL FOR FINISHES CARRIED TO SUMMARY PAGE				**188,650.00**

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	EXTERNAL WORKS				
	PAVING SLABS				
	Digging and leveling work - All provisional				
A	Excavate for making level. This includes and earth compressing according to the technical regulations for this activity and spread on site as directed. The price includes ground compaction and levelling the bottoms and sides of excavation	m^3	5	600.00	3,000.00
B	Extra over excavation for excavation in rock (All classes)	m^3	1	3,000.00	3,000.00
	Hardcore filling				
C	Supply and handpack selected gravel 300mm thick, water and compact in layers not exceeding 150mm thick as directed by the Engineer	m^2	9	900.00	8,100.00
D	50mm thick quarry dust blinding to hardcore (measured separately)	m^2	9	150.00	1,350.00
E	Level the surface of the hardcore to be horizontal with a gentle slope of 1% or as directed by the engineer	m^2	9	100.00	900.00
	Supply, transport and lay precast concrete paving slabs 50mm thick on and including prepared sand bed of 50mm thickness. The paving slabs will be neatly joined at regular pattern and where cutting will be required, the cut face shall be cut neatly and straight				
F	600 x 600mm wide precast concrete paving slabs with and including jointing with cement and sand (1:3) mortar	m^2	9	1,500.00	13,500.00
	Supply, transport, deliver and install precast concrete channel at the end of the paving blocks to limit movement. The contractor will allow in his rate a provision for any concrete haunching that may be deemed necessary or instructed by the Engineer where the ground condition necesitates its requirement				
G	125 x 100mm precast concrete channel	m	20	1,500.00	30,000.00
	TOTAL FOR EXTERNAL WORKS CARRIED TO SUMMARY PAGE				**59,850.00**

PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

PIT LATRINE CONSTRUCTION SUMMARY (LADIES AND GENTS)

ITEM	DESCRIPTION		AMOUNT (KSHS)
1	SUBSTRUCTURES	From Page 4	269,640.00
2	WALLING	From Page 6	176,400.00
3	ROOFING	From Page 8	98,340.00
4	OPENINGS	From Page 11	76,400.00
5	FINISHES	From Page 14	188,650.00
6	EXTERNAL WORKS	From Page 15	59,850.00
	TOTAL CARRIED TO GRAND TENDER SUMMARY PAGE		**869,280.00**

PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

GENERAL FENCING WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (KSHS)
	SUBSTRUCTURES WORKS				
	Digging and leveling work - All provisional				
A	Excavate for precast concrete poles, load, transport and spread on site as directed/instructed by the Engineer	m^3	40	600.00	24,000.00
B	Ditto for column bases to support access gates	m^3	7	600.00	4,200.00
C	Extra over excavation for excavation in rock (All classes)	m^3	9	3,000.00	27,000.00
D	Return fill and ram selected soil materials. Where the selected materials are not suitable, the contractor will use imported and approved imported materials	m^3	40	450.00	18,000.00
E	Allow for keeping all excavations free from spring, subterranean or flood water	Item			10,000.00
F	Allow for all necessary planking and strutting sides of all types of excavation	Item			10,000.00
	Concrete class 1:3:6 (40mm aggregate)				
G	50mm thick blinding to column bases	m^2	5	500.00	2,500.00
	Supply and put in place vibrated reinforced concrete class 25 (20mm aggregate) in:-				
H	Column bases	m^3	5	13,000.00	65,000.00
I	Columns in foundations	m^3	1	13,000.00	13,000.00
	Supply and put in place vibrated mass concrete class 25 (20mm aggregate) in:-				
J	Mass concrete for the precast concrete poles (measured separately)	m^3	14	13,000.00	182,000.00
	Carried to collection				**355,700.00**

PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

GENERAL FENCING WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	SUBSTRUCTURES WORKS - CONTINUED				
	Supply and construct formwork to the sides of the strip foundation. The formwork shall comprise acceptable timber or steel shutters with and including mould oil, putting in place and striking off. Where the surface of concrete is disturbed by the striking off, it shall be repaired at the Contractor's cost				
A	Formwork to sides of column bases	m^2	4	700.00	2,800.00
B	Formwork to sides of column in foundations	m^2	4	700.00	2,800.00
	Supply, transport, deliver, cutting, bending and installing of steel rods.				
	Hot rolled deformed reinforcement bars with and including bends, hooks, tying wire, distance blocks, and spacers				
C	Assorted reinforcement bars 8 - 12mm diameter	Kgs	600	150.00	90,000.00
	Carried to collection				**95,600.00**
	COLLECTION				
	Brought forward from page 1				355,700.00
	Brought down from above				95,600.00
	TOTAL FOR SUBSTRUCTURES CARRIED TO COLLECTION PAGE				**451,300.00**

PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

GENERAL FENCING WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	FENCING AND GATES				
	CONCRETE WORKS				
	Supply and put in place vibrated reinforced concrete class 25 (20mm aggregate) in:-				
A	Columns for the gates	m^3	1	13,000.00	13,000.00
	Supply, transport, deliver and install concrete posts. The concrete posts shall be vertical and shall be installed in the concrete in holes (measured separately)				
B	Precast concrete poles size 100 x 100mm x 2400mm long reinforced with 4 No. R6 reinforcing rods with and including 4 No. straining wire holes on the straight part (3000mm long) and 3 No. holes on the bent part (400mm long)	No.	111	3,000.00	333,000.00
	Supply and construct formwork to the sides of the strip foundation. The formwork shall comprise acceptable timber or steel shutters with and including mould oil, putting in place and striking off. Where the surface of concrete is disturbed by the striking off, it shall be repaired at the Contractor's cost				
C	Formwork to vertical sides of columns	m^2	6	600.00	3,600.00
	Supply, transport, deliver, cutting, bending and installing of steel rods.				
	Hot rolled deformed reinforcement bars with and including bends, hooks, tying wire, distance blocks, and spacers				
D	Assorted reinforcement bars 8 - 12mm diameter	Kgs	100	150.00	15,000.00
	Supply and install approved wiremesh fence complete with straining and tying wire to pre-cast concrete poles (measured separately)				
E	G16 wiremesh with 50 x 50mm squares	m^2	720	1,800.00	1,296,000.00
	Carried to collection				**1,660,600.00**

PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

GENERAL FENCING WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL (KSHS)
	GATES				
	Supply, transport, deliver and install fabricated animal control gates comprising of 75 x 75 x 3mm thick vertical members and 25 x 25 x 2.5mm thick mild steel members (6 horizontal members and supporting vertical members) as shown on drawing. The contractor shall include in his rate the cost of 12mm dia. 300mm long slide bolt assembly with 4mm thick steel hasp and staple, 3 No.150mm wide painted purpose made pin hinges and all other associated iron mongery to make the gate operational				
A	Double gate size 4300 x 2400mm high	No.	1	154,800.00	154,800.00
B	Ditto to the holding area but comprising of metal grills 50 x 50 x 2mm Square hollow sections and painted to approval overal size 3000 x 2400mm high	No.	1	86,400.00	86,400.00
	Supply, transport, deliver prepare and apply gloss paint. The paint shall be Manufactured by Crown Paint Ltd or other approved manufacturer. Whenever required by the Engineer, the paint will be tested and if the paint does not pass the test, the contractor shall re-paint the whole area at his own cost				
C	Gloss paint to gate surfaces	m^2	35	300.00	10,500.00
	Guard house construction				
D	Allow a provisional sum of Kshs 100,000.00 only for the construction of guard house as directed	Sum			100,000.00
	Carried to collection				**351,700.00**
	COLLECTION				
	Brought forward from page 3				1,660,600.00
	Brought down from above				351,700.00
	TOTAL FOR FENCING AND GATES CARRIED TO COLLECTION PAGE				**2,012,300.00**

PROPOSED SAND HARVESTING PROJECT IN LAKE VICTORIA NEXT TO RIVER KUJA MOUTH, MIGORI COUNTY

GENERAL FENCING WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	SUMMARY PAGE				
A	SUBSTRUCTURES				451,300.00
B	FENCING AND GATES				2,012,300.00
	TOTAL CARRIED TO GRAND TENDER SUMMARY PAGE				**2,463,600.00**

FRANCIS MBURU MBUGUA
REGISTERED QUANTITY SURVEYOR
No. Q1163
P. O. BOX 75173 - 00200 NAIROBI

12/03/2024

PRACTISING CERTIFICATE FOR QUANTITY SURVEYORS

Pursuant to the Architects & Quantity Surveyors Act Cap 525

QS. FRANCIS MBURU MBUGUA (Q1163)

is duly qualified as a Quantity Surveyor and is entitled to practise as such Quantity Surveyor

From **1st July 2024** *to* **30th June 2025**

Registrar *Date* **1st July 2024**

serial no. PCQS/13/24-25