



Environmental and Social Impact Assessment Study Report for the Proposed Maritime Rescue Coordination Centre in Kisumu Port

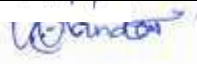
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CERTIFICATION**Certification by Lead Experts**

We, **Envasses Environmental Consultants Limited** hereby confirm that this Environmental and Social Impact Assessment Study Report has been prepared by ourselves pursuant to Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

Signed by ESIA Study Experts on 27th June 2024;

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Certification by Proponent

We, **Kenya Maritime Authority**, hereby confirm that this Environmental and Social Impact Assessment Study Report has been prepared and submitted to NEMA with our authority as the proponent pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

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ACKNOWLEDGEMENT

This Environmental and Social Impact Assessment (ESIA) study report was prepared in collaboration with the proponent, State and Non-State Actors as well as the local community. The proponent, Kenya Maritime Authority (KMA), provided the financial resources to carry out the ESIA, project documentation and coordinated site visits. To this end, we are grateful to the support by Mr. Michael Mbaru, the Ag. Assistant Director-Marine Environment Protection and Mr. Edwin Were from KMA Kisumu office.

Lahvens (K) Limited led by Mr. Lovans Spoo collaborated with the consultant in collection, analysis and reporting on the baseline environmental media i.e., water quality, ambient air, noise level measurements and soil tests of the project site.

We acknowledge all stakeholders for their participation in the ESIA process through the various engagement meetings held between May and June 2024. They include government agencies (County Government of Kisumu, Ministry of Interior and National Administration, Kenya Ports Authority, Kenya Shipyard Limited, Kenya Railways Corporation, Kenya Coast Guard Service, Kenya Wildlife Service, Lake Victoria Basin Commission, State Department for Blue Economy and Fisheries, Kenya Fisheries Service, Water Resources Authority, Communications Authority of Kenya, Directorate of Occupational Safety and Health and Kenya Power and Lighting Company among others) and non-state actors (Kichinjio Beach Management Unit, Friends of Lake Victoria, Mega Properties and Swan Center Limited).

Envasses Environmental Consultants Limited staff supported data collection and analysis, facilitated stakeholder engagement meetings as well as preparation of the ESIA report. To this end we acknowledge the input of Ms. Cynthia Mungai, Mr. Jack Otieno and Ms. Fridah Khamalishi.

EXECUTIVE SUMMARY

Lake Victoria is Africa's largest lake supporting a thriving artisanal fishery, water transport and trade among riparian communities. Despite these benefits, maritime accidents and disasters attributed to overloading and bad weather within the Lake Victoria Basin have been reported in the past and the trend continues. Kenya Maritime Authority (KMA), being a government agency with the mandate to oversee, coordinate and regulate the maritime industry, seeks to construct a Maritime Rescue Coordination Center (MRCC) in Kisumu to address maritime accidents and disasters in the Lake. The proposed MRCC will be located within Kisumu Port at Latitude 0°05'48.32"S and Longitude 34°44'57.31"E. The project will comprise construction and operation of MRCC building, a jetty and auxiliary facilities.

Under the Second Schedule of the Environmental Management and Coordination Act (EMCA), Cap 387 of the Laws of Kenya, the project is categorized as a High Risk and thus should undergo Environmental and Social Impact Assessment (ESIA) Study process. To comply with this legal requirement, improve environmental performance and ensure sustainability of the proposed project activities, KMA contracted Envasses Environmental Consultants Limited (the consultant) to carry out the ESIA study for the project.

Following the contractual engagement, the consultant prepared and submitted the Terms of Reference for the Study to NEMA which were approved in May 2024. Thereafter, the Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003) informed the ESIA approach and methodology on data collection, analysis, and reporting. A reconnaissance survey and site visits were carried out between April and June 2024 to assess the site status and baseline conditions of the project area. The consultants also carried out literature review of project documentation including designs, published and non-published works on project area and Lake Victoria and policy documents, environmental media sampling and analysis (ambient air, noise levels and water quality) at the project site in collaboration with Lahvens (K) Limited (a National Environment Management Authority designated laboratory), biological community sampling and analysis and several stakeholder engagement meetings.

The results of the ESIA study demonstrate that the proposed MRCC will have both positive and negative environmental and social impacts. The positive impacts include enhancing maritime safety thus reducing accidents and the attendant loss of life and businesses, enhancing public awareness on maritime safety and emergency preparedness, promoting international cooperation and diplomacy and generating revenue to both county and national governments. Despite the benefits, negative environmental and social impacts will arise at the construction, operational and possible decommissioning phases.

During construction phase, the negative environmental and social impacts will include storm water management, occupational safety and health risks, air and noise pollution, water quality degradation, increased water and energy demand, waste management, potential conflicts with neighbors and other lake users, labor influx and social concerns, reclamation of riparian area and navigational risks. The topography of the site slopes to the lake area and storm water from Kisumu Central Business District (CBD) flows through the site to the lake. To mitigate risks of flooding or structural failure due to poor storm water management, the proponent has constructed an effective storm water management system. The safety and health of the workers, neighbors and visitors to the site will be enhanced by complying with the Occupational Safety and Health Act, 2007. The Act requires registration of the construction site as a workplace with the Directorate of Occupational Safety and Health Services (DOSHS), obtaining insurance cover for the workers,

preparing and implementing an emergency response plan, providing well stocked first aid kits and trained personnel, training workers on first aid services and working at lake area, providing adequate and appropriate Personal Protective Equipment (PPEs) and enforcing their use, erecting appropriate signage at all active construction areas and providing an incident/accident register.

Air and noise pollution are inevitable during construction phase and the proponent should install appropriate dust screens around the project site, sprinkle water at active excavation areas and unpaved access road to suppress fugitive dust, provide dust masks to workers, cover all trucks hauling soil, sand and other loose materials or maintain at least two feet of freeboard, use of energy efficient machinery and equipment, ensure excavation and construction works are limited to day time hours only and comply with provisions of the Environmental Management and Coordination (Air Quality) Regulations, 2014 and (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Reclamation of the riparian land as well as civil works on the adjacent terrestrial environment will result in water quality degradation. The ESIA recommends use of silt curtains to prevent siltation/sediment flow into non active construction areas, construct embankments along the shoreline area to manage storm water, where possible, avoid civil works when it's raining, use of excavated material for backfilling and levelling and providing adequate waste collection infrastructure. In addition, the proponent should obtain a land reclamation permit from the Water Resources Authority (WRA) and collaborate with KPA and KWS in enhancing the green spaces within the port through tree growing to enhance biodiversity and stabilize the shoreline consistent with the Port Master Plan.

To conserve water and energy as well as ensure proper waste management, the proponent should sensitize workers on water and energy conservation measures, monitor water and energy consumption, procure construction materials based on Bill of Quantities, place adequate waste collection bins, maximize use of recyclable materials, procure services of NEMA licensed solid waste handler for disposal of waste, use mobile toilets from NEMA licensed waste contractor for workforce sanitation and compliance with the Environmental Management and Coordination (Water Quality) Regulations, 2006 and the Sustainable Waste Management Act, 2022.

Other impacts at construction phase include potential conflicts with neighbors with respect to the access road, labour influx and the attendant social concerns, reclamation of riparian area and navigational risks. The recommended mitigation measures include liaising with the County Government of Kisumu to determine an alternative route for use by Kichinjio BMUs members, collaborating with Kenya Railways Corporation (KRC) to enhance co-existence of railway operations and construction activities, grading and applying murrum on the access road once construction is complete, developing a site-specific Labor Influx Management Plan and implementation framework, contracting security firms/marshals to enhance safety within the site, develop and implement a Grievances Redress Mechanism (GRM).

The navigational risks and cases of Human-Wildlife Conflicts during construction works should be mitigated by creating awareness among the local fishermen on the marine works and its extend, placing marker buoys and hazards demarcation, ensuring badges and construction areas are well lit at night, fencing off any key foraging habitats for hippos and collaborating with Kenya Wildlife Service to prevent and manage hippos and crocodiles sighted within the area.

During the operational phase, the main environmental and social concerns will include water pollution, oil spills and leakages, impacts of climate change and lake level rise, risks posed by macrophytes, waste management, impacts related to electromagnetic radiation and structural failure. To mitigate water quality degradation, proponent should install a bio digester to manage wastewater flow from the MRCC, conduct quarterly water quality monitoring of effluent from the bio digester, install solid waste screens along storm water drains, comply with KMA Act, 2016 and the Environmental Management and Coordination (Water Quality) Regulations, 2006.

During Search and Rescue Operations (SAR), vessels in distress can lead to oil spills and other forms of aquatic pollution especially if the distressed vessel is carrying hazardous materials or if fuel tanks rupture during the rescue process. However, it should be noted that KMA's core function includes reducing marine pollution from maritime vessels operations. Hence, the proponent should ensure refueling of boats is undertaken by competent personnel, vessels are in serviceable condition, and when oil spills occur, they are handled in compliance with the Draft National Marine Spills Response Contingency Plan.

Impacts of climate change and lake level rise might disrupt the coordination of SAR operations thus the proponent and project designs should incorporate lake level and temperature rise as well as climate change extreme conditions, maximize use of natural lighting and ventilation, prepare annual carbon footprints reports and implement recommendations and comply with the Climate Change Act 2023, National Climate Change Action Plan 2023-2027 and the Marpol Convention 73/78 (MARPOL Annex VI). The proponent should implement the Early Warning System (EWS) for drifting, proliferation of aquatic macrophytes prepared by KPA in collaboration with Trade Mark Africa (TMA) to mitigate the risks to the MRCC as well as Search and Rescue Missions.

Solid waste management will be addressed through provision of adequate waste collection bins, contracting NEMA licensed personnel to collect and dispose off the wastes on a regular basis, and compliance with the Sustainable Waste Management Act, 2022. Carrying out regular safety training among the staffs, using navigational lights to demarcate jetty area and installing appropriate lights forewarn other lake users will mitigate loss of lives during operational phase. To resolve impacts related to insecurity, electromagnetic radiations and structural failure, the proponent should restrict entry to server rooms, ensure regular servicing of electronic equipment, as well as inspection and monitoring of MRCC building and jetty carried out by a licensed engineer.

At decommissioning phase, the proponent should prepare a due diligence decommissioning audit and submit it to NEMA for approval at least 3 months in advance. Decommissioning would result in demolition wastes which shall be handled by a NEMA licensed contractor through disposal and material recovery.

In conclusion, the proposed project is important and beneficial to the riparian communities as it will promote their safety and well-being. However, the construction, operation and possible decommissioning phases will have significant environmental impacts which if not addressed could lead to pollution safety risks that affect the health of the communities. To address these impacts, the ESIA Study report proposes has proposed a suite of comprehensive Environmental and Social Management and Monitoring Plans to be implemented during the entire project cycle. It is on this basis that we recommend that the project be issued with an EIA Licence consistent with the provisions of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

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ACRONYMS

BMUs	Beach Management Units
CAK	Communications Authority of Kenya
CBD	Convention on Biological Biodiversity
CGK	County Government of Kisumu
CIDP	County Integrated Development Plan
dB	Decibels
DOSHs	Directorate of Occupational Safety and Health Services
EMCA	Environmental Management and Coordination Act
ESG	Environmental and Social Governance
ESIA	Environmental and Social Impact Assessment
ESMPs	Environmental and Social Management Plans
EWS	Early Warning System
GoK	Government of Kenya
GRM	Grievances Redress Mechanism
ICT	Information Communications Technology
KCGS	Kenya Coast Guard Services
KeFS	Kenya Fisheries Service
KES	Kenyan Shilling
KIWASCO	Kisumu Water and Sewerage Company
KMA	Kenya Maritime Authority
KMFRI	Kenya Marine and Fisheries Research Institute
KNBS	Kenya National Bureau of Statistics
KPA	Kenya Ports Authority
KPLC	Kenya Power and Lighting Company
KRC	Kenya Railways Corporation
KSL	Kenya Shipyard Limited
KWS	Kenya Wildlife Service
LBDA	Lake Basin Development Authority
LPG	Liquefied Petroleum Gases
MARPOL	International Convention for the Prevention of Pollution from Ships
MRCC	Maritime Rescue Coordination Centre
NEMA	National Environment Management Authority
NGO	Non-Governmental Organization
OSHA	Occupational Safety and Health Act
OSIENALA	Friends of Lake Victoria
PPEs	Personal Protective Equipment
PWD	People with Disabilities
SAR	Search and Rescue Operations
SHM	Stakeholder Meetings
TORs	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
WRA	Water Resources Authority

1 INTRODUCTION

1.1 Background information

Lake Victoria is Africa's largest lake by area, the world's largest tropical lake, and the world's second-largest fresh water lake by surface area (59,947km²). The lake's area is divided among three countries: Tanzania occupies 49% (33,700 km²), Uganda 45% (31,000km²) and Kenya 6% (4,100km²). The importance of the lake includes socio-economic benefits accruing from a thriving artisanal fishery, supporting water transport and trade among the riparian communities. In the recent past, these benefits have been enhanced by the revitalization of Kisumu Port and potentially the other small ports in the Lake. Despite these benefits, maritime accidents and disasters attributed to overloading and bad weather within the Lake Victoria Basin have been reported in the past and the trend continues. Data provided by KMA indicates that between February 2021 and April 2024 maritime accidents led to loss of lives and injuries (Annexure 2). Furthermore, since August 2015 to September 2021 there have been reports of 20 casualties of boat capsizing in Kenya, 63 in Uganda and hundreds in Tanzania within Lake Victoria Basin (Annexure 3).

The Kenya Maritime Authority (KMA), being a government agency with the mandate to oversee, coordinate and regulate the maritime industry, seeks to construct a Maritime Rescue Coordination Center (MRCC) within Kisumu Port to address maritime accidents and disasters in the Lake region. KMA strives to strengthen national maritime administration through enhancement of regulatory and institutional capacities for safety and security, fostering effective implementation of international maritime conventions and other mandatory instruments on safety & security, promoting maritime training and education, coordinating Search and Rescue, preventing marine pollution and promoting preservation of the marine environment as well as promoting maritime trade and investments.

The objective of the proposed MRCC project is therefore to enhance maritime transportation and safety navigation by reducing maritime accidents, saving lives, improving security, and providing efficient and affordable communication to Lake Victoria communities. Additionally, the project will contribute to provision of safe, efficient transport and safe conduct of fishing activities that are essential in supporting local livelihoods.

Under the Second Schedule of the Environmental Management and Coordination Act (EMCA), Cap 387 of the Laws of Kenya, the project is categorized as High Risk and should therefore undergo an Environmental and Social Impact Assessment (ESIA) Study process. To comply with this legal requirement, improve environmental performance and ensure sustainability of the proposed project activities, KMA contracted Envasses Environmental Consultants Limited to carry out the ESIA study for the proposed project.

1.2 ESIA Study Objectives and Terms of Reference

The objective of the ESIA Study process was to identify the potential environmental and social impacts of the proposed MRCC project and provide mitigation measures as well as an Environmental Management Plan (EMP) to inform decision-making by the National Environment Management Authority (NEMA). To guide the process, KMA provided the following Terms of Reference (TORs) to the consultant to guide the ESIA process consistent with the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya. The TORs of the ESIA study were to;

- Provide a detailed description and analysis of project cycle activities. Objectives, anticipated materials to be used, by-products and waste generation potential and a detailed analysis of the technology to be used in the project activities

- Prepare a description of the relevant national policy, environmental legislative and institutional frameworks in respect to all the phases of the proposed project.
- Undertake a detailed baseline study of the proposed area including the bio-physical profile
- Undertake analysis of design and project alternatives including the technologies, materials used and assess their suitability in addressing the potential environmental concerns
- Initiate and carry out a wider public and stakeholder participation process during the course of undertaking the ESIA study to include profiling of all socio-actors likely to be impacted upon by the project, collection, collation of their views, consultative meetings and development of a project-community feedback Mechanism in line with Regulation 17 of Legal Notice Number 101 and mainstream the outcomes into the final environmental management plans for the entire project cycle.
- Identify, profile and conduct an in-depth assessment of the environmental, health and safety impacts of the proposed project on ordinal scales of direct, indirect, cumulative, irreversible, short term and long-term etc.
- Develop a suite of Environmental Management and Monitoring Plans based on the outcomes of the study proposing measures to eliminate, reduce or mitigate adverse effects.
- Any other information or matters as NEMA will inform or direct during the preparation of the ESIA study, appraisal and decision-making process.

2 ESIA APPROACH AND METHODOLOGY

The ESIA Study was prepared pursuant to Section 58 of the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya. Specifically, the Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003 informed the approach and methodology used in data collection, analysis and reporting. In this regard, data collection methods included reconnaissance survey to assess site status and baseline conditions of the project area, environmental media sampling and analysis (ambient air, noise level measurements, water quality analysis and soil tests), terrestrial and aquatic biodiversity sampling and analysis, literature review including project documentation, published and non-published works on project area and L. Victoria and policy documents e.g. Kisumu CIDP 2023-2027, Kisumu Spatial Plan (2020), Legal and Institutional frameworks and stakeholder consultations.

2.1 Reconnaissance survey

The consultant carried out a reconnaissance survey of the site on 13th June 2024. The objective of the survey was to undertake a screening and scoping exercise to identify key environmental and social issues that would be addressed by the ESIA study, carry out stakeholder mapping, establish key informants contacts and data requirements for the ESIA process. Environmental screening and scoping were informed by the Second Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. Pursuant to the Schedule the ESIA issues considered were ecological, socio-economic, landscape use and changes and water demand (Table 1).

Table 1: Summary of the results of screening and scoping exercise for the proposed Maritime Rescue Coordination Centre

Criteria	Results
Ecological considerations	– Excavation will occur – Reclamation of riparian area for construction works will occur – No endangered species of trees and plants were found at the site – No endemic species reported on site
Socio-economic considerations	– No cultural or heritage assets at the site – No relocation of any inhabitant – There's railway line crossing through the access road to the site – The project will create employment – Enhancement of maritime navigational safety and security – Revenue to the government through taxes & licenses
Landscape impacts	– The proposed project will not significantly impact the landscape of the area – Project located with the port area hence consistent with landscape development plans
Land use	– The proposed project area land use includes low density mixed residential, commercial and industrial developments
Water	– Implementation of the proposed project will increase water demand and impact on water resources through potential pollution from waste disposal – Reclamation of the riparian area will potentially affect water quality

Following the reconnaissance survey, the consultant prepared a Scoping report and Terms of Reference (TORs) as required under Regulation 11 of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003 and submitted them to NEMA after approval by KMA. The TORs were subsequently approved by NEMA (Annexure 4).

2.2 Literature review

The consultants carried out literature review of the project area and Lake Victoria region in general. Literature review provided data and information on the biophysical profile of the site (climate and meteorology, hydrology, topography, geology and soils), biological communities (terrestrial and aquatic flora and fauna) and socio-cultural environment (population demographics, community structure, cultural properties, land use and land cover, socio-economic profile, planned development and public utility infrastructure) within the project area. Additionally, literature review was used to bridge gaps in data and information collected during site visits and monitoring activities with respect to the scope of the ESIA. Documents reviewed included MRCC preliminary designs, published works and literature on Lake Victoria Basin, Kisumu County Integrated Development Plan, 2023-2027, Kisumu County Spatial Plan (2020), Policy and Legal Instruments by the National and County Governments and Multilateral Environmental Agreements (MEAs).

2.3 Baseline environmental media sampling and sampling analysis

Baseline environmental media data was collected on ambient air, noise levels, water quality and soil tests in collaboration with Lahvens (K) Limited. The results will be used to provide a benchmark for implementing the Environmental Monitoring Plan proposed in the ESIA study report. The approaches and methods used for sampling and analysis of baseline environmental media are discussed below.

2.3.1 Ambient air quality monitoring

A Fixed-Point monitoring strategy was used to obtain the ambient air quality measurements for the project site which was conducted in June 2024. Air quality monitoring was conducted at the offices, pier and gate areas over a 3-hour duration weighted average period and a calculated 24-hour time weighted average period for the measurements of particulate matter ($PM_{2.5}$, PM_{10}), carbon monoxide (CO), Sulphur dioxide (SO_2), oxides of nitrogen (NO_x), Ozone (O_3) and volatile organic compounds (TVOC). Sampling of gases was done using Aeroqual portable air monitors which use a mix of sensor technologies. The results interpretation and analysis as well as sampling duration information was used to calculate the gases concentrations.

2.3.2 Noise level measurements

Prior to recording the noise measurements, an inspection of the monitoring points and implicated activities of the area were undertaken, perimeter walls identified and sound level meter calibrated. Noise levels were determined using a Sound Level Meter Model UT – 351, C150107874. The Sound Level Meter was raised 2 meters above the ground and at least 3.5m away from any sound reflecting surfaces. Noise level measurements were taken at timed intervals of 15 minutes every one-hour period and stored in SLM's memory. The sound level meter was placed on the microphone to reduce any wind interference during measurements. For all measurements taken to establish the ambient noise levels, the equivalent noise level (Leq), the maximum sound pressure level (L_{max}) and the minimum sound pressure level (L_{min}) during were recorded. Each individual measurement was taken simultaneously with the nature of the noise climate of the facility. This involved an auditory observation and identification of noise incidents influencing the sound level meter readings by the surveyor.

2.3.3 Baseline sediment quality

Baseline sediment quality monitoring was carried out at Rive Kisat estuary (Station 3) and at the project area (Station 4). The sampling strategy involved use of Auger Sampler to scoop sediments from the river bed and the Bay (Figure 1) Sediment samples were then analyzed for heavy metals

such as PCBs, POPs, hydrocarbons and heavy metals such as arsenic, lead, mercury. The purpose of the soil sampling and analysis was to give a general classification and bearing capacity of subsoils and for future monitoring of project impacts during construction, operational and possible decommissioning phases.



Figure 1. The Auger Sampler used in collection of sediments at River Kisat Estuary and the MRCC project site (Source: Site visits, June 2024).

2.3.4 Water quality sampling and analysis

The project area lies within the Winam Gulf which receives sediments and pollution loads from the port itself, river systems, and discharges from point and non-point sources. Impacts of water quality degradation and nutrient loading from these sources into Winam Gulf include proliferation of water hyacinth, decline in fish populations and loss of tourism appeal. The consultants in collaboration with Lahvens (K) Limited carried out water quality sampling at 4 No. monitoring stations within the Winam Gulf.

2.3.4.1 Monitoring locations

Water quality monitoring was undertaken in 4No monitoring stations within the Winam Gulf including; Kichinjio landing site (WQMS No.1), River Kisat Estuary (WQMS No. 2), and Coca Cola Bottlers Limited intake (WQMS No.3) and shoreline of the project site (WQMS No. 4) (Figure 2).



Figure 2: The Water Quality Monitoring Stations (WQMS) for the proposed MRCC (WQMS No. 1, 2, 3 &4)
(Source: Google Earth, June 2024)

2.3.4.2 Monitoring parameters

A total of three (3) water samples were obtained which were then analyzed for physio-chemical parameters. The test parameters included temperature, turbidity, Dissolved Oxygen (DO), electrical conductivity, pH, Total Dissolved Solids (TDS), Salinity, Oxidation Reduction Potential (ORP) and specific gravity.

2.3.5 Biological communities monitoring

The Winam Gulf within which the project area is located has important marine and terrestrial biodiversity. Within the Lake, floral communities include floating macrophytes (hyacinth, hippo grass and papyrus) while the faunal communities include fish, mammals, birds, reptiles, amphibians and insects. Port activities have the potential to impact on these biological communities. Biological monitoring on the impact of the port operations on aquatic environment was assessed by sampling and analyzing fish and macro-invertebrates data from 4No. stations. resources. The monitoring stations coincided with the water quality monitoring stations.

2.3.5.1 Monitoring locations

Biological monitoring was undertaken in 4No monitoring stations within the Winam Gulf including Kichinjio landing site BMS No.1, River Kisat Estuary BMS No. 2, Coca Cola Bottlers Limited intake BMS No.3 and the project site shoreline (Figure 3).



Figure 3: The Biological Monitoring Stations (BMS) for the proposed MRCC (BMS No.1, 2,3 & 4) (Source: Google Earth, June 2024)

2.3.5.2 Biological monitoring parameters

The focus of the biological monitoring at the 4No. stations was two key biodiversity within the Winam Gulf. These are;

1. Fisheries
2. Macro-invertebrates

2.3.5.3 Fisheries

Fisheries biological sampling was conducted following LVFO Standard Operating Procedures for Gillnet (LVFO 2005a) and LVFO Standard Operating Procedures for collecting and monitoring Biological and Ecological information of the fishes (LVFO 2005b). Monofilament nets were used for the biodiversity assessment; these were set between 8.00AM-12.00PM. The monofilament set had three fleets each having five monofilament nets/panel. Each panel was 30m long of different mesh sizes from 0.5-3.0". Two fleets were set parallel to the shoreline, 100 m apart while one fleet was set perpendicular to the shoreline: This was to cater for depth-profile segregation reported in the species. The nets were allowed to soak in the water for two hours and the time of lifting recorded. Individual fleets staggered allowing for processing of fleet one while the second fleet was soaking. Fish larval survey was carried out using a purse seine net (3mm mosquito seine) at each of the sampling sites. A total number of six stations were assessed for fisheries diversity.

2.3.5.4 Macro-invertebrates

During field sampling, Macro invertebrates in sediment samples were collected using an Ekman grab tool. In each station, triplicate samples were collected and analyzed separately. The samples

were washed with sieve of 500 μ m, sorted live in a white tray, and then preserved in 70% ethanol. In the laboratory, sample were observed, sorted, and counted under dissecting microscope and identified to Genus level with the aid of different keys (Merritt & Cummins, 2006; Gerber & Gabriel, 2002; Samways, 2008; and [http://extension.usu.edu/water quality](http://extension.usu.edu/water%20quality)). Macro invertebrate community structure and functional composition was described in terms of number of genera per station, relative abundance, numerical abundance, evenness, dominance, diversity, species richness, and functional feeding guilds of all taxa. The ratios of the various FFGs were calculated based on numerical abundance. Using One-way Analysis of Variance (ANOVA), descriptive statistics values were assessed from the data obtained from various sampling stations. Biotic indices were used to characterize the sites based on their status.

2.4 Stakeholder engagement

Prior to commencement of the EIA process, the consultants conducted a stakeholder mapping and analysis to determine the individual, groups and institutions that will be affected by and have an interest in the project (Figure 4). The consultants then prepared a comprehensive list of all the stakeholders in consultation with the proponent and categorized them based on interest and influence (Table 2).

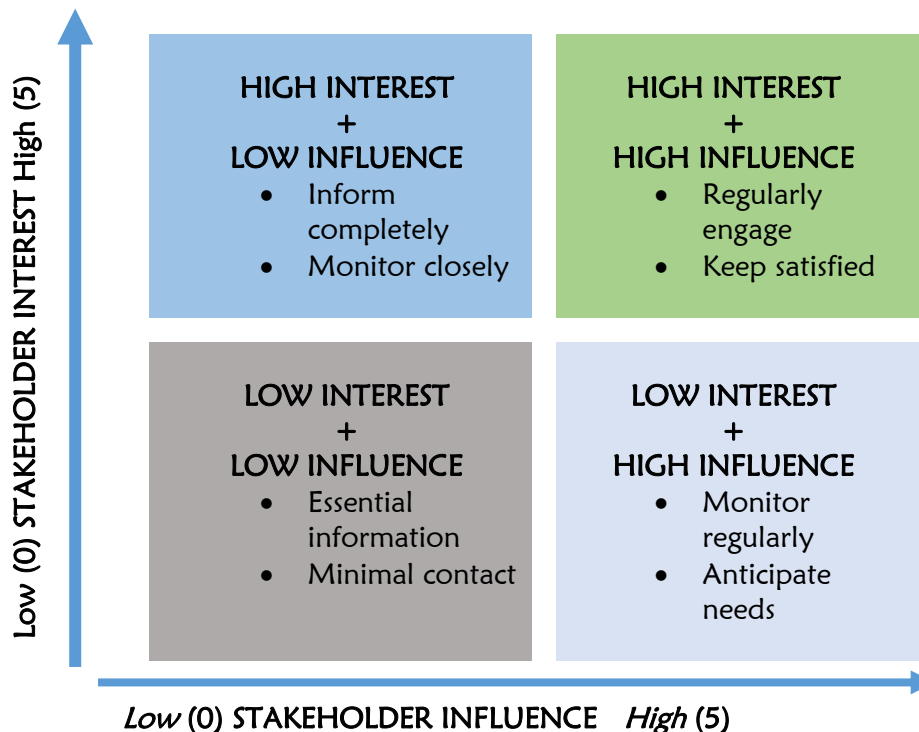


Figure 4: Stakeholder mapping considerations based on interest and influence in the proposed project

Table 2: Key stakeholder groups engaged in the preparation of the ESIA Study Report

Key stakeholder group	Stakeholders engaged
National Government Agencies	• Kenya Maritime Authority • Kenya Ports Authority • Kenya Railways Corporation • Kenya Shipyard Limited • Kenya Marine and Fisheries Research Institute • State Department for Blue Economy and Fisheries • Kenya Fisheries Service

Key stakeholder group	Stakeholders engaged
	• Water Resources Authority • Kenya Coast Guard Services • Kenya Wildlife Service • Ministry of Interior and National Administration • National Environment Management Authority • Directorate of Occupational Safety and Health Services • Communications Authority of Kenya • Kenya Civil Aviation Authority • Kenya Power and Lighting Company • Department of Immigration Services
County Government	• County Government of Kisumu
Beach Management Units (BMUs)	• Kichinjio Beach Management Unit
East African Community (EAC)	• Lake Victoria Basin Commission
Community Based Organisations (CBOs)	• Self Help Groups • Women Groups • Youth Groups
Non-Governmental Organisations (NGOs)	• Local NGOs i.e., Osienala (Friends of the Lake), Lake Sea Network International (LASANI), East African Inland Waters Environmental Concern and Lake Victoria Wetlands Team
Special Interest Groups	• People with Disabilities
Private Sector and other neighbours	• Commercial developers and neighbouring residents

Following stakeholder mapping and analysis, four (4) stakeholder consultation meetings i.e., Two (2) kick off meetings to sensitize stakeholders on the proposed project, a second meeting to review draft ESIA Study Report and third meeting to validate the ESIA Study Report which were held on 16th April 2024, 19th June 2024, 21st June 2024 and 25th June 2024 respectively. The views, comments and information gathered from the stakeholders was incorporated into the ESIA Study Report.

3 POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORKS

3.1 Policy framework

3.1.1 National Environment Policy, 2013

Kenya has a National Environment Policy prepared and approved in 2013 by the Ministry of Environment, Water and Natural Resources. Its overall goal is to provide better quality of life in Kenya for present and future generations through sustainable management and use of freshwater resources and wetlands. This policy elaborates the use of environmentally- friendly development strategy that integrates and promotes cohesion of development and environmental policies and enhances transfer of environmentally sound technologies. Chapter 5 of the policy elaborates on environmental stewardship and specifically part 5.6 states that environment impacts of infrastructural development like ports are distinct and unique such as effects on flora and fauna, social and psychological disruption and vegetation clearance among others. Chapter 6 of the policy elaborates on environmental quality and health and the need to ensure a clean and healthy environment for all.

The relevant policy statements for the proposed project include 1) Develop and implement integrated freshwater and wetland resources management strategies and action plans, 2). Promote and institutionalize payment for environmental services schemes to support catchment protection and conservation, 3). Promote sustainable use of freshwater and wetland resources and the conservation of river and lake ecosystems through development and implementation of river basin management plans, and 4). Involve and empower communities in the management of fresh water and wetland ecosystems.

3.1.2 Kenya Vision 2030

Chapter 5 of the Vision 2030 blueprint focuses on water, environment and urbanization amongst other sectors which the project will impact during construction and operational phases and hence the need to develop and implement mitigation measures for sustainable development.

3.1.3 National Climate Change Framework Policy, 2016

The policy outlines Kenya's commitment to mitigating greenhouse gas emissions, adapting to climate change impacts, and promoting sustainable development practices. It emphasizes the importance of integrating climate change considerations into various sectors, such as agriculture, energy, water resources, and infrastructure. The key objectives of the policy include 1) reducing greenhouse gas emissions through measures such as promoting renewable energy sources, improving energy efficiency, and enhancing carbon sequestration through reforestation and sustainable land management practices and 2) Building resilience to climate change impacts by implementing strategies to manage risks associated with changing weather patterns, sea-level rise, and extreme weather events.

3.1.4 Kisumu County Integrated Development Plan 2023-2027

The overall aim of the County Integrated Development Plan (CIDP) is to increase and expand sustainable development opportunities and build people's capacities to enable them create wealth and transform their lives for growth and prosperity in line with the Kenya's Vision 2030 and the Sustainable Development Goals.

3.2 Regional policy framework

There are various regional legal and policy Instruments governing maritime transport sector in Lake Victoria basin (Table 3);

Table 3: Some of the Regional policy frameworks on maritime safety and security

Regional framework	Provisions
Lake Victoria Transport Act, 2007	This Act makes provisions for regulation of maritime safety and security of vessels operation in Lake Victoria Basin.
Africa Maritime Transport Charter, 2010	It provides framework for cooperation and implementation of maritime conventions and regulations in areas of safety, security and investments.
East Africa Community Customs Management Act, 2004, (EACCOMA)	Provides a framework for the management/administration of customs and related matters;

3.3 Multilateral Environmental Agreements

Kenya is a signatory to several international conventions, protocols and treaties which are binding pursuant to the Constitution of Kenya, 2010 (Table 4).

Table 4: Multilateral Environmental Agreements and their relevance to the proposed MRCC

No.	Multilateral Environmental Agreement	Relevance to the proposed MRCC
1.	International Convention for the Prevention of Pollution from Ships (MARPOL), 1973/78	The proponent should comply with the MARPOL 1973/78 Annexes (Annex I – VI) with an objective to minimize pollution of the aquatic environment including dumping of hazardous wastes oil and air pollution
2.	Convention on the International Maritime Satellite Organization, 1976	Provides standards of satellite communications for shipping specifically those used in the Global Maritime Distress and Safety System (GMDSS)
3.	International Convention on Maritime Search and Rescue, 1979	Provides for the establishment of rescue co-ordination centers and sub centers. The proposed project is implemented in line with the convention
4.	Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 1989	Article 4 (Part 2(a, b, c) which states that ‘each party shall take the appropriate measures to: (a) Ensure that the generation of hazardous wastes and other wastes within it is reduced to a minimum, taking into account social, technological and economic aspects; b) Ensure the availability of adequate disposal facilities, for the environmentally sound management of hazardous wastes and other wastes, that shall be located, to the extent possible, within it, whatever the place of their disposal; and (c) Ensure that persons involved in the management of hazardous wastes or other wastes within it take such steps as are necessary to prevent pollution due to hazardous wastes and other wastes arising from such management and, if such pollution occurs, to minimize the consequences thereof for human health and the environment.’
5.	Convention on Biological Biodiversity, 1992	The proponent should identify and monitor port activities likely to have significant adverse impacts on the aquatic environment and provide measures to mitigate them.
6.	United Nations Framework Convention on Climate Change (UNFCCC), 1992	The proponent should take stock of the carbon emissions from the project implementation activities and put in place measures to address them including construction of climate proof transport and energy infrastructure among others.

3.4 Legal framework

3.4.1 Constitution of Kenya, 2010

The Constitution of Kenya 2010 is the supreme law of the land. It lays the foundation on which the wellbeing of Kenya is founded. Chapter IV, article 42 states that ‘every person has the right to a clean and healthy environment and article 69 states that “the state shall; encourage public participation in the management, protection and conservation of the environment. Chapter V, Part 2 elaborates on the obligations of the proponent in respect to protection of the environment and enforcement of environmental rights.

Relevance to the proposed MRCC

- KMA should ensure that the construction and operation of the proposed MRCC does not infringe on the right to a clean and healthy environment for all.
- KMA should ensure project implementation activities are carried out in an ecologically, economically, and socially sustainable manner through a sustained stakeholder engagement process. The stakeholder engagement should build on the foundation set by the ESIA study during the three meetings as well development and implementation of a Grievances Redress Mechanism (GRM).

3.4.2 Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya

EMCA Cap 387 is the framework law that governs the use, management, and regulation of environmental resources in Kenya. The Act provides guidelines and recommendations in carrying out environmental assessment. The Act harmonizes the sector specific legislations touching on the environment in a manner designed to ensure greater protection of the environment in line with the National Environment Policy, 2013. The Regulations to support the implementation of the Act are summarized in Table 5.

Table 5: Regulations under the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya

Regulation	Article	Relevance to MRCC development and compliance requirements
Air Quality Regulations, 2014	EMCA (Section 78-85)	Air quality monitoring should be carried out as part of the Annual Environmental Audits at operational phase
Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	EMCA (Section 101-103)	Undertake quarterly noise level monitoring throughout the project cycle
Wetlands, Riverbanks, Lakeshores, and Seashores Management Regulations, 2009	EMCA (Section 42-43)	KMA should ensure protection and conservation of the riparian area to be reclaimed and the water quality
Water Quality Regulations, 2006	EMCA (Section 71-72)	A bio digester is required to ensure treatment of wastewater to the Standards in Third Schedule of the Regulations before discharge into the environment Once operational, KMA should apply and obtain an Effluent Discharge License from NEMA
Waste Management Regulations, 2006	EMCA (Section 86-107)	KMA should provide adequate waste infrastructure for collection, segregation, and procure services of NEMA Licensed waste

Regulation	Article	Relevance to MRCC development and compliance requirements
		handler for disposal
Biodiversity Regulations, 2006	EMCA (Section 49-52)	KMA should promote and ensure conservation of riparian and aquatic biodiversity.
Impact Assessment and Audit Regulations, 2003	EMCA (Section 58) EMCA (Section 68)	EIA License required prior to construction of the MRCC hence the ESIA study Annual audits will be required from one year after completion of the construction of the MRCC.

3.4.3 Kenya Maritime Authority Act, 2016

This Act established the Kenya Maritime Authority (KMA) in 2004, for the purpose of transferring areas of responsibility over shipping concerns from the Merchant Shipping Department of Kenya Ports Authority to an independent Governmental Authority. Thus, KMA is responsible for Port and Flag State implementation of various international instruments relating to maritime transport, rescue and search. The Acts provide a framework for KMA to implement international maritime conventions, especially those emanating from the International Maritime Organization (IMO) with regards to maritime safety, security and pollution control. 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.

Relevance to the proposed MRCC

- KMA are the primary custodian for attaining international standards in safety and security and the preservation of the maritime environment. The proposed MRCC is therefore meant to fulfill part of the KMA's mandate

3.4.4 Merchant Shipping Act, 2009

This Act makes provision for the registration and licensing of Kenyan ships, to regulate proprietary interests in ships, the training and the terms of engagement of masters and seafarers and matters ancillary thereto; to provide for the safety of navigation, prevention of pollution, maritime security, the liability of ship-owners and others, inquiries and investigations into marine casualties; to make provision for the control, regulation and orderly development of merchant shipping and related services; generally to consolidate the law relating to shipping and for connected purposes.

Relevance to the proposed MRCC

- The proposed project will enhance maritime navigation and safety

3.4.5 Kenya Ports Authority Act, 2014

This Act of Parliament established the Kenya Ports Authority (KPA) with the responsibility to manage all port infrastructure in Kenya. Kenya Ports Authority maintains, operates, improves, and regulates all scheduled ports on the coastline and hinterland of Kenya, including principally Kilindini Harbor at Mombasa, as well as other ports along the Kenyan Coast including Lamu, Malindi, Kilifi, Mtwapa, Kiunga, Shimoni, Funzi, Vanga and the Lake Victoria Basin.

Relevance to the proposed MRCC

- KMA will collaborate with KPA to enhance maritime safety, trade and transport.

3.4.6 Kenya Railway Corporation Act Cap 397 of Laws of Kenya

The Act outlines general principles for the management and maintenance of railway reserves, ensuring that they are kept clear of obstructions and do not interfere with the operation of the railway. It established Kenya Railways Corporation with the mandate to

Relevance to the proposed MRCC

- KMA to liaise with KRC to enhance efficiency and management of their operations during project implementation.

3.4.7 Kenya Coast Guard Service Act, 2018

This Act established Kenya Coast Guard Service with the mandate of protecting the country's waters against dumping of harmful wastes and pollutants, search, and rescue services, and combating illegal activities.

Relevance to the proposed MRCC

- KMA will collaborate with the Kenya Coast Guard Service (KCGS) in promoting maritime safety and combating illegal activities such as pollution.

3.4.8 Occupational Safety and Health Act, 2007

This Act of Parliament was established to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces. Section 19 of the Act provides that an occupier of any premises likely to emit poisonous, harmful, injurious or offensive substances, into the atmosphere shall use the best practicable means to prevent such emissions into the atmosphere and render harmless and inoffensive the substances which may be emitted. Part VII of the Act deals with machinery safety requirements to avoid accidents and injuries at work.

Relevance to the proposed MRCC

- KMA should comply with the provisions of this Act by ensuring a safe and health working environment for its employees.

3.4.9 Work Injury Beneficiary Compensation Act, WIBA, 2007

This is an Act of Parliament to provide compensation to employees for work-related injuries and diseases contracted in the course of their employment and for connected purposes. The Act applies to all employees, including employees employed by the Government, other than the armed forces, in the same way and to the same extent as if the Government were a private employer. It is the duty of all employers to obtain and maintain an insurance policy from an approved insurer in respect of any liability the employer may incur as provided for by the Act. The Act also stipulates that an employee who suffers an accident that leads to disablement or death is subject to the provisions of this Act and is entitled to compensation.

Relevance to the proposed MRCC

- KMA/ Contractor should ensure the safety and health of all workers during the project implementation phase and provide them with appropriate insurance cover.

3.4.10 Physical and Land Use Planning Act, 2019

The 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 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.

Relevance to the proposed MRCC

- KMA to ensure the project designs are approved by the County Government of Kisumu and compliance with the provisions of the Act.

3.4.11 Water Resources Regulations, 2021

This Act was established to implement the provision of the Water Act 2016 concerning networks, facilities, equipment and assets. Section 18 (30) allows Water Resource Authority to demand from any person or institution, documents, samples or materials on water resources.

Relevance to the proposed MRCC

- KMA should obtain permit from WRA to reclaim and develop the riparian area adjacent to the project site
- KMA should prevent pollution of Lake Victoria by providing effective waste management infrastructure

3.4.12 Sustainable Waste Management Act, 2022

The Act establishes the legal and institutional framework for the sustainable management of waste and ensures the realization of the constitutional provision of the right to clean and health environment. Section 12 of the Act requires all public and private sector entities to segregate non-hazardous waste into organic and non-organic fractions, ensure segregated waste are placed in a properly labelled and color-coded waste receptacle bins and waste service providers to collect handle and transport the segregated waste to the disposal facility provided by county government.

Relevance to the proposed MRCC

- KMA should ensure waste is collected by NEMA licensed personnel, adequate waste coded bins provided and comply with the provisions of the Act.

3.4.13 Fisheries Management and Development Act, Cap 378 of Laws of Kenya

The Act provides the framework for the development, management, exploitation, utilization and conservation of fisheries and for connected purposes. Article 49 (1) and 50 (1) of the subsidiary Regulation fisheries conservation, management and development has provisions for the prevention of pollution and protection of fish breeding areas. The overall objective of this Act is to protect, manage, use and develop the aquatic resources in a manner which is consistent with ecologically sustainable development, to uplift the living standards of the fishing communities and to introduce fishing to traditionally non-fishing communities and to enhance food security. As part of the implementation of the Act and improve community participation in the conservation and management of fisheries, the Kenya Government gazetted the Beach Management Units (BMUs) Regulations in 2007.

Relevance to the proposed MRCC

- The project site is located on the shores of Lake Victoria, which supports a thriving artisanal fishery and local livelihoods. The proponent will implement measures to prevent pollution of

the lake by both solid wastes and effluent generated by construction and operation activities which would degrade water quality and affect fisheries productivity.

3.4.14 Wildlife Conservation and Management Act, 2013

It is an Act of Parliament to provide for the protection, conservation, sustainable use and management of wildlife in Kenya and for connected purposes. It designates protected areas, lists and provides for the protection of endangered, vulnerable and protected species as well as invasive species. It is critical in the study of biodiversity as it is the most comprehensive database alongside the IUCN red list of endangered species.

Relevance to the proposed MRCC

There is potential of human-wildlife conflicts during the development and subsequent operation of the MRCC. In this regard, the proponent should comply with Part IX (Human-Wildlife Conflict), Section 77 of the Act which makes the following provisions;

1. Any authorized officer of the Service may, with the consent of the owner or occupier in respect of private land, where it is necessary for the purpose, go onto any land to destroy any animal which, has been deemed a problem animal: Provided that where the animal is a dangerous animal, which has been previously wounded or otherwise injured so as to make it a potential source of danger to human life, the officer may follow such animal with the intention of killing it on any land notwithstanding that the prior consent of the owner or occupier of the land has not been obtained. The Service 'shall under such circumstances provide the owner or occupier a subsequent report of what occurred.
2. Notwithstanding anything to the contrary in this Act, the owner or occupier of land, or any agent of such owner or occupier may, subject to the provisions of this Act, destroy any animal which has been deemed a problem animal: Provided that nothing in this section shall authorize the killing of a problem animal in a protected area, or the use of any poison, pitfall or snare for the killing of any such animal.
3. Any person who kills an animal in the circumstances set out in subsection (1) shall, as soon as possible, and in any case not later than forty-eight hours after the event, report the circumstances of such killing and deliver the trophies of such animal, to the nearest wildlife office or police station.

3.4.15 Science, Technology and Innovation Act No. 28 of 2013

KMFRI was established under this Act with the mandate to undertake research in "marine and freshwater fisheries, aquaculture, environmental and ecological studies, and marine research including chemical and physical oceanography", in order to provide scientific data and information for sustainable development of the Blue Economy.

Relevance to the proposed MRCC

- KMA should liaise with KMFRI in scientific research, water quality monitoring, implementation of the Early Warning System on Water Hyacinth and fisheries monitoring in the project area during both construction and operational phases

3.4.16 Kenya Communications (Amendment) Act, 2008

The Act established Communications Authority of Kenya (CA) to manage communications sector in Kenya. The Authority is responsible for facilitating the development of the information and communications sectors including; broadcasting, cybersecurity, multimedia, telecommunications, electronic commerce, postal and courier services.

Relevance to the proposed MRCC

- KMA to liaise with CAK to ensure efficient communication during operational phase of the MRCC

3.4.17 Civil Aviation (Amendment) Act, 2016

This Act empowers the Kenya Civil Aviation Authority (KCAA) to oversee and manage various aspects of civil aviation including safety, security, air navigation services, and economic regulation. maritime affairs. The Act establishes a framework for the coordination of maritime rescue operations, ensuring effective communication and collaboration between various agencies involved in maritime safety. Additionally, the Act sets standards for training, safety management, and operational procedures to enhance the effectiveness of search and rescue missions within Kenyan waters.

Relevance to the proposed MRCC

- KMA will liaise with KCAA for installation of communication infrastructure and enhance operations of MRCC.

3.4.18 Public Roads and Roads of Access Act Cap 399

This Act states that a public road is any road which the public has a right to use immediately before the commencement of this Act, or all proclaimed or reserved roads and thoroughfares being or existing on any land sold or leased or otherwise held under the East Africa Land Regulations, 1897, the Crown Lands Ordinance, 1902, or the Government Lands Act at any time before the commencement of this Act and all roads and thoroughfares hereafter reserved for public use.

Relevance to the proposed MRCC

- The proponent will liaise with County Government of Kisumu and stakeholders for efficient coexistence of MRCC project activities and other proposed developments.

3.4.19 Energy Act, 2019

It's the Act of Parliament to consolidate the laws relating to the production, supply and use of energy and for connected purposes. Section 100 of the Act states the need and expression of an entity to conserve and protect the environment and natural resources in accordance to the Environmental and Coordination Act Cap 387 of Laws of Kenya.

Relevance to the proposed MRCC

- KMA should apply for energy supply from KPLC and monitor its consumption to inform measures for energy conservation.

3.4.20 Climate Change Act, 2023

This Act implements provisions of the Climate Change Act, 2023, providing for the regulation of the carbon markets besides enhancing response to climate change. It provides for mainstreaming climate change responses into development planning, decision making and implementation as well as resilience and adaptation in all governance sectors.

Relevance to the proposed MRCC

- KMA should monitor the proposed facility's carbon footprints and adopt efficient and renewable energy sources to power the development.

3.4.21 Public Health Act, 2012.

The Act aims to prohibit activities that may be injurious to the general public. It outlines the responsibilities for the County Government to maintain a safe and clean environment by controlling the operation activities of any facility.

Relevance to the proposed MRCC

- KMA should ensure safe and clean environment for workers and neighbors

3.4.22 County Government Act, 2012

To ensure implementation of the provisions of the Kenya Constitution, the County Governments are granted the power to make by-laws in respect of all such matters as are necessary or desirable for the maintenance of health, safety and well-being of the general public.

Relevance to the proposed MRCC

- KMA should comply with Act

3.5 Institutional framework

Several institutions have been established to implement the policy and legal frameworks discussed above. For the proposed project, the institutions to be involved will include but not limited to KMA, NEMA, KPA, KCGS, DOSHS and County Government of Kisumu among others (Table 6).

Table 6: Institutions and their legal mandate as it applies to the Maritime Rescue Center

Institution	Legislative mandate (To implement the provisions of relevant Acts)
Kenya Maritime Authority	KMA Act and Merchant Shipping Act, 2014
Kenya Ports Authority	KPA Act, 2014
Kenya Railways Corporation	Kenya Railways Corporation Act Cap 397 of Laws of Kenya
National Environment Management Authority	Environmental Management and Coordination Act, Cap 387 of Laws of Kenya and Associated Regulations
Kenya Coast Guard Service	Kenya Coast Guard Service Act, 2018
Kenya Fisheries Service	Fisheries Management and Development Act Cap 378 of Laws of Kenya
Kenya Wildlife Service	Wildlife Conservation and Management Act, 2013
Water Resources Authority	Water Resources Regulations, 2021
Department of Public Health	Public Health Act, 2012
Directorate of Occupational Safety and Health Services	Occupational Safety and Health Act, 2007 alongside the subsidiary legislation
Communications Authority of Kenya	Kenya Information (Amendment Act), 2008
Kenya Civil Aviation Authority	Civil Aviation (Amendment) Act, 2015
County Government of Kisumu	County Government Act, 2012, its by-laws and the Physical Planning and Land Use Planning Act, 2019
Civil society e.g. BMUs and conservation organization e.g. OSIENALA, LASENI etc.	Non-state, not for profit voluntary entities who play a various role in the implementation of a project including advocacy, conservation, safeguarding the environment and funding among others.

4 PROJECT DESCRIPTION

4.1 Project location

The proposed MRCC will be located within Kisumu Port area covering a total of 0.7 acres at Latitude $0^{\circ}05'48.32''S$ and Longitude $34^{\circ}44'57.31''E$ (Figure 5 & 6). The site is adjacent to the proposed KPA passengers' terminus and neighborhood include Devki Steel Limited-Kisumu, Mega properties/Shiloah Investment group, CMC Motors-Kisumu, Nissan Kisumu, Swan Centre and Lake Victoria shoreline.

It should be noted that KMA has already obtained approvals from Kenya Ports Authority (KPA) to utilize Block 7 of Kisumu Port for development of the project (Annexure 5).

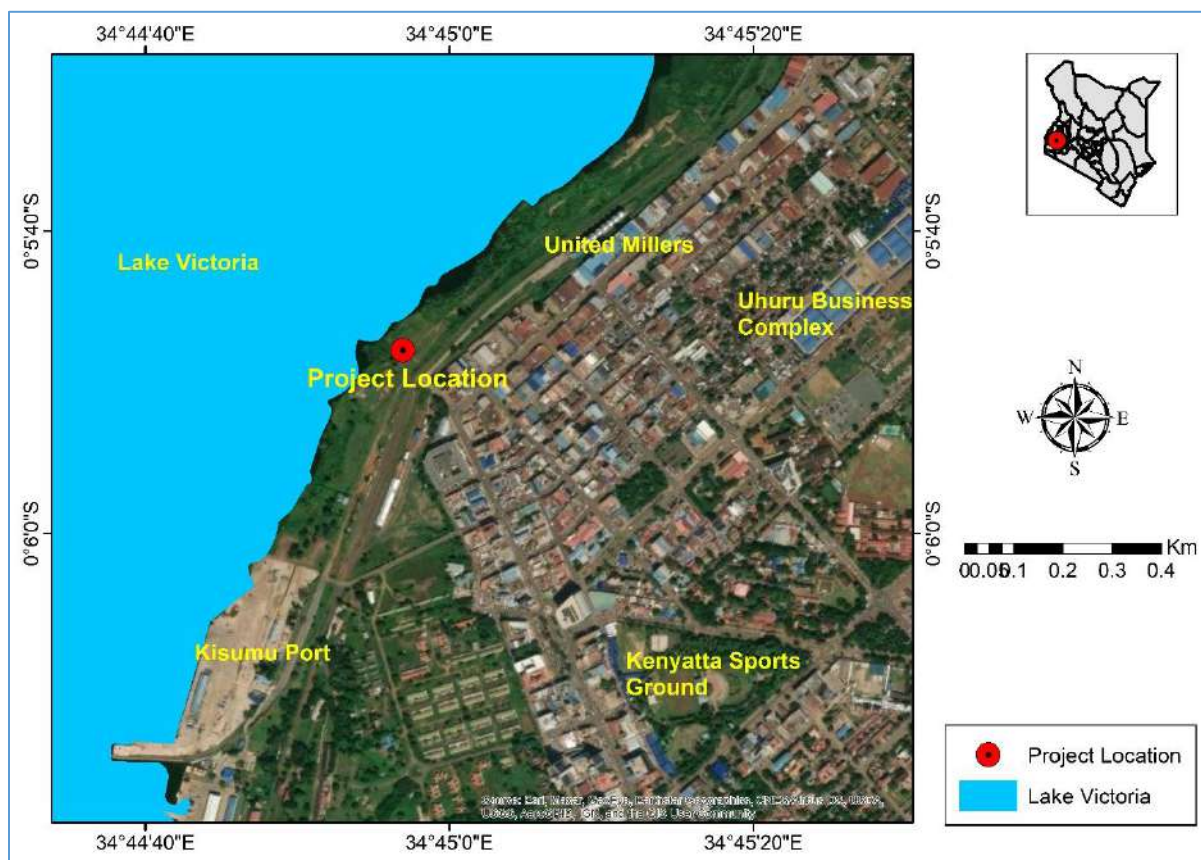


Figure 5: Location of the project site (Source: ESRI Base Map, June 2024)



Figure 6: Location of the proposed site in Kisumu Port (Source: ARPRIM Consultants, June 2024)

4.2 Project design

The proposed project will involve construction, operation and possible decommissioning of a Maritime Rescue Coordination Center and auxiliary facilities. Based on the preliminary designs, the project will be implemented in two phases i.e., phase 1 will involve construction of MRCC building, ambulance bay, shared parking area with capacity of 70 cars, staff parking area and gatehouse. Phase 2 will involve reclamation of the riparian area by constructing a 20m long jetty, boat spillway. These auxiliary facilities will include a services building, staff parking area, shared parking lot with a capacity for 70 vehicles and a gatehouse. (Figure 7).

Tentatively (as per the current designs) the proposed building will comprise of a ground floor, four floors, a rooftop area and a roof slab (Table 7). It should be noted that the design at this stage is preliminary and the scope might be varied depending on consultation between various government agencies, the project consultant and the output of EIA process.

Table 7: Description of proposed MRCC building components (Source: Aprim Consultants, June 2024)

Floor level	Description of project components
Ground floor	(3) Training Rooms, First aid room, crew-mending store and reception
First	(3) Training Rooms, Training Room/Media Briefing Room, Executive lounge/waiting room, Lift, Main lobby and washrooms
Second	(3) Trainings rooms, office space, executive office room, lift, main lobby and washrooms
Third	Weather room, radio repair workshop, (2) Office spaces and executive office room, lift, main lobby and washrooms
Fourth	Operations Center Security, Syndicate Room, Operations Center Supervisory, Regional manager's office, Assistant manager's office, lift, main lobby and washrooms
Roof terrace	Indoor and Outdoor restaurant seating, kitchen, solar battery room, solar panels
Roof slab	Water tank and solar panels



Figure 7: The proposed MRCC site layout plan (Source: Aprim Consultants, June 2024)

4.3 Description of project activities

4.3.1 Construction phase

The scope of the project during construction phase includes building works (i.e. architectural, structural & external works), civil works, marine works, mechanical works and electrical works (Table 8).

Table 8: Description of proposed construction works (Source: KMA, 2024)

Scope of works	Description
Building works	These will include construction of the main building (four floor levels), generator house, a gate and gate house.
Civil works	These will involve construction of the access road, parking, walkways, storm water drainage, foul drainage, retaining wall and external works around the building.
Marine works	These will include construction of jetty facility, retaining wall and boat spillway.
Mechanical works	These will involve fittings for water storage & reticulation, rainwater draining, plumbing, sanitary and drainage, air conditioning, fire protection (i.e. horse reels, portable fire extinguishers and dry riser), kitchen LPG and solar water heating system.
Electrical works	These will include installations of electrical, data and voice, audio visual, security, lift, solar and generator works. For electrical, there will be light fittings (i.e., LEDs, Sensors and solar lights), fire alarm system, power reticulation, television and lightning arrestors. Security works includes

Scope of works	Description
	CCTV, access control, voice evacuation system, traffic arm/ boom barrier among others. 100kW monocrystalline solar panels will also be installed.

Site preparatory works will involve excavation, transportation of construction materials and levelling of railway line along the access road. The contractor will excavate, spread, and level soil in low areas and depressions and backfill with hardcore. In addition, the excavated materials will be carefully selected for reuse in landscaping works and the rest will be disposed of. The excavation will involve the use of heavy machinery and equipment as well as human labor where necessary which will create employment for the locals, especially the youth.

Building materials will be stored on site. Bulky materials such as stones, ballast, sand and steel will be carefully piled at designated areas on site. To avoid piling large quantities of materials on site, the proponent should order bulky materials such as sand, gravel and stones in quotas as dictated by the contractor's pace.

Utilities to service the development will include power supply, drainage systems and access roads. The facility will be connected to the Kenya Power Limited Company electricity main line which will be used in all phases of the project. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to. The project site is located on low level ground with depressions thus prone to flooding during heavy rain seasons. Application of soil erosion control measures such as leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil. Manholes will be provided within the roads to provide suitable access in accordance with the design codes. In select areas a dedicated manhole and storm water drainage connections will be provided. The project activities will include use of structural steel for stability, Installation of pipe works to create a drainage channel and water distribution networks for use throughout the project cycle. To ensure the protection of rail transit, motorists, pedestrians and cyclists, the proponent will employ Traffic marshals to ensure the proposed construction activities do not bring traffic snarl ups along C. Obote Road.

4.3.2 Operational phase

At the operational phase, project activities will include coordination and communication on rescue operations and maritime safety, medical care, resource allocation for SAR, data management, monitoring, and general maintenance of the MRCC.

- **Coordination and communication**

These will include receipt of distress call from vessels, aircraft and other maritime entities in distress, evaluation of nature and severity of distress, maintenance of communication with other key stakeholders in SAR operations and declaration of SAR close-out.

- **Medical care**

These will include arrangement of medical assistance for injured or ill individuals, ensuring safety and health of SAR personnel, guidance on safety procedures and emergency protocol

- **Resource allocation for SAR**

This will include coordination of SAR operations by organizing rescues assets such as ships, aircrafts, jetties and personnel.

- **Data management**

This will involve keeping record of all SAR incidents and analyze to identify trends as well as provide recommendations to enhance preparedness and response procedures.

- **Monitoring**

This will include carrying out debriefing and post-incident evaluations to assess the effectiveness of response efforts and continuous training of SAR personnel.

- **General repair and maintenance of the facility**

The proposed MRCC and associated facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repair and maintenance of electrical gadgets, painting, and replacement of worn-out materials among others.

Other activities will include energy and water monitoring, wastewater and solid waste management.

4.4 Project budget

The project budget is a tentative of Kenyan Shilling Six Hundred Million Only (KES 600,000,000). The statutory charge of 0.1% payable to NEMA is therefore KES 600,000. The payment was made on the e-citizen platform after receipt of an invoice from NEMA.

5 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

Baseline conditions of the project site were assessed and documented using both primary and secondary data sources. This section details the findings of the baseline survey which will form a basis for impact monitoring plans and improvement of the environmental and social performance during the entire project cycle.

5.1 Bio-physical environment

5.1.1 Climate

The proposed project is within the shores of Lake Victoria in Kisumu County which experiences generally warm and humid climate. The county has bimodal rainfall pattern where long rains are experienced from March to June and the short rains from October to December (Figure 8). During these periods, the lake and its surrounding regions receive significant rainfall, contributing to the lake's overall water balance. Temperatures range from an average high of 25°C to an average low of 22°C. The hottest months are between December to March with relatively cooler temperatures experienced during the two rainfall seasons.

Impacts of climate change have led to increased rainfall within the lake region leading to increased runoff and subsequent lake water level rise. Consequently, riparian areas have been inundated causing displacement of people, changes in water quality, damage to settlements, farmlands and infrastructure along the lake shoreline.

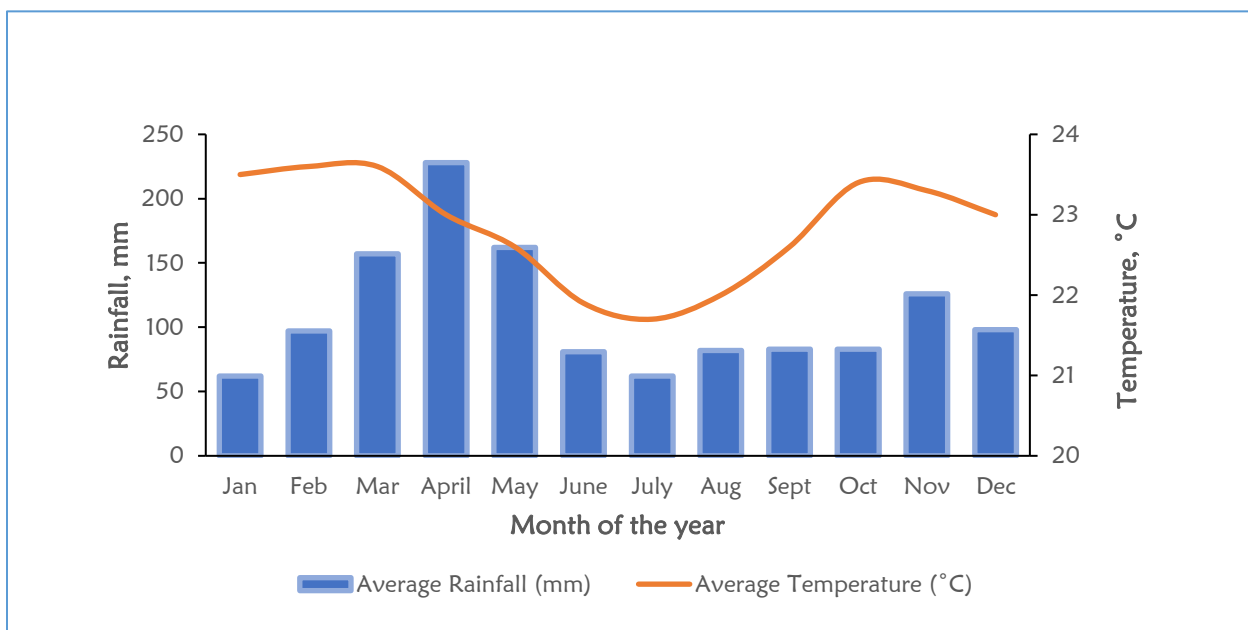


Figure 8: Average rainfall and temperature distribution in Kisumu County (Source: World Weather Online accessed in 2024)

5.1.2 Hydrology

Lake Victoria receives a substantial amount of its water from direct rainfall which averages 115mm per year. Approximately 80% of the water input to the lake comes from precipitation falling directly onto its surface, with the remaining 20% primarily contributed by inflowing rivers. There are ten (10) main rivers draining into Lake Victoria that originate from the surrounding highlands discharging water into the lake. These include; Rivers Nzoia, Gucha-Migori, Sondu, Yala, Nyando

and Sio. Streams draining into the lake are; Awach Seme, Awach Kibos, Awach Kano and Awach Tende and Awach Kibuon.

During reconnaissance survey, the rivers around the project area include River Kisat located about 1.5 km to the north of the port and River Wigwa located about 2.6km to the south. Both river systems drain into Lake Victoria and have wetland estuaries with rich biodiversity.

5.1.3 Geology and Soils

The soil types within the port area are dominated by Vertsols, Cambisols, and Gleysols. Vertsols (black cotton soils/ clayey soil) found on the low-lying areas of poor drainage and in non-paved areas. Nitisols (well drained loam soil) were observed transported and spread on lower side where a seasonal stream flows. The Gleysols were observed within the swampy areas along the shoreline.

5.1.4 Bathymetry of the Lake Victoria (Winam Gulf)

Bathymetric data for Winam Gulf was obtained from the study undertaken by Hamilton S.E., 2017 to characterize the Lake depth levels. The lake depth levels within the project area ranges between 0.84m to 74.47m. (Figure 9).

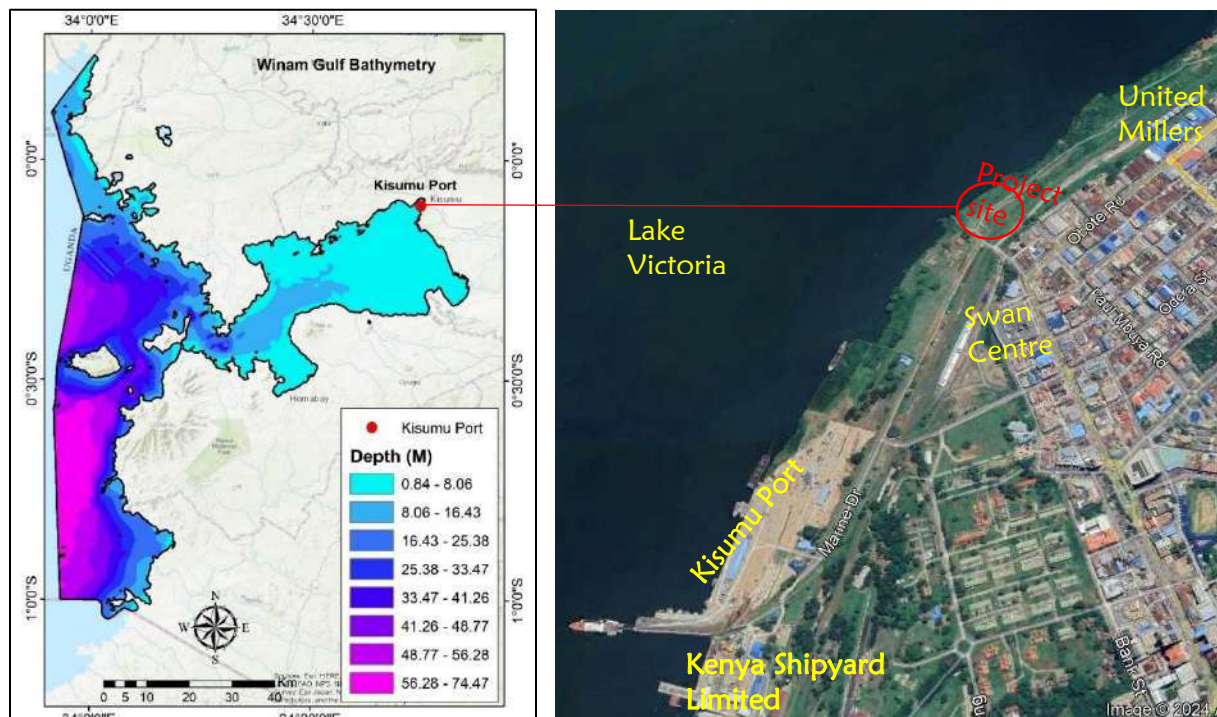


Figure 9: Winam Gulf Bathymetry (Source: Hamilton S.E., 2023)

5.2 Biological environment

5.2.1 Fauna

The survey did not record wildlife sightings or species of conservation value except for bird species such as the papyrus gonolek, swamp flycatcher, northern brown-throated weaver, morning collared dove, golden-backed weaver and the African sacred. Most of the birds have established their nest along the shoreline within the papyrus reeds. During interviews with the locals it was noted that snakes and mammals such as hippopotamuses are sited within the project area although this was not sighted during site visit.

5.2.2 Terrestrial vegetation cover

The terrestrial vegetation covers at the project site include 1No. mature tree and grass/sedge, particularly *Fimbristylis* (Figure 10).



Figure 10: Vegetation cover at the project site (Source: Site visit, June 2024)

5.2.3 Aquatic macrophytes

Aquatic macrophytes such as papyrus reeds, water hyacinth and hippo grass form part of the biodiversity within the riparian area of the project area (Figure 11). Among the key impacts of aquatic macrophytes are hindering navigation, blockage of water supply systems, water quality degradation as well as effects on local community livelihoods who depend on fishing and tourism activities.



Figure 11: Hippo grass, water hyacinth and papyrus reeds at the project site shoreline (Site visit June 2024)

A study carried out in 2023 depicted that aquatic macrophytes infestations have exhibited a cyclic pattern of proliferation and variations in spatial extent for the last 10 years (2013-2023). In analysis of the trends, three epochs were observed i.e., the first epoch occurred between 2013-2015 whereas the second between 2015-2019 while the third epoch occurred between 2019-2023 (Figure 12). The first two epochs indicate a highly fluctuating trend in terms of area extent and spatial position within the Winam Gulf while the third epoch depicts a continuous downward trend attributed to improved water quality following the opening of Mbita Causeway. The opening of the causeway

allowed the influx and tidal flushing of the Winam Gulf which could be enhanced by further similar interventions.

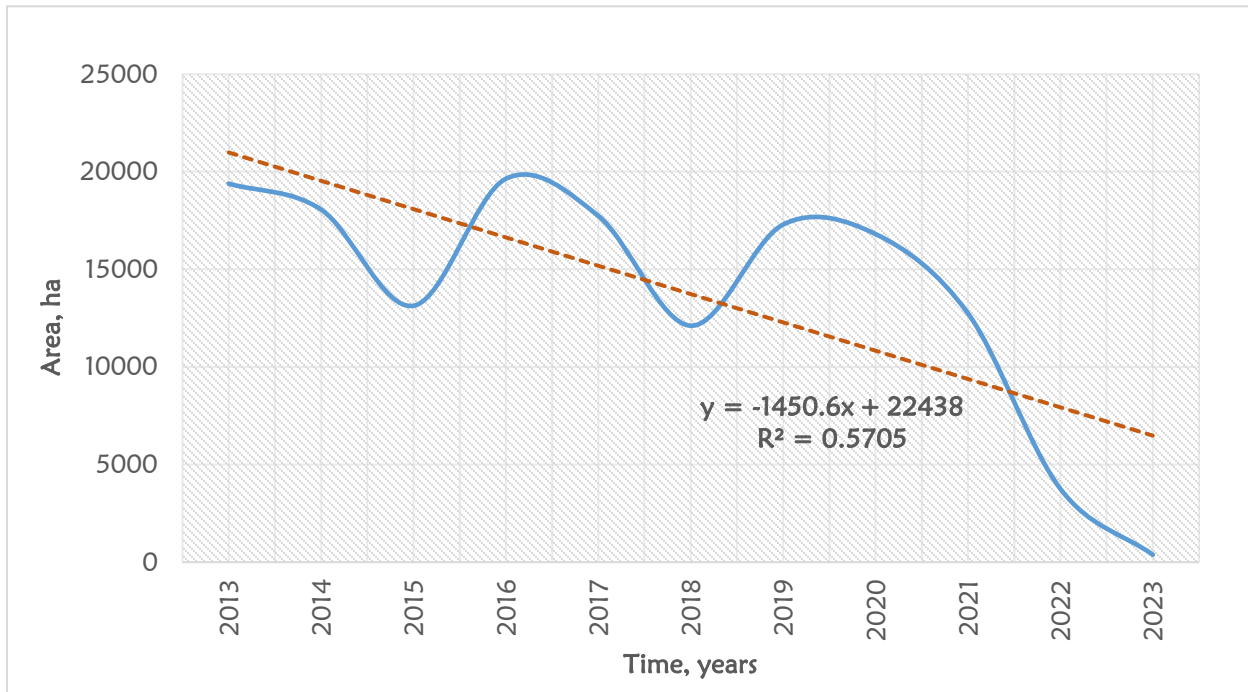


Figure 12: Aquatic macrophytes trends in the Winam Gulf of Lake Victoria between 2013 and 2023 (Source: Landsat 8 OLI/TIRS 2013-2023, Envasses/TMA/KPA, 2023)

To address the risks posed by the macrophytes to port installations Trade Mark Africa (TMA) on behalf of KPA designed and developed an Early Warning System (EWS) which is an integrated system featuring three models based on water quality, satellite imagery and citizen science to inform timely interventions (Figure 13).

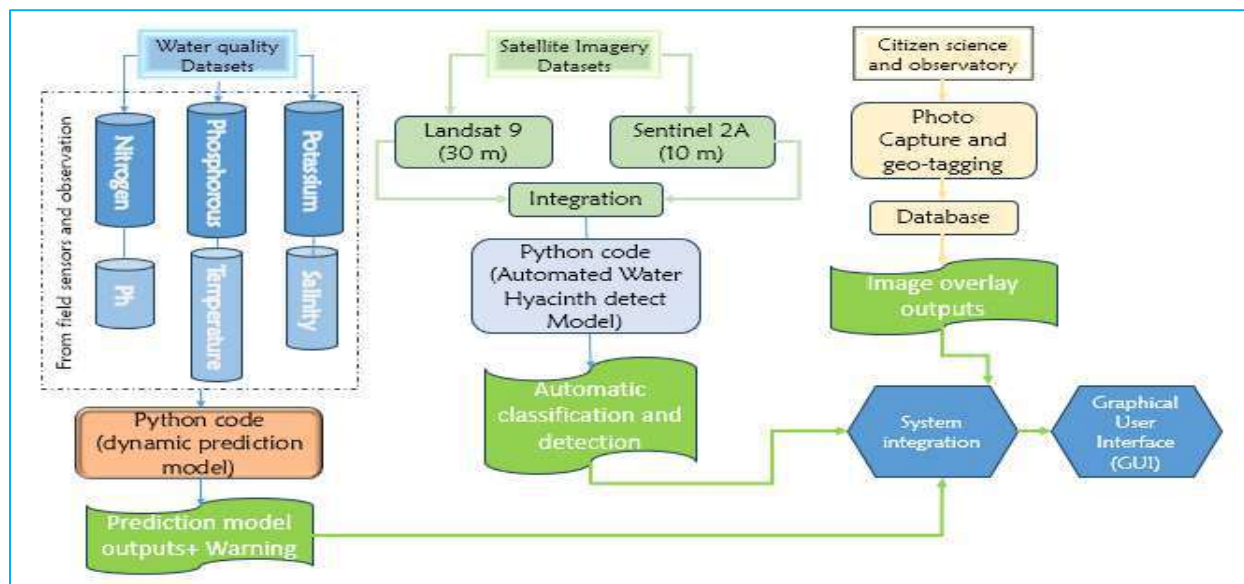


Figure 13: The design of the Early Warning System for the proliferation and infestation of aquatic macrophytes in Lake Victoria (Source: Envasses/TMA/KPA, 2023).

5.2.4 Fish diversity and relative abundance

Biological survey within Kisumu Bay indicated higher fish species diversity with over ten different species including *Lates niloticus*, *Rastrineobola argentea*, *Syndontis victoriae*, *Brycinus sadleri*, *Haplochromis sp.*, *Labeo victorianus*, *Schilbe mystus*, *Clarias gariepinus* and *Oreochromis niloticus* (tilapia); with three rare species: *Ctenophoma murei*, *Entomius aploerogramma* and *Entomomus profundus*. The most dominant fish species within the bay are *L. niloticus* (Nile perch) followed by *S. victoriae* (Okoko), *R. argentea* (Dagaa/Omena) and *haplochromis sp* while the rest accounted for less than 5% of the total catch.

There was a high abundance of juvenile *L. niloticus* and *R. argentea* larvae within the bay (Figure 14) indicating the importance of the bay as a breeding area. This area is fringed with macrophytes which are critical for fish breeding by providing refugia and a suitable substrate.

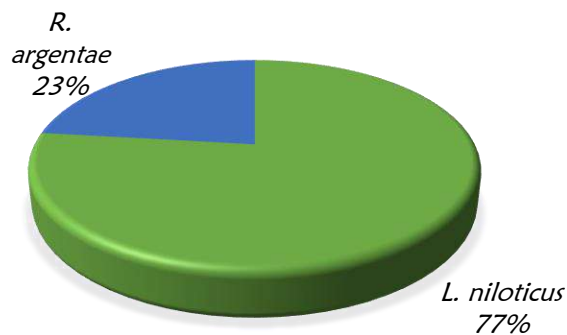


Figure 14. Fish larval diversity and abundance within Kisumu Bay

5.2.5 Aquatic macro invertebrates

Macroinvertebrates dominance within the bay were Order Hemiptera (dominated by the family corixidae (537) at the shoreline while the Order Haptotaxida of the family tubifidae were highest in number (32) at the bottom (i.e., benthic). Taxa richness was high in Kisumu Bay (18) though it's generally associated with good water quality, low taxa richness does not necessarily indicate poor water quality, nor does high richness always indicate good water quality. In some cases, intermediate or low levels of disturbance can cause an increase in taxa richness (Townsend et al. 1997). This could be obtained either through physical mechanisms (i.e., increased heterogeneity of substrate niches), biological interactions, that is, addition of invasive or pioneering species without loss of native species, or increased nutrients and energy (Richard A. Lillie, et al. 2003).

Diversity richness was high in Kisumu Bay (0.747) with Corixidae dominating (571) counts followed by Paleomonidae (27). Shredders in Kisumu Bay (0.45), deposit collectors (7.38), predators (91.15), scrapers (0.45), deposit filters (7.38). All variations were measured in percentages. Barbour et al. (1996) found that percent shredders decrease with increasing perturbations. The accumulation of terrestrial toxicants (i.e., pesticides and herbicides) on leaf surfaces can contribute to a substantial loss of shredders (Plafkin et al. 1989). Barbour et al. (1996) suggest that because collectors and filterers are generalists, they may be more tolerant to certain forms of pollution. Consequently, the relative contribution of collectors in a sample may increase with more severe perturbations due to the loss of more intolerant taxa.

The ratio of the shredders to scrapers in Kisumu Bay was 20 and deposit filters were 30. Shredders and Scrapers are more sensitive to environment disturbances because they exhibit the highest level of feeding specialization, whereas filters feeders and gatherings collectors are more tolerant to disturbances because they exhibit generalized feeding habits (Barbour et al.1996).

5.2.6 Baseline water quality results

The consultant in collaboration with Lahvens (K) Limited, NEMA designated laboratory sampled and analyzed water samples at four monitoring stations within the Winam Gulf i.e. Kichinjio landing site (WQMS No. 1), River Kisat estuary (WQMS No. 2), Coca Cola Equator Bottlers Limited intake (WQMS No. 3) and at the project site shoreline (WQMS No. 4) to provide baseline data on water quality within the project area.

The results indicate that water quality parameters i.e., pH, Dissolved Oxygen (DO) and Total Dissolved Solids (TDS) were within set limits under water quality Regulations, 2006 while high turbidity levels are attributed to deposition of sediments into the estuary from River Kisat (Table 9 and Annexure 7).

Table 9: Water quality results for the four monitoring stations at the proposed MRCC site (Source: Lahvens (K) Limited, June 2024)

Monitoring Locations	Acidity/Basicity (pH)	Dissolved Oxygen (mg/l)	Total Dissolved Solids (g/l)	Turbidity (NTU)
WQMS No. 1	7.93	6.52	124.5	33.5
WQMS No. 2	7.1	3.86	156	130
WQMS No. 3	8.08	4.1	139.5	30.9
WQMS No. 4	7.86	6.83	301.5	29.75

5.2.7 Baseline ambient air quality

Air quality monitoring was carried out the project site and the results indicated that particulate matter including PM_{2.5} ranged from 9 to 27µg/m³ with PM₁₀ levels spanning from 11 to 29 µg/m³ across the three monitoring stations. The results also showed gaseous parameters including carbon monoxide (CO) were <0.001 mg/m³, Nitric oxides were <0.001ppm, Nitrogen dioxide (NO₂) ranged from 0.029 to 0.037 ppm, Sulphur dioxide (SO₂) ranged from 0.039 to 0.064 ppm, Ozone (O₃) concentrations were detected from 0.07 to 0.088 ppm and total volatile organic compounds (TVOC) levels ranged from 0.001 to 0.003 µg/m³ (Tables 10 & 11). The findings show that the baseline values are within the limits prescribed under the Environmental Management and Coordination (Air Quality) Regulations, 2014.

Table 10: Ambient air quality measurements for MRCC project (Source: Lahvens (K) Limited, June, 2024).

Monitoring Locations	PM _{2.5} µg/m ³	PM ₁₀ µg/m ³	CO mg/m ³	SO ₂ ppm	NO ₂ ppb	NO ppm	O ₃ ppm	TVOC µg/m ³	TEMP. °C
Project Boundary1 (PB1) -0.096632" S 34.749084" E	10	11	<0.001	0.051	0.033	<0.001	0.0875	0.001	31

Monitoring Locations	PM _{2.5} µg/m ³	PM ₁₀ µg/m ³	CO mg/m ³	SO ₂ ppm	NO ₂ ppb	NO ppm	O ₃ ppm	TVOC µg/m ³	TEMP. °C
Project Boundary (PB2) -0.096522" S 34.749387" E	27	29	<0.001	0.064	0.037	<0.001	0.07	0.003	30
Mid-Section of the proposed site (MSPS) -0.096325" S 34.749353" E	9	12	<0.001	0.039	0.029	<0.001	0.0867	0.002	33

Table 11: Average results for gaseous parameters for MRCC project site (Source: Lahvens (K) Limited, June 2024)

Monitoring Locations	NOX (ppm)	SO ₂ (ppm)	CO mg/m ³	Ozone (ppm)	Remarks
PB1	0.033	0.051	0.001	0.0875	-
PB2	0.037	0.064	0.001	0.07	-
MSPS	0.029	0.039	0.001	0.0867	-
EMC Air Quality Regulations, 2014	4.0	0.191	4.0	0.12	Complies

5.2.8 Baseline noise levels

Noise survey was conducted using a sound level meter type HT 80A (30 ~ 130dB), S/No. 201811022090 with a 1/2-inch electret condenser Omni- directional microphone. The noise equivalent results for the PB1, PB2 and MSPS were 52.5 dB(A), 54.7 dB(A), and 50.3dB(A) respectively. The results indicate that noise level measured across all the three survey locations complied with the Environmental Management Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. Further analysis of the noise significance at each measurement site were rated as insignificant having scored <75 units based on parameters measured and score criteria (Table 12).

Table 12: Summary results for singular noise equivalents for MRCC project (Source: Lahvens (K) Limited, June 2024)

Monitoring Locations	Measured Sound Pressure Level (Noise) (dBA)			EMC Noise Regulations, 2009
	Leq	Lmax	Lmin	Leq
Project Boundary (PB1) -0.096632" S 34.749084" E	52.5	73.2	46.7	55
Project Boundary (PB2) -0.096522" S 34.749387" E	54.7	69.8	48.2	55

Monitoring Locations	Measured Sound Pressure Level (Noise) (dBA)			EMC Noise Regulations, 2009
	Leq	Lmax	Lmin	Leq
Mid-Section of the proposed site (MSPS) - 0.096325" S 34.749353" E	50.3	70.4	47.7	55

5.3 Social and cultural environment

5.3.1 Population demographics

Kisumu Central sub-county has a total population of 174,145 people out of which 84,155 were males, 89,985 females and 5 intersexes (KNBS, 2019). The proposed project site lies within Nyalenda B ward which has a total of 34,905 people out of which 17,000 are males and 17,903 females.

5.3.2 Community structure

Kisumu central where the project site lies occupies a total area of 36.8km² and the population density per household is 3.3km². Luo community are natives within the lake region and the area exhibits a nuclear settlement pattern in line with typical traditional way of living. The average household size is 6 persons, though polygamy is common.

5.3.3 Cultural properties

There are various legendary cultural sites within Lake Victoria region in Kenya and this includes places of significant historical phenomena or mythical incidents and rituals. Some of these sites are Lwanda Magere, Simbi Nyaima, Nyamgondho, Kit Mikayi, Thim Iye Lich Ohinga and legendary islands such as Atego, Ringiti and Mbasana na Muole, Nyama ni Ware. Discussions with the locals indicated that there were no sites of cultural significance at the project site.

5.3.4 Land use and land cover

The proposed project area covers about ≈ 0.7 acres and the Land use/land cover patterns within the project area and neighbourhood includes industrial, commercial, residential, fish landing site, port activities and Kisumu-Nairobi railway line (Figure 15). In addition, land use/land cover characterization and analysis was carried using remote Sentinel-2 imagery and five land use-land-cover classes established (Figure 16). It should be noted that the land use patterns around the port area have been changing over the years owing to the growth of the economy of Kisumu City, increased population and devolution of resources under the Kenya Constitution 2010.



Figure 15: Kichinjio BMU landing site (left) and Devki steel Kisumu (right) within the project area (Site visit, June 2024)

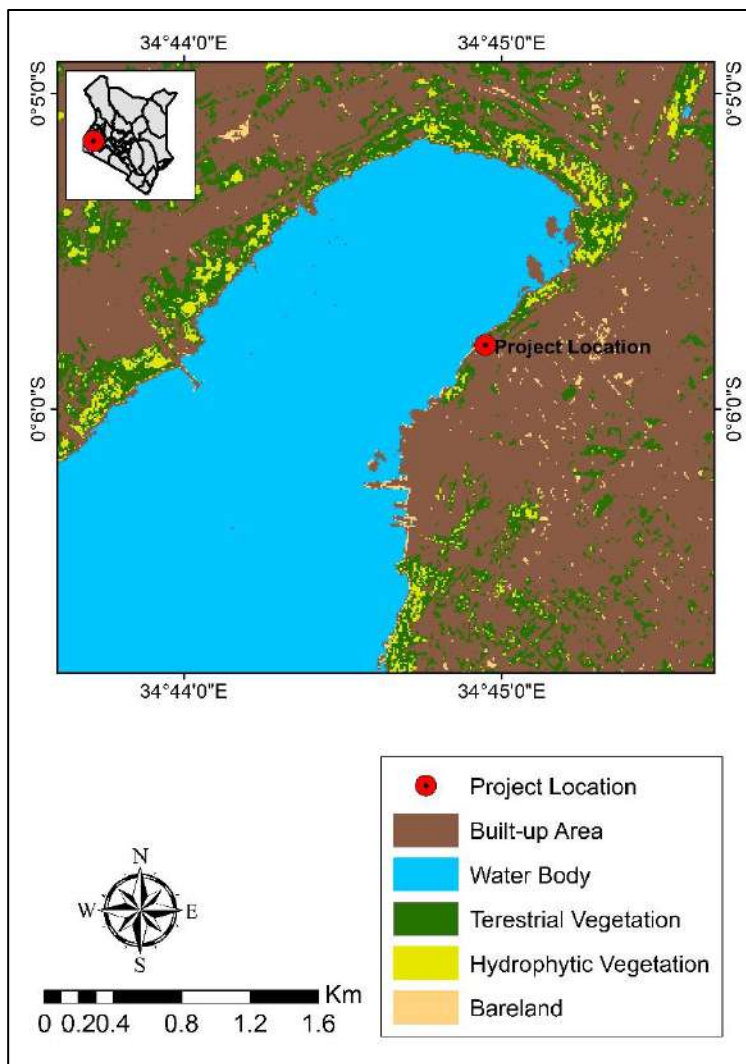


Figure 16: Land use / land cover map of project area ((Source: Sentinel-2 image acquired in 2023 and reconnaissance Survey, June 2024)

5.3.5 Socio-economic profile

The economy of the peri-urban areas of Kisumu City and rural sub-counties is largely based on agriculture which accounts for 47% of household income. Agriculture support livelihoods of about two thirds (62%) of all households in Kisumu County and provides raw materials to the manufacturing sector and therefore stimulating non-farm incomes and employment (GoK, 2012). The main subsistence crops include maize, sorghum, rice, bean, finger millet, cassava, potato, groundnut, and kale while key cash crops include sugarcane, rice and cotton. Livestock production is also practiced within the county where chicken, cattle, goats and sheep are reared. Some of the main non-agricultural (informal) activities in the County include *boda boda* (especially in Kisumu City), small-scale trading (shop vendors), tourism and to lesser extents recreational sailing.

Fishing is also one of the key economic activities in the project area and among the riparian communities. It contributes KES 30 Billion in annual fish export revenues to the economies of

Kenya, Tanzania and Uganda who share the lake. According to the Fisheries Frame Survey 2017, there are 3,275 fishermen, and 189 fish farm families in the entire Kisumu County. The most common fish include omena, tilapia, and Nile perch, which generate incomes of KES12 million, 28 million, and 11 million per year, respectively. The fish is sold locally and also processed for export (GoK, 2014). With the introduction of aquaculture, households have been investing in cage farming on the shores of the lake as well as pond construction and maintenance within the riparian zones and terrestrial hinterlands. There are over 1,330 fish farms which have been established within the County and over 3,000 cage fish farms as of 2017 (Source: State Department of Fisheries, Aquaculture and the Blue Economy, November 2019).

During the reconnaissance survey, there was no record of any fishing landing site at the shoreline of the project site, however about 200m to the East of the project site there exists Kichinjio BMU landing site.

5.3.6 Public utility infrastructure

5.3.6.1 Transport infrastructure

Kisumu County is served with an effective and reliable infrastructure. Historically, Kisumu County was connected to other major cities in Kenya by the Mombasa-Nairobi-Kisumu railway with a branch extension to Butere. There are three railway stations that fall within the city, namely Kibos station, Kisumu mainline station and Kisian station on the Butere branch. The narrow-gauge railway moves both passengers and cargo, linking Kisumu with other cities and towns along the railway line. During reconnaissance survey, there's Kisumu-Nairobi railway line crossing along the project site boundary (Figure 17).

The county is also served with an international airport which has the potential to be an entry port for the entire region with the capacity to handle local and regional flights, while steamer operations provide further communication to other lakeshore towns in Kenya, Tanzania and Uganda, across Lake Victoria. Water transport on the lake is provided mostly by private operators in wooden boats with outboard engines. The services connect towns on the shores and also link the county with the other three lakeside counties and the countries of Tanzania and Uganda. Lake Victoria holds significant potential for the mass transport of goods and passengers across the region and beyond.

Kisumu County is served by all-weather roads traversing the area feeding the A-class Nairobi-Bondo Road. Telecommunication infrastructure is available throughout the site, covered by mobile phone signals from different service providers. The site can be accessed at the junction off Obote Road and Oginga Odinga Road. It should be noted that the road primarily serves other developments within the project area and will also be utilized by the proposed passenger terminus to access Kisumu CBD (Figure 18).



Figure 17: Section of Kisumu-Nairobi Railway line along the project site boundary (Source: Site visit, June 2024)



Figure 18: Access road to the proposed MRCC site (Source: Site visit, June 2024)

5.3.6.2 Energy supply

The project area is served by electricity from the national grid as seen in the surrounding area. Power for the proposed MRCC will also be sourced from the national grid and supplemented by solar systems where applicable. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to.

5.3.6.3 Water supply

Kisumu Water and Sewerage Company (KIWASCO) is the main source of water for the City and has two fresh water treatment plants in Dunga and Kajulu areas located at Hippo point and River Kajulu respectively. They have a combined capacity of producing 80,000m³ per day i.e., Dunga 44,000m³ and Kajulu 36,000m³ per day against the current demand of the city which is 58,000m³.

Other sources of water in the county include boreholes, rivers, streams, springs, rainfall and the users who draw water directly from Lake Victoria. At the project site, the surrounding settlements have reticulated water supply by the KIWASCO hence the MRCC will also be connected to the supply however, daily availability of water at the project site cannot be guaranteed and the proponent should supplement the supply from the water bowzers, borehole and abstractions from Lake Victoria which should be subjected to effective treatment.

5.3.6.4 Wastewater flows and management

Wastewater flows in Kisumu City includes domestic, commercial, industrial and institutional sources. Based on data provided by KIWASCO whose sewerage coverage of the population is at 16%, Kisumu theoretically generates 75,000m³ of wastewater per day. The wastewater management strategies include two (2) sewage treatment works i.e., Kisat Sewage Treatment Plant and Nyalenda Wastewater Stabilization Ponds. The two facilities have installed capacities of 8,000m³ and 12,000m³ per day respectively. However, the daily flows to these facilities are approximately 6,000m³ each for the two of them. Apart from the treatment plants, the rest of the population (84%) use septic tank-soak pit systems and pit latrines which can potentially contaminate ground water reservoirs or overflow when they are full, blockages and during the rainy season and lead to the outbreak of water borne diseases. Both KIWASCO and the private sector provide exhauster services and transport the sewage for disposal at the Nyalenda Wastewater Stabilization Ponds.

The project designs have incorporated wastewater treatment systems to service the MRCC.

5.3.6.5 Solid waste management

The main solid waste sources are from domestic, commercial ventures, hotels, markets, industries, health facilities and social institutions. The types of waste include Plastic comprised of papers and hard plastics, organic materials including food remnants and wooden debris, rubber, paper, metals, chemicals, glass and biomedical waste from health institutions and sanitary wastes. The solid waste management strategy for the city includes provision of waste bins, established central collection points and use of trucks and other vehicles to transport the collected waste from the municipal dustbins to the dumpsite. The County solid waste infrastructure collects 60% of the waste generated while the rest are collected by the private sector who use hand carts, tuk tuks, pickups and trucks. Another management strategy involves law enforcement to prevent littering as well as illegal and indiscriminate dumping by the County Government of Kisumu. Challenges of solid waste management in the city include lack of adequate infrastructure for solid wastes management.

The proponent should contract NEMA licensed waste handler to dispose of the waste, develop and implement an integrated waste management system throughout project implementation.

5.3.7 Planned development activities

Lake Victoria is an important habitat supporting a thriving artisanal fishery and facilitates the shipping of goods and people within the basin. The proposed MRCC, Kisumu Port and other small ports in the region are key infrastructure in promoting regional water transport, trade, tourism and

fisheries development. Kenya Ports Authority (KPA) intends to construct a passenger terminus on adjacent land to the MRCC site (Figure 19), rehabilitate and develop the existing 11 small (feeder) ports (Sio Pier, Port Victoria, Usenge Pier, Asembo Bay, Kendu Bay Pier, Kowuor Pier, Homa Bay, Mbita, Luanda K Oteino, Mfangano, Korungu Pier and Muhuru Pier) within Lake Victoria Basin. In addition, County Government of Kisumu intends to establish a lake front/marina along the shoreline of Paga to Dunga area.



Figure 19: Structures on adjacent land (Proposed KPA Passenger terminus site) to the proposed project site (Source: Site Visit, June 2024)

6 ENVIRONMENTAL AND SOCIAL IMPACTS, MITIGATION AND ANALYSIS

This section provides details of the anticipated benefits and attendant negative impacts of the proposed project. The ESIA Study process assessed and systematically valued the benefits against the environmental and social concerns and proposed mitigation measures to enhance the positive impacts as well as minimize and/or avoid the negative impacts. The measures are based on the underlying principles of EIA that every person is entitled to a clean and healthy environment and a duty to enhance and safeguard the environment, the precautionary and the polluter pays principle.

6.1 Positive impacts of the proposed project

1. Promote safety and well-being of riparian communities

The proposed project will enhance effective Search and Rescue (SAR) operations by ensuring timely responses to emergencies within Lake Victoria thereby contributing to safety and well-being of maritime communities, reducing both casualties and fatalities.

2. Enhance international cooperation and diplomacy

MRCC activities often require collaboration with the neighboring countries and riparian counties. Successful coordination of the rescue center will provide effective communication, cooperation, and diplomacy among Lake Victoria Basin countries and counties hence strengthening diplomatic ties and promoting East African regional stability.

3. Enhance public awareness and education

KMA's mission is to ensure sustainable, safe, secure, clean and efficient water transport for the benefit of stakeholders. The proposed MRCC will play key role in raising public awareness about maritime safety, emergency preparedness and importance of responsible behavior thereby empowering individual and communities in ensuring safer maritime environment.

4. Generation of revenue to both national and county

The proposed project will generate revenue to the government through taxes, licences and fees levied on goods/ services. Through the revenues generated, the government will be capable of financing its obligations to the citizens of Kenya.

6.2 Negative environmental and social impacts of the project

Despite the benefits, there will be attendant negative impacts throughout the project cycle i.e., at the construction, operation and possible decommissioning phase.

6.2.1 Construction phase impacts

The construction phase will involve building works (i.e., MRCC Building) and marine works (reclamation of riparian land). The main environmental and social concerns will include potential conflicts from neighbors and other road users, traffic congestion, occupational safety and health risks, air and noise pollution, water quality degradation, increased water and energy demand, waste management, labor and social influx concerns, reclamation of riparian area, navigational risks and HWC.

6.2.1.1 Potential conflicts with neighbors and other road users

During construction phase, trucks and other heavy commercial vehicles will be utilizing the access road at C. Obote Road Junction. It should be noted there are various road users at the project and to enhance the security, access to the site will be restricted and this might result to conflict with

neighboring facilities. In addition, during stakeholder engagement, it was noted that Kichinjio BMU members use the proposed project site to access their landing site. However, while the access road is considered illegal based on the county surveyors map, the members urged the proponent to at least provide an alternative access route to the landing site.

Mitigation measures

1. Liaise with County Government of Kisumu to determine access road to the shoreline
2. Restrict access to the construction site only and not any of the other areas
3. Erect warning sign along the access road to forewarn on the ongoing construction works
4. Liaise with KRC and install a level crossing at the railway line
5. Liaise with County Government of Kisumu, KPA and the BMU to determine the alternative route to the landing site

6.2.1.2 Reclamation of riparian land from the lake

The proposed site is adjacent to the riparian area and to fully accommodate the project components, reclamation will be undertaken. It should be noted that riparian areas provide key ecological services such as habitat to aquatic fauna, acts as buffer filtering pollutants from runoff, absorbing excess water during heavy rainfall and offering recreational opportunities. Reclamation of the riparian area to pave way for project implementation will result in habitat loss, increased sedimentation, degradation of water quality, increased risk of flooding and loss of recreational area, carbon sequestration and groundwater recharge among other services provided by the riparian zone.

Mitigation measures

1. Apply and obtain a Permit from Water Resources Authority (WRA) to riparian land enhance management conditions
2. Use of silt curtains during reclamation to prevent siltation/sediment flow into neighboring areas
3. Create an alternative green space by planting trees within the project site
4. Ensure the project structures can withstand changes in climatic conditions
5. Sustain stakeholder consultations to ensure continuous support for the project
6. Comply with the provision of the Physical Planning and Development Act, 2019
7. Comply with the provisions of Water Resources Regulations, 2021

6.2.1.3 Water quality degradation

Construction activities including excavations will create loose soils that are susceptible to erosion and subsequent potential sedimentation of the lake waters. Additionally, workers and construction activities will generate solid waste which includes plastic debris and if not properly managed may cause water quality degradation and impact on the health of aquatic organisms.

Mitigation measures

1. Construction of silt traps and embankments along the shoreline area to manage storm water from the construction site
2. Construction could be carried out during the dry season and at times of minimal rainfall (<20mm)
3. Use of excavated soil material for backfilling and leveling as well as compacting
4. Provision of waste collection infrastructure at the site including litter bins

6.2.1.4 Traffic congestion

The proposed MRCC will be accessed via at C. Obote Road and Oginga Odinga Junction. The entrance of heavy commercial vehicles to the construction site might cause traffic snarl up along the access road as well the activities be stalled by during cargo transportation along the Kisumu – Nairobi railway line, which will have a widespread impact to all roads users.

Mitigation measures

1. Deploy fleet officers to manage traffic flow in and out of the site
2. Collaborate with KRC to enhance management of cargo transportation and construction activities
3. Signage and barricades should be used as part of the typical construction traffic controls.
4. Offload of construction materials be done on the site and not on the road reserves to ensure smooth flow of traffic
5. Comply with the provisions of the Traffic Act, 2016

6.2.1.5 Occupational safety and health risks

During construction, the workforce, neighbors, and visitors will be exposed to safety and health risks. These risks include accidents, trips and falls, cuts and bruises, fall at height, drowning for personnel working at the lakeside, air and noise pollution which could lead to impairment, death and financial losses.

Mitigation measures

1. Register site as workplace with DOSHs
2. Obtain insurance cover for workers at the site
3. Prepare and implement an emergency response plan
4. Provide well stocked first aid kits and trained personnel at the site
5. Train workers on first aid services and working at the lakeside area
6. Provide adequate and appropriate PPEs and enforce on their use
7. Erect safety signage at all active construction areas
8. Provide an incident/accident register
9. Comply with the provisions of the Occupational Safety and Health Act, 2007

6.2.1.6 Air pollution

During the construction phase, air pollution will be in form of dust generated from excavations, concrete mixing activities and exhaust fumes from machinery use and HCVs delivering construction materials to the site. The most relevant pollutant considered is particulate matters (PMs) of varying sizes because of their potentially significant increase during the construction phase. PMs contain microscopic solids or liquid droplets that are so small that when inhaled can cause serious health problems. Some of the fine particles get deep into lungs and even bloodstream building up to cause inflammation and breathing difficult. Based on World Health Organization studies, the long-term exposure to $PM_{2.5}$ is associated with an increase in the risk of cardiopulmonary mortality by 6–13% per 10 $\mu g/m^3$ of $PM_{2.5}$. Further, some of the dust particles are respiratory irritants and sensitizers that cause asthma, rhinitis (runny or stuffy nose) and allergic reactions. These risks result in financial losses and reduced work output. Respirable particulate matter may present respiratory diseases, cause eye irritation and visual intrusion to workers, visitors to the project site and the neighbors if it is more than 100 $\mu g/Nm^3$ as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014.

Mitigation measures

1. Install appropriate and adequate dust screens around the project site
2. Sprinkle water at active excavation areas and unpaved access road to suppress fugitive dust
3. Cover stockpiles of construction materials (aggregates, sand and fill material) to reduce dust emissions especially during windy conditions
4. Provide adequate Personal Protective Equipment and enforce on their use among personnel
5. Use serviceable machinery/equipment and trucks
6. Comply with the provisions of Environmental Management and Coordination (Air Quality) Regulations, 2014

6.2.1.7 Noise pollution

Noise and excessive vibrations will be generated during concrete mixing, hoisting cranes and other civil works related activities. The noise levels produced may be above the stipulated EMCA limits and may lead to hearing impairments to the workers, visitors to the site and the neighbours. Construction sites such as the proposed project can only emit noise levels of up to 60dB (A) during the day and 35dB (A) at night as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Mitigation measures

1. Ensure excavation and construction works are limited to daytime hours only (i.e., between 8am to 5pm)
2. Locate peak noise producing machines away from neighboring residential developments
3. Provide and enforce the use of appropriate PPEs to workers and visitors accessing the peak noise producing areas
4. Sensitize truck drivers to avoid unnecessary hooting and running of vehicle engines
5. Comply with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

6.2.1.8 Water use and effluent management

During construction, water will be required for concrete mixing, casting and curing works, drinking and sanitation purposes and will be sourced from Kisumu Water and Sanitation Company Limited. About 70% of water consumed will be generated as wastewater which will need to be properly disposed off. The rest of the water soaks into ground areas within the project site. Poor disposal of the wastewater generated has the potential to pollute the lake and thus should be managed appropriately. The contractor will compute the wastewater flows based on the project's water demand and the workforce to inform requirements for disposal and sanitation respectively as well as monitoring plans during the construction phase.

Mitigation measures

1. Sensitize workers on water conservation
2. Monitoring water consumption streams by the project
3. Use of mobile toilets from a NEMA licensed waste contractor for workforce sanitation
4. Comply with the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006

6.2.1.9 Solid waste management

At construction phase vegetation clearance, construction works and workers at the project site will generate solid wastes comprised of biomass, metal and wood cuttings and domestic wastes (plastics,

paper etc.) while servicing of machinery, equipment and motor vehicles will generate wastes such as spare parts, oil and fuel containers and tyres. Poor disposal of solid wastes causes environmental pollution and disposal sites are potential breeding grounds for diseases and therefore a health risk to communities. Plastic wastes are particularly harmful to the environment as they are non-degradable and persist in the environment (air, water, soil, vegetation etc.) as micro-plastics which are health hazards. Hence the proponent will implement measures to ensure proper management of solid wastes during the construction phase of the project cycle.

Mitigation measures

1. Use overburden in backfilling and landscaping the site
2. Procure construction material based on the Bill of Quantities to avoid wastage
3. Procure and strategically place adequate solid waste collection bins within the construction site. The waste collection bins should have capacity for segregation of wastes into plastics, glass, paper, metal and organic wastes to promote recycling
4. Maximize re-use of recyclables and minimize use of packaged materials
5. Create awareness on the process of solid waste collection, segregation and proper disposal among the workforce
6. Procure a sizeable central solid waste collection bin with chambers to accommodate separated wastes
7. Procure the services of a NEMA licensed solid waste handler for disposal of solid wastes from the central collection bin
8. Comply with the Environmental Management and Coordination (Waste Management) Regulations, 2006 and the Sustainable Waste Management Act, 2022

6.2.1.10 Labour influx and social concerns

During the implementation of the proposed project, there will be the creation of employment opportunities. It is expected that the contractors will source labour from the local community and elsewhere in the country when the skills required are not available locally. The influx of workers will potentially lead to increased demand and competition for goods, social and health services. This can lead to price hikes and crowding out of local consumers, increased volume of traffic and higher risk of accidents, social conflicts within and between communities, increased risk of spread of communicable diseases, and increased rates of illicit behavior and crime. In addition, employee grievances such as poor working conditions, discrimination and Sexual Exploitation Abuse and Harassment (SEAH) at the workplace may arise.

Mitigation measures

1. Contractor to prepare a site-specific Labor Influx Management Plan and implementation framework which should be approved by KMA prior to project commencement.
2. Implement measures to prevent, identify, address, and resolve conflicts before and when they occur including Sexual Exploitation Abuse and Harassment (SEAH) at the workplace including anonymous reporting systems.
3. KMA to ensure development and implementation of a Grievances Redress Mechanism (GRM) by the contractor throughout the project phases

6.2.1.11 Potential conflicts with other lake users and stalling of the project

During jetty construction, increase in turbidity and water quality degradation may impact on the operations of Beach Management Units especially fishing activities, neighboring tourism establishments and other lake users due to increased sediment load. This may result to conflicts between the contractor and the neighbors which might result to stalling of the jetty project.

Mitigation measures

1. Develop and implement Grievances Redress Mechanism
2. Install silt curtains around the jetty to reduce potential increase in turbidity in adjacent waters
3. Develop and implement a Water Quality Monitoring Plan during the construction of the jetty facility

6.2.1.12 Navigational risks

Maritime accidents are likely to occur when the local fishermen who use non-motorized boats such as dug-out canoes to fish along the shoreline and their boats drift into the jetty construction areas or collide with the barge or jetty pillars at night. These accidents could lead to damage or complete loss of boats, livelihoods, injuries and even death thus fueling conflicts with other lake users.

Mitigation measures

1. Create awareness among the local fishermen on the construction of the jetty and its extend on the lake side
2. Ensure placement of marker buoys and hazard demarcations during construction of the jetty to warn fishermen of potential dangers
3. Ensure the barges and construction areas are well lit at night
4. The barge used in the construction should have old tyres affixed continuously on all sides to minimize potential impacts in case of drifting of fishermen's boats into the area

6.2.1.13 Increased Human – Wildlife Conflicts

Marine works activities may cause disturbance (vibrations/noise) to the hippopotamus herds and other wildlife fauna within the project area. This is anticipated to result in an increased wildlife presence on land leading to human wildlife conflicts. Kisumu Bay supports a local/community based blue tourism industry that relies on hippo sightings and its therefore important that these are taken into consideration during the construction of the jetty.

Mitigation measures

1. The proponent should fence off the outer fringes of areas where there is hippo grass which are the key foraging habitats for the hippos.
2. Liaise with Kenya Wildlife Service to manage hippos and crocodiles sighted within the area
3. Keep records on wildlife sightings, incidents and action taken

6.2.2 Operational phase impacts

During the operation phase, the main environmental concerns will include water pollution, oil spills and leakages, solid waste generation and management, safety risks, impacts related to electromagnetic radiations, structural failure, shoreline erosion and changes in benthic communities.

6.2.2.1 Water pollution

During operation and maintenance of infrastructure associated with MRCCs, such as jetties, drainage systems and walkways can lead to sedimentation, runoff of pollutants, and chemicals into the lake. Without proper surface run-off control measures, increase in turbidity, sedimentation, and nutrient loading might affect water quality of the nearby aquatic area. Furthermore, improper disposal of waste materials or wastewater from MRCC building could contribute to water pollution in the lake hence degrading the fish breeding sites.

Mitigation measures

1. Install a bio digester to manage wastewater flow from the building
2. Conduct quarterly water quality monitoring on the flows from the bio digester to ensure it meets the standards for discharge into the aquatic environment
3. Installation of solid waste screens along storm water drains and ensuring their regular maintenance and monitoring
4. Comply with Marpol Convention 73/78 and KMA Act, 2012
5. Comply with provisions of Environmental Management and Coordination (Water Quality) Regulations, 2009

6.2.2.2 Oil Spills

During Search and Rescue Operations (SAR), vessels in distress can lead to oil spill and other forms of aquatic pollution especially if the distressed vessel is carrying hazardous materials or if fuel tanks rupture during the rescue process. Oil spills smothers aquatic habitats or cause bioaccumulation of heavy metals thus detrimental to aquatic biodiversity and are health hazards. Furthermore, the oil handling bay can be source of oil leakages if proper measures are not in place leading to fire outbreak. However, it should be noted that KMA's core functions include reducing marine pollution from maritime vessels operations and such knowledge and expertise should enhance the capacity to mitigate the impact of oil spills during SARs or other operations at the MRCC.

Mitigation measures

1. Provide adequate oil response kits for containment of oil spills
2. Ensure workers are regularly trained and sensitized on oil spill cleaning and containment
3. Refueling of boats to be undertaken by competent personnel
4. Compliance with the National Marine Spills Response Contingency Plan

6.2.2.3 Impacts of climate change

Climate change has not only led to drought, floods, diseases, pests, sea level rise, human-wildlife conflicts, wildfires in some parts of Kenya, but it has also caused unprecedented rainfall and lake level rise. Lake Victoria water levels reached 1137.29m (3731.27 feet) above mean sea level on May 19, 2021, a high for satellite data records that date to 1992 (NASA Global Water Monitor, 2021) and has affected riparian settlements and infrastructure. Consequently, part of the project site has high water level and measures should be put in place to avoid the proposed structures being submerged in future if climate change impacts are not considered in its design.

Additionally, the area is humid experiencing yearly temperature of 22.97°C which is 0.47% higher than Kenya's averages. In addition, deployment of search and rescue vessels and aircraft involves the burning of fossil fuels, leading to the emission of Green House Gases and contributing to climate change. The project designs and the proponent have incorporated use of solar systems, LED and sensors to minimize the facility's carbon footprint.

Mitigation measures

1. Consider lake level rise in MRCC project design. The MRCC design for both the building and the jetty should consider climate change extremes which include lake level rise and recession which portend flooding and lack of access respectively
2. Maximize on natural lighting and ventilation by ensuring the building infrastructure such as offices rely less on-air conditioners
3. Ensure optimal insulation to reduce heating and cooling requirements
4. Prepare annual carbon footprint reports and implement recommendations

5. Comply with the Climate Change Act 2023, National Climate Change Action Plan 2023-2027, and Marpol Convention 73/78 (MARPOL Annex VI)

6.2.2.4 Risks posed by aquatic macrophytes

Aquatic macrophytes such as water hyacinth, papyrus and hippo grass poses various risks to L. Victoria users and include hindering navigation, blocking water supply systems, degrading water quality as well as affecting local community livelihoods who depend on fishing and tourism activities. During SAR, there will be risks posed by the aquatic macrophytes hence affecting the operational activities KMA.

Mitigation measures

1. Implement the Early Warning System for drifting, proliferation of aquatic macrophytes prepare by KPA in collaboration with Trade Mark Africa (TMA).

6.2.2.5 Solid waste generation and management

During operations, debris such as wrecked vessels and general wastes will be generated. Improper disposal of these wastes can contribute to pollution and pose hazards to workers and visitor to the facility.

Mitigation measures

1. Provide adequate waste collection bins
2. Contract NEMA licensed personnel to dispose of waste
3. Ensure timely collection and disposal of wastes
4. Sell of the recyclable to recycling companies
5. Comply with the provisions of the Sustainable Waste Management Act, 2022

6.2.2.6 Loss of lives and economic decline

Inadequate coordination and delays in rescue efforts can result to loss of life and economic loss for riparian communities. This can also be caused by time constrains, burnout among rescue personnel and pressure of responding to distress calls and managing resource. In addition, use of jetty can result to maritime accidents especially when not clearly marked.

Mitigation measures

1. Ensure regular refresher courses for SAR staff
2. Use navigational lights to demarcate the jetty area and install appropriate lights to forewarn other lake users on the presence of the jetty at night

6.2.2.7 Impacts related to electromagnetic radiations

Coordination and communication is one of the main activity during the SAR. Electromagnetic radiation, particularly from sources such as radio transmissions, radar systems, or nearby electronic equipment, can disrupt the ability to communicate effectively with maritime vessels, aircraft, or other rescue assets, cause electronic equipment malfunction, hindering coordination efforts during emergencies. Furthermore, electromagnetic radiation especially from radio transmissions can potentially be intercepted by unauthorized parties, raising security concerns for sensitive communications within the MRCC.

Mitigation measures

1. Restrict entry to server rooms
2. Ensure regular servicing of the electronic equipment

3. Ensure encryption and other security measures mitigate risks of insecurity

6.2.2.8 Structural failure

Prolonged exposure to harsh weather or age can all cause the jetty and lake wall to deteriorate. This can lead to crack formation or collapsing of the MRCC structures.

Mitigation measures

1. Ensure regular inspection of the MRCC building, jetty and the retaining walls by a licensed engineer to check its structural integrity
2. Ensure the design and construction of the jetty and lake wall conforms to the building code and implementation is supervised by registered engineers

6.2.2.9 Increased shoreline erosion

During operations, increased frequency of rainfall and wave action can cause an increase in shoreline erosion. The unconsolidated materials such as sands, gravels and clays that are loosely bound and much more susceptible to erosion will be carried away leaving the shoreline bare.

Mitigation measures

1. The retaining wall structure should include pressure absorption points to use up energy from wave action

6.2.3 Decommissioning phase impacts

Due to the sensitivity of the aquatic environment and the pollution potential, the proponent would prepare a due diligence decommissioning audit and submit it to NEMA for approval at least 3 months prior to the decommissioning exercise. The negative environmental impacts will include loss of SAR services, loss of investment by the Government of Kenya, safety of the workforce and neighbors during demolitions, generation and disposal of solid wastes, water quality degradation, etc.

The main recommendation for mitigation would be to ensure that demolition works are supervised by a licensed engineer and a NEMA solid waste handler will undertake the decommissioning process in a manner that protects and conserves the lake environment and ensures the safety of the general public.

1. Loss of SAR services
2. Loss of investment by the Government of Kenya
3. Occupational safety and health risks
4. Waste generation and management
5. Water quality degradation

6.2.3.1 Loss of SAR Services

A decommissioning phase would mean loss of SAR services created during the operational phase of the proposed MRCC. Thus, this may lead to increased fatalities from maritime accidents hence loss of lives and economic decline.

Mitigation measures

1. Look for a suitable alternative site for MRCC
2. Provide alternative infrastructure for SAR services

6.2.3.2 Occupational safety and health risks

Safety and health risks during demolition are likely to emanate from accidental falls and cuts, injuries from demolition tools and machinery use. Noise and air pollution from demolition works could pose safety and health risks to workers, neighbors and visitors to the site.

Mitigation measures

1. Carry site safety risk assessment
2. Install signage to forewarn people on ongoing demolition activities
3. Ensure demolitions are carried out by a licensed contractor
4. Provide and enforce the use of PPE throughout the demolition works
5. Avail first aid kits on site throughout the decommissioning
6. Ensure workers are given the correct hand tools and equipment for the jobs assigned
7. Comply with the Environmental Management and Coordination Air Quality Regulations, 2014
8. Comply with Noise and Excessive Vibration Pollution (Control) Regulations, 2009
9. Comply with the Occupational Safety and Health Act, 2007

6.2.3.3 Waste generation and management

The main sources of wastes will be demolition works of the MRCC, jetty and retaining wall. The waste will include materials such as concrete, metal, wood, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. The debris and other solid waste have the potential to pollute the environment and lower quality of lake water.

Mitigation measures

1. Material recovery for sell or re-use in other projects
2. Procure services of a NEMA licensed waste handler to dispose the demolition waste
3. Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006.

6.3 Impact analysis

Potential project impacts are predicted and quantified to the extent possible. The magnitude of impacts on resources such as biodiversity or receptors such as people is defined. Magnitude is a function of the following impact characteristics;

1. Type of impact (direct, indirect, induced)
2. Size, scale or intensity of impact
3. Nature of the change compared to baseline conditions (what is affected and how)
4. Geographical extent and distribution (e.g. local, regional, international)
5. Duration and/or frequency (e.g. temporary, short-term, long term, permanent)

Magnitude describes the actual change that is predicted to occur in the resource or receptor. It considers all the various impact characteristics in order to determine whether an impact is negligible or significant. Some impacts can result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes can be regarded as essentially having no impact and are characterized as having a negligible magnitude

1. **Negligible impact (very low)** - Where a resource or receptor would not be affected by a particular activity or the predicted effect is deemed to be imperceptible or is indistinguishable from natural background variations.
2. **Less than significant impact (Low)** - Is a minor impact where a resource or receptor would experience a noticeable effect but the impact magnitude is sufficiently low (with or without mitigation) and /or the resource or receptor is of low sensitivity. In either case, a less than significant impact must be sufficiently below applicable standard threshold limits.
3. **Potentially significant impact (moderate)** - A moderate impact that meets applicable standards but comes near the threshold limit. The emphasis for such moderate impacts is to demonstrate that the impact has been reduced to a level that is as minor as reasonably practicable so that the impact does not exceed standard threshold limits.
4. **Significant impact (high)** - One where an applicable standard threshold limit would or could be exceeded or if a highly valued or very scarce resource would be substantially affected.

Table 13: Risk rating of Impacts for the proposed MRCC

Environmental and social impact	Magnitude of impact at construction phase	Magnitude of impact at operation phase	Magnitude of impact at decommissioning phase
Reclamation of riparian land			
Water pollution/water quality degradation			
Occupational safety and health risks			
Potential conflicts on access road			
Traffic congestion			
Impacts of climate change e.g. lake level rise			
Air pollution			
Noise pollution and excessive vibrations			
Water use and effluent management			
Solid waste management			
Labour influx and social concerns			
Potential conflicts with lake users and stalling of project			
Navigational risks			
Human-Wildlife conflicts			
Oil Spills			
Risks posed by aquatic macrophytes			
Loss of lives and economic decline			

Environmental and social impact	Magnitude of impact at construction phase	Magnitude of impact at operation phase	Magnitude of impact at decommissioning phase
Increased shoreline erosion			
Impacts related to electromagnetic radiation			
Structural failure			
Loss of SAR services			
Security risks			

Legend

Impact magnitude	Colour
Negligible	
Low	
Moderate	
High	

6.4 Public and stakeholder consultations and findings

Public and stakeholders' participation in the ESIA study process is important as outlined under Regulation 17 of the Environmental Management and Co-ordination (Impact Assessment and Audit) Regulations, 2003 where public participation is a mandatory requirement. The objective of the public and stakeholder participation was to obtain and document comments, views, and concerns that the neighbors and stakeholders have regarding the proposed project (Table 14).

Table 14: Stakeholder engagement schedule

Date	Level of SHM	Nature of SHM	Venue	No. of participants
16 th April 2024	Kick-off stakeholder meeting	Sensitization on proposed MRCC	Project site in Dunga area, Kisumu	34
19 th June 2024	Kick-off stakeholder meeting	Sensitization on proposed MRCC	Selella Resort, Kisumu	14
21 st June 2024	Second stakeholder meeting	Review draft ESIA Study report for the proposed MRCC	Selella Resort, Kisumu	23
25 th June 2024	Third stakeholder meeting	Validate ESIA Study Report for the proposed MRCC	Selella Resort, Kisumu	20
Total				91

A total of 91 participants attended the three meetings comprising of stakeholders from Government agencies, private sectors, Non-Government organizations and neighbors to the site etc.

6.4.1 Kick-off stakeholder meetings

Initially, two sites had been proposed for the construction of the MRCC i.e., one at Dunga area adjacent to Dunga Hill Camp and the other at Kisumu Port. Hence the consultant in collaboration with KMA organised and held two kick-off meetings. The first one was held on 16th April 2024 at the initial proposed project site in Dunga area and was attended by 34 participants while the second one was held on 19th June 2024 at Selella Resort, Kisumu and was attended by 11 participants drawn from the Ministry of Interior and National Administration, Kenya Railways Corporation, Kichinjio Beach Management Unit and neighbors to the project site (Figures 20 and 21).



Figure 20: Participants during the kick-off stakeholder meeting at Dunga Beach Site No. 1 (Source: Stakeholder Meeting held on 19th April 2024).



Figure 21: Participants during the kick-off stakeholder meeting at Sellela Resort (near Kisumu Port) Site No. 2 (Source: Stakeholder Meeting held on 19th June 2024).

The objective of the kick-off meetings was to sensitize stakeholders on the proposed project, document their views and opinions. During both kick-off meetings, KMA provided an overview of the project activities, stakeholders undertook a tour of the two project sites depending on their proximity to the site (Figure 22) while the consultant made separate presentations on the ESIA study process including scope of the ESIA, the approach and methodology, the timeframe and the stakeholders' roles in the ESIA. Several key issues raised were discussed during the plenary session based on the presentations by the consultant and other matters arising from the project (Table 15

and Annexure 9). A key task for the two kick-off meetings was the analysis of alternatives with respect to site suitability where Kisumu Port was favored over Dunga area.



Figure 22: Participants during tour of the project site in Dunga area (Source: Stakeholder meeting No. 1 held on 16th April 2024)

Table 15: Summary of key issues raised during kick off stakeholder meeting No. 1 for the proposed MRCC at Dunga area

Issue No.	Description	Response provided
1.	Project site seen inadequate to accommodate all the project components.	– Reclamation of the riparian will be undertaken.
2.	Narrow access road to the site limiting accessibility	– Liaise with relevant agencies to determine the size of the access road to the project site – Consult and agree with the neighbors on the measures to be implemented to achieve the correct size of the access road
3.	Risks of flooding and/ or backflow of water at the nearby River Aleora during heavy rainfall	– Conduct pegging of the riparian area and hydrological assessment to inform the project designs
4.	Impacts of climate change such as lake level rise and extreme climatic conditions	– Ensure the structures will withstand the changes in climatic conditions – Incorporate lake level rise in project designs

Table 16: Summary of issues raised during kick off stakeholder meeting No. 2 for the proposed MRCC at Kisumu Port

Issue No.	Description	Response provided
1.	Clarification on land ownership for the MRCC site	– KMA obtained approval from KPA to proceed with project implementation at the site. – Clarification of who (KPA or KRC) owns the land will be forwarded to the proponent for response
2.	Clear reason for relocating the project from Dunga area which has lots of water users than the proposed site	– Accessibility to the site and nearest health facilities prompted the shift from Dunga to Kisumu Port Area.

Issue No.	Description	Response provided
3.	Restriction on use of road passing through the project site to the landing site as well as along the access road off C. Obote Junction.	– The concerns on access road by Kichinjio BMU will be forwarded to the proponent for consideration – There will be no access restrictions along the access road at C. Obote and Oginga Odinga Junction.
4.	Storm water management and drainage system	– The concerns will be forwarded to the proponent and engineers for considerations
5.	Increase of insecurity cases due to labour influx at the construction phase	– Procure services of security firms/marshals to enhance security
6.	Water quality degradation and pollution	– Installation of effective bio digester, monitor water quality
7.	Noise and air pollution	– Construction undertaken during daytime hours, installation of dust screens around the project area, use of efficient machinery and equipment and monitoring of air quality and noise levels
8.	The road to be used by heavy commercial vehicles and trucks while delivering construction material to site	– Access road off C. Obote and Oginga Odinga Road junction
9.	MRCC operation activities and train along the project area	– Provide alternative route during operation of MRCC – Incorporate helipad in the project designs – Liaise and collaborate with KRC to enhance smooth operations of both rail cargo and MRCC ambulances
5.	Sustainability of the MRCC project	– The concerns will be forwarded to KMA to consider collaborating with KRC and other key state agencies for sustainability of the proposed project

6.4.2 Stakeholder meeting to review draft ESIA Study Report

The stakeholder meeting to review draft ESIA Study Report was held on 21st June 2024 at Selella Resort, Kisumu. The meeting was attended by 23 participants drawn from government agencies, non-governmental organization, civil society and neighbor to the site. The purpose of the meeting was to review the draft ESIA study report for the proposal and summary of issues and concerns (Table 16) and stakeholders took tour of the access road and the project site (Figure 23 and 24).



Figure 23: Participants during tour of the project site (left) and access road at C. Obote Junction (right) (Source: Stakeholder meeting held on 21st June 2024)



Figure 24: Participants during the stakeholder meeting to review the draft ESIA Study Report follow the proceedings (Source: Stakeholder Meeting held on 21st June 2024).

Table 17: Summary of issues raised during stakeholder meeting to review draft ESIA Study Report and response provided by the proponent and consultant on 21st June 2024

Issue No.	Issues raised by stakeholders	Response provided
1.	Restriction of access road to Kichinjio BMU Landing Site	– KMA will work with County Government of Kisumu and stakeholders to provide alternative access road to Kichinjio BMU Landing Site
2.	The wayleave distance to the railway line	– KMA will work closely with KRC to ensure compliance of provisions of KRC Act Cap 397 of Laws of Kenya
3.	Reclamation of riparian area	– The project will be implemented in collaboration with KPA and other relevant agency during the reclamation process.
4.	Waste management	– Effective waste management plan and waste management system will be put in place
5.	Obstruction of lake view	– The building will be constructed in compliance with the Physical Planning Act and Building Code

6.4.3 Stakeholder meeting to validate ESIA Study Report

Third stakeholder meeting was held on 25th June 2024 at Seella Resort, Kisumu (Figure 25). The agenda of the meeting was as follows;

- Prayer and introductions
- Opening remarks by KMA
- Review of stakeholder comments on ESIA Study Report as per the meeting held on 21st June 2024
- Presentation on final ESIA Study Report
- Plenary discussions
- Validation ESIA Study Report
- Way forward and AOB



Figure 25: Participants during the stakeholder meeting to validate ESIA Study Report (Source: Stakeholder meeting held on 25th June 2024)

Table 18: Summary of issues raised during stakeholder meeting to validate ESIA Study Report and response provided on 25th June 2024

Issue No.	Issues raised by stakeholders	Response provided
1.	Provision of alternative access route to the landing site	– Temporary alternative route can be provided after further deliberations. However, consultations between KMA, CGK and Kichinjio BMU should be carried out to determine permanent solution
2.	Collaboration with CGK and ministry of roads to ensure the project is not decommissioned due to future development plans at the project area	– Recommendation will be taken into consideration
3.	Consider lake level while designing and developing waste management system	– Recommendations will be forwarded to engineers for consideration
4.	Ensure design for the bio digester incorporates efficient and effective technology	– Recommendations will be forwarded to engineers for consideration and evaluation
5.	Progress on engagement between KMA, KPA and KRC	– A consultation meeting has been scheduled
6.	Timely application of energy supply from KPLC to minimize delays in approvals	– Recommendation will be taken into consideration
7.	Corporate Social Responsible (CSR) activities	– KMA will continue offering marine training and education once the facility is operational

All the stakeholders validated the ESIA Study Report subject to inclusion of their final comments.

6.5 Grievances Redress Mechanism

The project affected persons may raise their grievances and dissatisfaction about the actual or perceived impacts in order to find a satisfactory solution. The grievances may arise at different stage of the project cycle and may be influenced by the physical, situational or social issues which should not only be given adequate hearing but also provided with satisfactory solutions to both the affected person as well as the project. Moreover, the project affected persons have access to legitimate, reliable, transparent and efficient institutional mechanisms that are responsive to their complaints.

6.5.1 Grievances prevention

Grievances cannot be avoided entirely, but much can be done to reduce them to manageable numbers and reduce their impacts. This will be achieved by;

1. Sufficient and timely provision of information to locals. The local communities should be provided with accurate and adequate information about the proposed project and its related activities regularly since many grievances arise because of inconsistent or insufficient information, misunderstandings and lack or delayed information.
2. Meaningful community consultations where the proponent should continue the dialogue and consultation with the community throughout the project implementation. To achieve, this the information should be shared, project progress reported and community provided with an opportunity to express their concerns, clarification as well as the issues responded or feedback provided.
3. Overall good management of the facility will ensure a reduction in potential conflicts with the local community and other stakeholders.

6.5.2 Grievances Redress Mechanism Tool

The proposed MRCC will have a prompter and efficient resolution on individual and collective complaint and provision of feedback on any grievances and dissatisfaction from stakeholders during construction and operations. The flow chart below (Figure 26) shows a proposal consideration for the Grievances Redress Mechanism (GRM) for the proposed project that provides an accessible channel for submission of complaints and feedback to stakeholders. The proponent should therefore prepare site specific GRM during construction and operation phase.

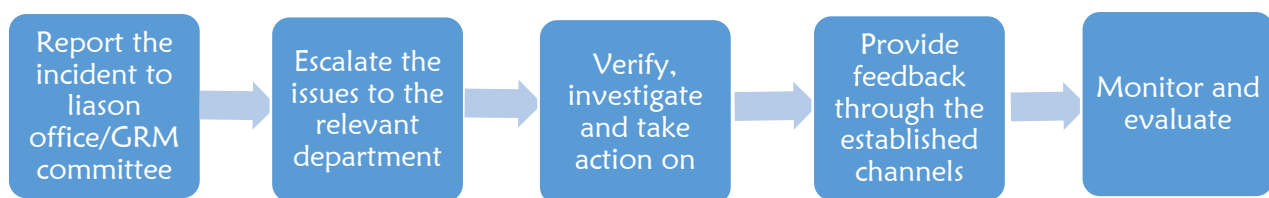


Figure 26: Schematic representation of the proposed Grievances Redress Mechanism Tool

7 ANALYSIS OF ALTERNATIVES

7.1 Introduction

Identifying and assessing alternatives to the proposed project is key since it allows the proponent to evaluate possible options that could mitigate the identified environmental and social concerns during the ESIA process. The feasibility and pre-construction design alternatives will also assist NEMA and relevant lead agencies in decision making process.

7.1.1 The 'No' project alternative

The 'No' Project option in respect to the proposed project implies that the status quo is maintained. From an extreme environmental perspective, this option is the most suitable alternative as it ensures non-interference with the prevailing conditions. The 'No Project Option' will deny KMA the opportunity to enhance navigation safety, create employment opportunities and generation of revenue to both national and county governments. Hence, this option is not considered viable in the light of the benefits of the proposed project.

7.1.2 The 'Yes Project' alternative

The 'Yes Project' alternative is deemed the most viable due to its significant socio-economic benefits. The MRCC will enhance navigational safety and the well-being of local communities while also fulfilling the KMA's mandate for the coordination of Search and Rescue (SAR) operations. Under this alternative, NEMA would approve and issue an Environmental Impact Assessment (EIA) license for the proposed project, provided all environmental measures and license conditions are adhered to during both the construction and operational phases. This alternative encompasses the applicant's final proposal, with the incorporation of the NEMA regulations and procedures as stipulated in the environmental impacts to the maximum extent practicable.

7.1.3 Alternative Site

Initially, two sites had been proposed for the construction of the MRCC i.e. at Dunga area and Kisumu Port. During the reconnaissance survey and kick-off stakeholder engagement meetings, it was noted that Dunga had several challenges including the size of the land which would require substantial reclamation to provide adequate area for the construction of the MRCC, a river traversing the site, high risk of human-wildlife conflicts, backflow of water increasing instances of flooding, access road and was fraught with navigational risks. On the other hand, Kisumu Port area presented the most viable site in terms of land area, accessibility, navigation and the opportunities to build on the synergies provided by the revitalized port infrastructure. Hence the choice of the site at Kisumu port for the construction of the MRCC.

7.1.4 Alternatives to Construction materials and Technology

The proposed project will be constructed using modern, locally, and internationally accepted standards of materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that facilitates effective air quality control, saves energy and water will be given priority without compromising on cost or availability factors. The concrete pillars and walls will be made using locally sourced stones, cement, sand (washed and clean), metal bars and fittings that meet the Kenya Bureau of Standards (KEBS) requirements.

7.1.5 Waste water management alternatives

Six locally available technologies are discussed below: -

1. Alternative one - Connection to the existing sewer system

This alternative works best in areas served by a sewer line. Connection to an available large main sewer line solves wastewater management issue at a very minimal cost and in an environmental efficient manner. The site within which the proposed project is to be undertaken is not served by a sewer line hence this option would not be preferable for this case.

2. Alternative two - Use of bio-digester

Bio-digester is a technology based on the biodegradable processes. The organic waste matter is broken down by the bacteria to produce biogas (used for cooking). In addition, water is let out to water bodies without polluting them and also it's recycled (for irrigation purposes and flushing toilets) or soaked in soil. The project design should adopt an element of this alternative in-order to manage the wastewater from MRCC building. There are various bio-digester technologies and the proponent should ensure the designs factors in the issue of lake level, efficiency and effectiveness of the treatment option.

3. Alternative Four - Use of septic tanks

This involves the building of underground concrete-made tanks for sludge storage. The construction cost is high and it requires regular emptying. This is not a preferred option given the anticipated large volumes of wastewater emanating from the proposed MRCC.

4. Alternative five- Use of stabilization ponds/lagoons

This refers to the use of a series of ponds/lagoons which allow several biological processes to take place, before the water is released to the outside environment. The lagoons can be used for aquaculture purposes and irrigation. However, they occupy a lot of space but are less costly. No chemicals are used/heavy metals sink and decomposition processes take place. They are usually a nuisance to the public because of smell from the lagoons/ponds. This option is not preferable because of the availability of land and proximity to residential area.

5. Alternative Six - Waste water treatment plant

This involves the construction of a WTP and use of chemicals to treat the effluents to locally/internationally accepted environmental standards before it is discharged into the river nearby. It is usually expensive to construct and maintain, but it is the most reliable, efficient and cost-effective in the long term. The sludge obtained can be composted and used for agricultural and gardening purposes. The option is not preferable as it is expensive.

7.1.6 Energy Source**1. Natural lighting**

This refers to maximum use of the natural environment, the windows spacing of the MRCC are enlarged such that natural lighting is utilized during the day. It is the most efficient, environmentally friendly and cost-effective especially for daytime lighting

2. Renewable energy (Solar Option)

Installation of solar panels is another green technology the project design has prioritized to supplement energy supply. Solar power is environmentally sound and doesn't produce emissions from burning of fossil fuel. In addition, the facility will have lower carbon footprint and reduced impact on the environment

3. Kenya Power & Lighting Company Ltd (KPLC)

The main source of electricity will be by Kenya Power and Lighting Company. It is an efficient and reliable source of power. However, to reduce the electricity costs priorities should be; make use of motion detectors, use of Light Emitting Diodes (LEDs) that have Light Dependent Resistance (LDR) for security and street lighting and use of hybrid electricity i.e. combining electricity from photovoltaic solar panels used for lighting purposes to complement KPLC power source, this will provide a balanced energy supply.

Thus, a combination of KPLC, Natural lighting and Solar Power is the most recommended option for this project.

4. Stand by-Generator

The generator will be used as a back-up power supply option in case of emergency or power-outage. The cost of running the generator maybe very high and the noise and air pollution can cause nuisance and enhance carbon footprint impact. It is therefore recommended that the contract supplying the generator should install silencers to minimize noise, install scrubbers to prevent emissions and house it in an enclosure.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The preceding section has analyzed and identified the potential environmental and social impacts of the proposed project as well as the mitigation measures to address the impacts. Under this section, three Environmental and Social Management Plans (ESMPs) are proposed to guide the proponent in implementing the mitigation measures. These are ESMPs for the establishment, operational and possible decommissioning phases. Each of the ESMP is organized into five sections comprising of the environmental and social impacts, mitigation measures, implementing party, timeframe and estimated cost.

8.1 Environmental and Social Management Plan during the construction phase

During construction phase of the proposed project, the environmental and social concerns will include reclamation of riparian area, occupational safety and health risks, water quality degradation, air and noise pollution, water use and effluent management, solid waste generation and management, conflicts arising from the access road, labour influx and social concerns, potential conflicts with neighbours and other lake users, navigational risks, increases Human-Wildlife conflicts. Table 19 provides the mitigation measures, implementing party, timeframe and estimated budget to avoid and/or eliminate the magnitude of the identified impacts.

Table 19: Environmental Management Plan during construction phase of the Maritime Rescue Coordination Centre

Anticipated impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
Potential conflicts with neighbours and other road users	Liaise with County Government of Kisumu, KPA and the BMU to determine the alternative route to the landing site	KMA/ Contractor	Throughout construction	Nil
	Restrict access to the construction site only and not any of the other areas	KMA/ Contractor	Throughout construction	Nil
	Erect warning sign along the access road to forewarn on the ongoing construction works	KMA/ Contractor	Throughout construction	Nil
	Liaise with KRC and install a level crossing at the railway line	KMA/ Contractor	Prior to construction	Nil
Reclamation of riparian land from the lake	Apply and obtain a Permit from Water Resources Authority (WRA) to riparian land enhance management conditions	KMA/ Contractor	Throughout construction	As per invoice
	Use of silt curtains during reclamation to prevent siltation/sediment flow into neighbouring areas	KMA/ Contractor	Throughout construction	Nil
	Create an alternative green space by planting trees within the project site	KMA/ Contractor	Throughout construction	20,000
	Ensure the project structures can withstand changes in climatic conditions	KMA/ Contractor	Throughout construction	Nil
	Sustain stakeholder consultations to ensure continuous support for the project	KMA/ Contractor	Throughout construction	Nil
	Comply with the provision of the Physical Planning and Development Act, 2019	KMA/ Contractor	Throughout construction	Nil
	Comply with the provisions of Water Resources Regulations, 2021	KMA/ Contractor	Throughout construction	Nil
Water quality degradation	Construct silt traps and embankments along the shoreline area to manage storm water from the construction site	KMA/ Contractor	Throughout construction	In project costs
	Construction could be carried out during the dry season and at times of minimal rainfall (<20mm)	KMA/ Contractor	Throughout construction	Nil
	Use of excavated soil material for backfilling and leveling as well as compacting	KMA/ Contractor	Throughout construction	Nil
	Provide waste collection infrastructure at the site including litter bins	KMA/ Contractor	Throughout construction	50,000

Anticipated impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
Traffic congestion	Deploy fleet officers to manage traffic flow in and out of the site	KMA/ Contractor	Throughout construction	In project costs
	Collaborate with KRC to enhance management of cargo transportation and construction activities	KMA/ Contractor	Throughout construction	Nil
	Signage and barricades should be used as part of the typical construction traffic controls.	KMA/ Contractor	Throughout construction	20,000
	Offload of construction materials be done on the site and not on the road reserves to ensure smooth flow of traffic	KMA/ Contractor	Throughout construction	Nil
	Comply with the provisions of the Traffic Act, 2016	KMA/ Contractor	Throughout construction	Nil
Occupational safety and health risks	Register site as workplace with DOSHs	KMA/ Contractor	Prior to construction	As per invoice
	Obtain insurance cover for workers at the site	KMA/ Contractor	Throughout construction	As per No. of workers
	Prepare and implement an emergency response plan	KMA/ Contractor	Throughout construction	20,000
	Provide well stocked first aid kits and trained personnel at the site	KMA/ Contractor	Throughout construction	25,000
	Train workers on first aid services and working at the lakeside area	KMA/ Contractor	Throughout construction	Nil
	Provide adequate and appropriate PPEs and enforce on their use	KMA/ Contractor	Throughout construction	As per No. of workers
	Erect safety signage at all active construction areas	KMA/ Contractor	Throughout construction	In project costs
	Provide an incident/accident register	KMA/ Contractor	Throughout construction	Nil
	Comply with the Occupational Safety and Health Act, 2007	KMA/ Contractor	Throughout construction	Nil
Air pollution	Install appropriate and adequate dust screens around the project site	KMA/ Contractor	Throughout construction	Nil
	Sprinkle water at active excavation areas and unpaved access road to suppress fugitive dust	KMA/ Contractor	Throughout construction	30,000 daily

Anticipated impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
	Cover stockpiles of construction materials to reduce dust emissions especially during windy conditions	KMA/ Contractor	Throughout construction	Nil
	Provide adequate Personal Protective Equipment(e.g., dust masks) and enforce on their use among personnel	KMA/ Contractor	Throughout construction	As per No. of workers
	Use serviceable machinery/equipment and trucks	KMA/ Contractor	Throughout construction	Nil
	Comply with the Environmental Management and Coordination (Air Quality) Regulations, 2014	KMA/ Contractor	Throughout construction	Nil
Noise pollution	Ensure excavation and construction works are limited to daytime hours only (i.e., between 8am to 5pm)	KMA/ Contractor	Throughout construction	Nil
	Locate peak noise producing machines away from neighboring residential developments	KMA/ Contractor	Throughout construction	Nil
	Provide and enforce the use of appropriate PPEs to workers and visitors accessing the peak noise producing areas	KMA/ Contractor	Throughout construction	As per No. of workers
	Sensitize truck drivers to avoid unnecessary hooting and running of vehicle engines	KMA/ Contractor	Throughout construction	Nil
	Comply with the Noise and Excessive Vibration Pollution (Control) Regulations, 2009	KMA/ Contractor	Throughout construction	Nil
Water use and effluent management	Sensitize workers on water conservation	KMA/ Contractor	Throughout construction	Nil
	Monitoring water consumption streams by the project	KMA/ Contractor	Throughout construction	Nil
	Use of mobile toilets from a NEMA licensed waste contractor for workforce sanitation	KMA/ Contractor	Throughout construction	Tender
	Comply with the Environmental Management and Coordination (Water Quality) Regulations, 2006	KMA/ Contractor	Throughout construction	Nil
Solid waste management	Use overburden in backfilling and landscaping the site	KMA/ Contractor	Throughout construction	Nil
	Procure construction material based on the Bill of Quantities to avoid wastage	KMA/ Contractor	Throughout construction	Nil
	Procure and strategically place adequate solid waste collection bins with capacity for segregation within the construction site	KMA/ Contractor	Throughout construction	Nil

Anticipated impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
	Maximize re-use of recyclables and minimize use of packaged materials	KMA/ Contractor	Throughout construction	Nil
	Create awareness on the process of solid waste collection, segregation and proper disposal among the workforce	KMA/ Contractor	Throughout construction	Nil
	Procure a sizeable central solid waste collection bin with chambers to accommodate separated wastes	KMA/ Contractor	Throughout construction	100,000
	Procure services of a NEMA licensed solid waste handler for disposal of solid wastes from the central collection bin	KMA/ Contractor	Throughout construction	Tender
	Comply with the Environmental Management and Coordination (Waste Management) Regulations, 2006	KMA/ Contractor	Throughout construction	Nil
	Comply with the Sustainable Waste Management Act, 2022	KMA/ Contractor	Throughout construction	Nil
Labour influx and social concerns	Prepare a site-specific Labor Influx Management Plan which should be approved by KMA	Contractor	Prior to Construction	50,000
	Implement measures to prevent, identify, address, and resolve conflicts before and when they occur at the workplace	KMA/ Contractor	Throughout construction	Nil
	Ensure development and implementation of a Grievances Redress Mechanism (GRM) by the contractor	KMA	Throughout construction	Nil
Potential conflicts with lake users and stalling of the project	Develop and implement effective Grievances Redress Mechanism	KMA/ Contractor	Throughout construction	Nil
	Install silt curtains around the jetty to reduce potential increase in turbidity in adjacent waters	KMA/ Contractor	Throughout construction	200,000
	Develop and implement a Water Quality Monitoring Plan during the construction of the jetty facility	KMA/ Contractor	Throughout construction	50,000
Navigational risks	Create awareness among the local fishermen on the construction of the jetty and its extend on the lake side	KMA/ Contractor	Prior to construction	Nil
	Ensure placement of marker buoys and hazard demarcations to warn fishermen of potential dangers	KMA/ Contractor	Throughout construction	Nil
	Ensure the barges and construction areas are well lit at night	KMA/ Contractor	Throughout construction	Nil
	The barge used in the construction should have old tyres affixed continuously on all sides	KMA/ Contractor	Throughout construction	Nil

Anticipated impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
Increased Human-Wildlife conflicts	Fence off the outer fridges of areas where there is hippo grass which are the key foraging habitats for the hippos.	KMA/ Contractor	Throughout construction	Nil
	Liaise with Kenya Wildlife Service to manage hippos and crocodiles sighted within the area	KMA/ Contractor	Throughout construction	Nil
	Keep records on wildlife sightings, incidents and action taken	KMA/ Contractor	Throughout construction	Nil

8.2 Environmental and Social Management Plan during the operational phase

The anticipated environmental and social concerns during the operational phase of MRCC will include water pollution, oil spills, risks posed by aquatic macrophytes, change in benthic communities, impacts of climate change and lake level rise, waste generation and management, loss of lives and economic decline, impacts related to electromagnetic radiation and structural failure of project infrastructure. Table 20 provides the mitigation measures and implementing agency to avoid and or eliminate the magnitude of the identified impacts.

Table 20: Environmental Management Plan during operation phase of the Maritime Rescue Coordination Centre

Anticipated impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
Water pollution	Install an effective bio digester to manage wastewater flow from the building	KMA Management	Throughout operations	Tender
	Conduct quarterly water quality monitoring on the flows from the bio digester to ensure it meets the standards	KMA Management	Quarterly	40,000per sample
	Installs solid waste screens along storm water drains and ensuring their regular maintenance and monitoring	KMA Management	Throughout operations	100,000
	Comply with Marpol Convention 73/78 and KMA Act, 2012	KMA Management	Throughout operations	Nil
	Comply with Environmental Management and Coordination (Water Quality) Regulations, 2009	KMA Management	Throughout operations	Nil
Oil Spills	Provide adequate oil response kits for containment of oil spills	KMA Management	Throughout operations	50,000
	Ensure workers are regularly trained and sensitized on oil spill cleaning and containment	KMA Management	Throughout operations	Nil
	Refuelling of boats to be undertaken by competent personnel	KMA Management	Throughout operations	Nil
	Compliance with the National Marine Spills Response Contingency Plan	KMA Management	Throughout operations	Nil
Impacts of climate change	Consider lake level rise in MRCC project design	KMA Management	Prior to construction	Nil
	Maximize on natural lighting and ventilation for the infrastructure	KMA Management	Throughout operations	Nil
	Ensure optimal insulation to reduce heating and cooling requirements	KMA Management	Throughout operations	Nil

Anticipated impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
	Prepare annual carbon footprint reports and implement recommendations	KMA Management	Annual	70,000
	Comply with the Climate Change Act 2023, National Climate Change Action Plan 2023-2027	KMA Management	Throughout operations	Nil
	Comply with the Marpol Convention 73/78 (MARPOL Annex VI)	KMA Management	Throughout operations	Nil
Risks posed by aquatic macrophytes	Implement the Early Warning System for drifting, proliferation of aquatic macrophytes prepared by KPA/TMA.	KMA Management	Throughout operations	Nil
Solid waste management	Provide adequate waste collection bins	KMA Management	Throughout operations	50,000
	Contract NEMA licensed personnel to dispose of waste	KMA Management	Throughout operations	Tender
	Ensure timely collection and disposal of wastes	KMA Management	Throughout operations	Nil
	Sell of the recyclable to recycling companies	KMA Management	Throughout operations	Nil
	Comply with the Sustainable Waste Management Act, 2022	KMA Management	Throughout operations	Nil
Loss of lives and economic decline	Ensure regular refresher courses for SAR staff	KMA Management	Throughout operations	Nil
	Use navigational lights to demarcate the jetty area	KMA Management	Throughout operations	Nil
	Install appropriate lights to forewarn other lake users on the presence of the jetty at night	KMA Management	Throughout operations	In project costs
Impacts related to electromagnetic radiations	Restrict entry to server rooms	KMA Management	Throughout operations	Nil
	Ensure regular servicing of the electronic equipment	KMA Management	Throughout operations	Nil
	Ensure encryption and other security measures mitigate risks of insecurity	KMA Management	Throughout operations	Nil
Structural failure	Ensure regular inspection of the facility by a licensed engineer to check its structural integrity	KMA Management	Throughout operations	Nil

Anticipated impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
	Ensure the design and construction of the jetty and lake wall conforms to the building code	KMA Management	Throughout operations	Nil
	Ensure project implementation is supervised by registered engineers	KMA Management	Throughout operations	Nil

8.3 Environmental and Social Management Plan during the possible decommissioning phase

The possible decommissioning ESMP is important in the event of end of project cycle, natural calamities and non-compliance with environmental and health regulations among others. The key issues of concern at this stage will be loss of MRCC, Safety and health risks, waste generation and insecurity (Table 21).

Table 21: Environmental Management Plan during operation phase of the Maritime Rescue Coordination Centre

Anticipated negative impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
Loss of SAR services	Provide an alternative on coordination center for SAR	KMA Management	Prior to decommissioning	Nil
	Train employees on alternative livelihoods prior to decommissioning	KMA Management	Prior to decommissioning	Nil
	Prepare and issue recommendation letters to employees to seek alternative employment opportunities	KMA Management	Prior to decommissioning	Nil
	Comply with labor laws by paying the employees their terminal dues	KMA Management	Throughout decommissioning	Nil
Safety and health risks	Carry site safety risk assessment	KMA Management	Prior to decommissioning	50,000
	Install signage to forewarn people on ongoing demolition activities	KMA Management	Throughout decommissioning	10,000
	Contract a licensed construction company to carry out demolitions	KMA Management	Throughout decommissioning	Tender
	Avail first aid kits on site throughout the entire period	KMA Management	Throughout decommissioning	25,000
	Ensure the process of demolition is supervised by competent personnel	KMA Management	Throughout decommissioning	Nil
	Comply with the Environmental Management and Coordination Air Quality Regulations, 2014	KMA Management	Throughout decommissioning	Nil
	Comply with Noise and Excessive Vibration Pollution (Control) Regulations, 2009	KMA Management	Throughout decommissioning	Nil
	Comply with the provisions of the Occupational Safety and Health Act, 2007	KMA Management	Throughout decommissioning	Nil
Waste generation	Contract NEMA licensed waste handler to dispose demolition wastes	KMA Management	Throughout decommissioning	Tender

Anticipated negative impacts	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
	All recyclable materials should be collected and sent to NEMA licensed recyclers	KMA Management	Throughout decommissioning	Nil
	Comply with the Environmental Management and Coordination (Waste Management) Regulations, 2006	KMA Management	Throughout decommissioning	Nil
	Comply with the Environmental Management and Coordination (Water Quality) Regulations, 2006	KMA Management	Throughout decommissioning	Nil
Insecurity	The proponent should extend the tenure of contracted security firm	KMA Management	Throughout decommissioning	As per contract

9 ENVIRONMENTAL MONITORING PLANS

A suite of Environmental Monitoring Plans is proposed to assist the proponent in mitigating the adverse impacts arising from the operations of the port and enhance the positive benefits arising from the facility through implementation of the proposed mitigation measures. The purpose of the monitoring plan is to ensure that the impacts do not exceed legal standards specified under the different legislations. Implementation of the monitoring plans will ensure that the negative impacts of the project are lessened throughout operations. For the proposed project site, seven monitoring plans are proposed. These are;

1. Water quality monitoring plan
2. Biodiversity monitoring plan
3. Occupational safety and health monitoring plan
4. Air quality monitoring plan
5. Noise monitoring plan
6. Solid waste monitoring plan

9.1.1 Water quality monitoring plan

9.1.1.1 Introduction

The objective of the water quality sampling and analysis is to assess the variation in physical and chemical characteristics of the water in the lake due to the construction and operational activities and provide a baseline for assessing the effectiveness of environmental mitigations measures designed to minimize water contamination.

9.1.1.2 Monitoring parameters

Effluent from the proposed bio-digester will be monitored pursuant to the Third Schedule of Environmental Management and Coordination (Water Quality) Regulations, 2006 whereas lake water will be monitored pursuant to the KS EAS 12:2018 specification for natural potable water (Table 22 & 23).

Table 22: Water quality monitoring parameters and the standards prescribed under the Third Schedule of the Environmental Management and Coordination (Water Quality) Regulations, 2006.

Parameter	EMC (Water Quality) Regulations, 2006 Standards
PH Value	6.5-8.5
BOD; mg/L	30max
COD; mg/L	50 max
Total Suspended Solids; mg/L	30 max
Ammonia-NH ⁺ ; mg/L	100 Max
Total Dissolved Solids; mg/L	1200 Max
E. <i>Coli</i> Colonies; count/100ml	Nil
Total coliform; count/100ml	1000/100ml

Table 23: Water quality monitoring parameters as per KS EAS 12:2018 specification for natural potable water.

Parameter	KS EAS 12: 2018 Specification for natural potable water
PHYSICAL TESTS	
Appearance	Unobjectionable
Odor	Unobjectionable
Suspended matter	Not detectable
Colour hazen units, TCU	50 MAX
PH@25°C	5.5-9.5
Conductivity, μ S/cm	2500 MAX

Parameter	KS EAS 12: 2018 Specification for natural portable water
CHEMICAL TESTS	
Total dissolved solids, mg/L	1500 MAX
Total hardness as CaCO ₃ , mg/L	600 MAX
Chlorides as Cl, mg/L	250 MAX
Aluminum as Al, mg/L	0.2 MAX
Manganese as M, mg/L	0.1 MAX
Iron as Fe, mg/L	0.3 MAX
Sodium as Na, mg/L	200 MAX
Magnesium as Mg, mg/L	100 MAX
Calcium as Ca, mg/L	150 MAX
Lead as Pb, mg/L	0.01 MAX
Copper as Cu, mg/L	1.0 MAX
Fluoride as F, mg/L	1.5 MAX
Potassium as K, mg/L	50 MAX
Sulphates as SO ₄ , mg/L	400 MAX
Total alkalinity as CaCO ₃ , mg/L	-
Residual Chlorine as Cl ₂ , mg/L	Absent
MICROBIOLOGICAL TESTS	
Total plate count@ 37°C, cfu/ml	50 MAX
Total plate count@ 22°C, cfu/ml	100 MAX
Total coliform count, cfu/ml	Absent
<i>Escherichia coli</i> , cfu/ml	Absent
<i>Pseudomonas aeruginosa</i> , /100ml	Absent

9.1.1.3 Monitoring location

Water quality monitoring should be carried out at the discharge point of the proposed bio digester and at the Jetty area in the Lake.

9.1.1.4 Monitoring frequency

Lake water sampling and analysis should be undertaken monthly whereas that for effluent should be undertaken quarterly in collaboration with a NEMA designated laboratory.

9.1.2 Biological communities monitoring plan

9.1.2.1 Introduction

The construction of the MRCC and subsequent operations are likely to deteriorate the water quality of the lake. Poor water quality may directly impact negatively on fisheries due to pollution and reduced oxygen hence destroying fish breeding grounds. In addition, invasive aquatic macrophytes in the lake exhibit a cyclical pattern of decline and proliferation with attendant ecological and economic impacts such as hindering navigation, fisheries and tourism/recreation. The objective of the biological monitoring plan is to track changes in fisheries, macroinvertebrates and aquatic macrophytes so as to inform mitigation measures and environmental management decisions by KMA.

9.1.2.2 Monitoring location

The monitoring location will coincide with that of the water quality monitoring station within the lake. Monitoring for aquatic macrophytes should target the hot spots including areas receiving nutrients loads, areas in proximity to river mouths and shallow areas within the lake.

9.1.2.3 Monitoring parameters

The monitoring parameters should include percentage cover for aquatic macrophytes, critical habitats, fisheries and macroinvertebrates species diversity, abundance, catch per unit effort and landings.

9.1.2.4 Monitoring frequency

Annually, during the annual Environmental Audit for the MRCC.

9.1.3 Safety and Health monitoring plan

9.1.3.1 Introduction

During construction and operation phases, workers, neighbors and visitors to the facility will be exposed to various safety and health risks. The purpose of the safety and health monitoring plan is to assess existing controls alongside potential safety and health risks to develop an effective action plan and to ensure compliance with Occupational Safety and Health Act, 2007.

9.1.3.2 Monitoring strategy

The proponent should be committed to ensuring, as far as is reasonably practicable, the safety and health of the workers, visitors to the site and neighbors is not put at risk during the construction and operational phase of the facility. This will be achieved by;

- Working closely with KRC to enhance smooth operations of railway cargo and MRCC activities
- Routine inspections of the facility and equipment.
- Visual inspection as well as interviewing key personnel to identify areas of improvement.
- Conducting occupational safety and health reviews and reports.
- Administration of safety awareness and motivation scheme.
- Undertaking and reviewing of fire, energy and risk assessment reports.
- Review of safety awareness, fire drills and fire safety training requirements.
- Evaluation of the effectiveness of health and safety training to the workforce.
- Action plans related to significant findings of the risk assessment.
- Having emergency evacuation plans and emergency routes and safety signage among others.
- Assessment of risks involving hazardous substances i.e. receipt, storage & handling.
- Hazard identification by analyzing activities that can be an immediate threat or cause harm over a period of time.
- Ensuring that all accidents and incidents occurring at the site are promptly reported and investigated.

The responsibility for implementing this monitoring plan will be vested in the Department of Occupational Safety and Health Services (DOSHS) and overall KMA management.

9.1.3.3 Indicator of success

The ideal indicators of success will include zero accidents and fatalities and reduction in the number of incidents and accidents at the site.

9.1.4 Air quality monitoring plan

9.1.4.1 Introduction

The purpose of the air quality monitoring plan is to ensure the concentrations of the dust, gaseous emissions and Green House Gases emanating from the construction and subsequent operations of

the proposed MRCC are within the stipulated standards set under the Environmental Management and Coordination (Air Quality) Regulations, 2014.

9.1.4.2 Monitoring parameters

The monitoring parameters and the specified target values are stipulated under the First Schedule of the Environmental Management and coordination (Air Quality) Regulations, 2014 (Table 24).

Table 24: Ambient air quality tolerance limits as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014.

Pollutant	Time weighted average	Industrial area
Sulphur oxides (SO _x)	Annual Average*	80 µg/m ³
	24 hours**	125 µg/m ³
Oxides of Nitrogen (NO _x)	Annual Average*	80 µg/m ³
	24 hours	150 µg/m ³
Nitrogen Dioxide	Annual Average	150 µg/m ³
	24 hours	100 µg/m ³
Suspended Particulate Matter (SPM)	Annual Average	360 µg/m ³
	24 hours	500 µg/m ³
Respirable particulate matter (< 10µm) (RPM)	Annual Average*	70 µg/m ³
	24 Hours**	150 µg/Nm ³
PM _{2.5}	Annual Average	35 µg/m ³
	24 Hours	75 µg/m ³
Lead (Pb)	Annual Average*	1.0 µg/Nm ³
	24 hours**	1.5 µg/m ³
Carbon monoxide/ Carbon dioxide	8 hours	5.0 mg/m ³
	One hour	10 mg/m ³
Hydrogen Sulphide	24 hours**	150 µg/m ³
Non methane hydrocarbons	Instant Peak	700ppb
Total VOC	24 Hours**	600 µg/m ³
Ozone	One hour	200 µg/m ³
	8 hour (Instant Peak)	120 µg/m ³

9.1.4.3 Monitoring location

Air quality monitoring should be carried out at the project site during the construction and operational phases.

9.1.4.4 Monitoring frequency

Air quality monitoring should be done on a quarterly basis in collaboration with a NEMA designated laboratory.

9.1.5 Noise monitoring plan

9.1.5.1 Introduction

Potential sources of noise pollution are construction activities, machinery and equipment operations and vehicular movements among others. The noise levels produced may be above the stipulated EMCA limits and may lead to hearing impairments to the workers, visitors to the site and the neighbours. The purpose of noise monitoring plan is to therefore ascertain the extent of the impact due to the construction and subsequent operation of the MRCC site in compliance with the First and Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibrations pollution) (control) Regulations, 2009.

9.1.5.2 Monitoring parameters

Noise level measurements will be monitored pursuant to the First and second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibrations pollution) (control) Regulations, 2009 (Tables 25 & 26).

Table 25: Maximum permissible intrusive noise levels for construction sites as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Zone		Maximum Noise Level Permitted (Leq) in db(A)	
		Day	Night
(i)	Health facilities, educational institutions, homes for disabled etc.	60	35
(ii)	Residential	60	35
(iii)	Areas other than those prescribed in (i) and (ii)	75	65

Table 26: The maximum permissible intrusive noise levels as per the First Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Zone		Sound Level Limits dB (A) Leq, 14 h		Noise Rating Level (NR) Leq, 14 h	
		Day	Night	Day	Night
A	Silent Zone	40	35	30	25
B	Place of worship	40	35	30	25
C	Residential: Indoor	45	35	35	25
	Outdoor	50	35	40	25
D	Mixed Residential (with some commercial and places of entertainment)	55	35	50	25
E	Commercial	60	35	55	25

Day: 6.01 a.m. – 8.00 p.m. (Leq, 14 h) Night: 8.01 p.m. – 6.00 a.m. (Leq, 10h)

9.1.5.3 Monitoring location

Noise monitoring should be carried out within the project site.

9.1.5.4 Monitoring frequency

Noise monitoring should be done on a quarterly basis in collaboration with a NEMA designated laboratory. Noise levels will be measured in dB (A).

9.1.6 Solid waste monitoring plan

9.1.6.1 Introduction

Solid waste will emanate from construction activities and during the operational phase of the proposed MRCC. Poor disposal of the waste will cause environmental pollution, water quality degradation of water quality, odor problems and therefore a health risk to the workers, visitors to the facility and neighbors. The purpose of the monitoring plan is to therefore ensure solid waste is managed in such a way that it protects both the public health and the environment.

9.1.6.2 Monitoring strategy

The solid waste monitoring plan will document the collection, storage and disposal of solid waste from the proposed facility. There is need to code each of the collection points, note the capacity and critical levels, frequency of disposal and the personnel and contractor responsible. In addition,

it will be important to characterize the waste streams at the collection points to inform investments in segregation infrastructure.

9.1.6.3 Monitoring frequency

The frequency of solid waste monitoring will differ from the collection to the disposal stage in order to ensure reduced odours and accumulated heaps of waste. Table 27 describes the outline for which the activity will be monitored but can be adjusted depending on the amount generated.

Table 27: Sample outline for solid waste monitoring plan.

Activity	Frequency	Critical levels (Tons)	Target	Responsibility
Collection	Daily			
Storage	Daily			
Management	Daily			
Disposal	Weekly			

9.1.6.4 Indicator of success

Indicators of success will include timely collection and disposal of waste by the contractors, waste disposal tracking documents and certificates issued at the disposal sites in case of hazardous waste.

9.1.7 Grievances Redress Mechanism

A Grievances Redress Mechanism (GRM) tool will be developed for conflicts prevention and resolution. The objective of the GRM tool is to ensure that grievances by stakeholders are addressed and resolved in a fair and transparent manner and ensure careful documentation and reporting of grievances and corrective actions.

10 CONCLUSION AND RECOMMENDATIONS

10.1 Conclusion

The proposed project is important and beneficial to the riparian communities as it will promote their safety and well-being. However, the construction, operation and possible decommissioning phases will have significant environmental impacts which if not addressed could lead to pollution safety risks that affect the health of the communities. To address these impacts, the ESIA Study report proposes has proposed a suite of comprehensive Environmental and Social Management and Monitoring Plans to be implemented during the entire project cycle and enhance the environmental performance during project implementation.

10.2 Recommendations

The main recommendation of the EIA is the need for concerted implementation of the EMP and Monitoring Plans by the proponent. These includes;

1. Consider lake level rise and extreme climate conditions in project designs
2. Construct silt traps and embankments along the shoreline area to manage storm water from the construction site
3. Incorporate an effective storm water management plan in the project designs
4. Liaise with the County Government of Kisumu, Kichinjio BMU and other key stakeholders to mitigate potential conflicts arising from access road
5. Liaise with KRC to enhance MRCC activities and rail cargo operations
6. Register site as workplace with DOSHS
7. Prepare and implement an emergency response plan
8. Consider alternative routes for ferrying to the health facilities
9. Provide adequate waste collection infrastructure at the site
10. Sprinkle water at active excavation areas and unpaved access road to suppress fugitive dust
11. Provide adequate Personal Protective Equipment and enforce on their use
12. Use serviceable machinery/equipment and trucks
13. Sensitize workers on water and energy conservation
14. Use mobile toilets from a NEMA licensed waste contractor for workforce sanitation
15. Install bio digester to manage wastewater flow from the building
16. Procure services of a NEMA licensed waste handler personnel for disposal of solid waste
17. Ensure development and implementation of the Grievances Redress Mechanism
18. Apply and obtain permit from WRA for riparian area to enhance management
19. Use of silt curtains during reclamation to prevent siltation/sediment flow into neighboring areas
20. Use navigational lights to demarcate the jetty area to enhance safety
21. Comply with Physical Planning and Land Use Act, 2019
22. Comply with the Water Resources Regulations, 2021
23. Comply with the provisions of the Occupational Safety and Health Act, 2007
24. Comply with the Environmental Management and Coordination (Air Quality) Regulations, 2014
25. Comply with the Noise and Excessive Vibration Pollution (Control) Regulations, 2009
26. Comply with the Environmental Management and Coordination (Water Quality) Regulations, 2006
27. Comply with the Sustainable Waste Management Act, 2022
28. Comply with the Climate Change Act, 2023, National Climate Change Action Plan 2023-2027

29. Comply with Marpol Convention 73/78 (MARPOL Annex VI)

On the basis of a commitment by the proponent to implement the proposed mitigation measures and the Environmental Management Plan, we recommend the issuance of an EIA License alongside its conditions as per the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

11 REFERENCES

1. Republic of Kenya Statutes:
 - Environmental Management and Coordination (Air Quality) Regulations, 2014
 - Environmental Management and Coordination (Controlled substances) Regulations, 2007
 - Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003
 - Environmental Management and Coordination (Noise and excessive vibration) Regulation, 2009
 - Environmental Management and Coordination (Waste Management) Regulations, 2006
 - Environmental Management and Coordination (Water Quality), 2016
 - Environmental Management and Coordination (Wetlands, River banks, Lake shores and Sea Shore Management) Regulations, 2009
 - Environmental Management and Coordination Act Cap 387 of the Laws of Kenya
 - Environmental Management and Coordination Act No. 8 of 1999 (Rev. 2015)
 - Climate Change Act, 2023
 - Constitution of Kenya, 2010
 - County Government Act, 2012
 - Kenya Coast Guard Service Act, 2018
 - Kenya Maritime Act, 2012
 - Kenya Ports Authority, 2014
 - Kenya Railways Corporation Act, 2012
 - Merchant Shipping Act, 2009
 - Sustainable Waste Management Act, 2022
 - Occupational Safety and Health Act, 2007
 - Physical and Land Use Planning Act, 2019
 - Public Health Act, 2012
 - Water Act, 2016
2. S. B. Wandera. "Seasonal Abundance, Vertical Migration and the fishery of Daaga *Rastrineobola argentea* in the Ugandan Waters of Lake Victoria". Food and Agriculture Organization. FAO accessed online 15th June 2023 at <https://www.fao.org/3/v2648e/V2648E21.htm>.
3. United Nations Environment Programme. (2006). Lake Victoria basin environment outlook: environment for development. United Nations Environmental Programme.
4. Wandera, S B. (1992). A study of *Rastrineobola argentea* in Ugandan Lakes, p 36-50. In: Mannini, P. (ed.) The Lake Victoria dagaa (*Rastrineobola argentea*). Report of the first meeting of the working group on Lake Victoria *Rastrineobola argentea*, 9-11 December 1991, Kisumu, Kenya. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP).
5. Witte F., Martien van Oijen, Mary Kische-Machumu and Jan Wanink (2007c) Thirty Years Research on Lake Victoria Cichlids; An Ecological Drama Provides New Scientific Opportunities: In, Lakes: Regional Limnology. Osil News Volume 51-December 2007.

12 ANNEXURES

1. Copy of Pin Certificate for Kenya Maritime Limited
2. Copy of KMA records of maritime accidents/incidents in Lake Victoria Basin
3. Copy of online reported maritime incidents in Lake Victoria Basin
4. Copy of approval of the Terms of Reference for the EIA study
5. Copy of approval from KPA to implement the proposed project on its area
6. Copy of the architectural designs and drawing for the proposed project
7. Copies of the baseline monitoring reports for water quality, ambient air and acoustic levels
8. Copies of acknowledged meeting invitation letters
9. Copies of the stakeholder engagement meetings programmes
10. Proceedings of the kick off stakeholder meetings held on 19th April and 19th June 2024
11. Proceedings of the stakeholder meeting to review draft ESIA Report held on 21st June 2024
12. Proceedings of the stakeholder meeting to validate ESIA Report held on 25th June 2024
13. Copy of NEMA practicing license for the firm, Envasses Environmental Consultants Limited
14. Copy of NEMA practicing license for Lead Expert, Ms. Jane Gitau
15. Copy of NEMA e-citizen payment receipt

Annexures

1. KMA Pin Certificate



**KENYA REVENUE
AUTHORITY**

www.kra.go.ke

PIN Certificate

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

Certificate Date : 17/05/2021

Personal Identification Number
P051175258E

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

Taxpayer Information

Taxpayer Name	KENYA MARITIME AUTHORITY
Email Address	ACCOUNTANTS@KMA.GO.KE

Registered Address

L.R. Number :	Building : WHITE HOUSE
Street/Road : WHITE HSE	City/Town : MOMBASA
County : Mombasa	District : Kilindini District
Tax Area : Kilindini	Station : PUBLIC SECTOR DIVISION
P. O. Box : 95076	Postal Code : 80104

Tax Obligation(s) Registration

Sr. No.	Tax Obligation(s)	Effective From Date	Effective Till Date	Status
1	Value Added Tax (VAT)	31/07/2014	N.A.	Active
2	Income Tax - Company	10/08/2005	N.A.	Active
3	Income Tax - PAYE	01/04/2006	N.A.	Active

The above PIN must appear on all your tax invoices and correspondences with Kenya Revenue Authority. Your accounting end month is June 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.

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

2. Copy of KMA records of maritime accidents/incidents in Lake Victoria Basin

LAKE VICTORIA INCIDENTS SINCE 2021

S/N O	DATE	VESSEL NAME	REGION	INCIDENT TYPE	CAUSE	REMARKS	DEAD/ CASUALT IES
1	25.02.2021	Unknown	Honge Beach, Siaya	Capsizing	Bad weather	A small canoe with two occupants capsized due to bad weather. One swam to safety but the other drowned which was later recovered.	1 dead 1 survived
2	21.03.2021	Unknown	Seme, Kisumu	Capsizing	Lost balance	Six none local mourners who had attended a burial strolled to the beach and requested two crew of a canoe for a leisure ride. While underway, in the process of taking photos the canoe lost balance and the situation worsened with the rough weather conditions thus capsized. Of the eight POB, three were rescued and five bodies recovered.	5 dead 3 rescued
3	21.03.2021	N/A	Homa Bay	Drowning	Swimming	A first year masonry student at a local technical college went to an abandoned private jetty to swim. Upon diving, he did not resurface but was later sighted trapped under the jetty and recovered.	1 dead
	17.04.2021	N/A	Sango, Rota Beach Nyakach S/County	Drowning	Unknown	Four fishermen who originate from Oseth Beach in Nyando Sub-County went fishing in Sango Rota area, across Winam Gulf where one of them fell into the water in unclear circumstances. The remaining three tried to recover him by deploying the fishing gear within that location but were not successful. A search operation was launched and the body recovered.	1 dead
4	30.04.2021	N/A	Dunga Beach, Kisumu	Crocodile Attack	Unknown	A man was attacked by a crocodile under unclear circumstances at Dunga Beach. His body dragged by the	1 dead

LAKE VICTORIA INCIDENTS SINCE 2021

						crocodile to a mushy area thus rendering the recovery operation difficult. Some parts of his body were later recovered	
5	22/5/2021	N/A	Sango Rota-Kisumu County	Drowning	Attempting to swim back from the drifting platform.	It was reported from Sango Rota BMU that one Moses Ogutu Ogana (Age:55) a resident of the area who had gone to the beach to cut papyrus reeds went missing yesterday at around 1300hrs. It was suspected that the buoyant free floating platform on which the reeds grow may have drifted away with him.	1 dead
6	27.07.2021	ONGER F. SOLDIER	Rari Beach, Kisumu West	Drowning	high speed	The incident occurred during a test-launch of a new wooden boat about 200 meters off the beach. The vessel had nine persons onboard of which three went overboard when the boat suspected to be at a very high speed made a turn. One of the three was rescued while two went missing. The boat and the remaining six persons onboard safely landed at the nearby beach after the incident. The two missing bodies were later recovered.	2 dead
7	21.09.2021	ADUR	Dhuru beach, Homabay	Capsized	Rough weather and overloading	A wooden passenger boat from Dhuru beach heading to Homabay pier capsized with 18 passengers a short distance off the pier. SAR operation was	8 rescued 10 dead

LAKE VICTORIA INCIDENTS SINCE 2021

						conducted by inter agency teams	
8	03.10.2021	N/A	Sango Rota beach	Drowning	accident	A 22yr old slipped off a fishing canoe rowing along the beach. A search operation was conducted by KMA 3 and the locals. the body was recovered and handed over to the police	1 dead
9	10.10.2021	Unknown	Mbita Causeway	Capsized	Unknown	A fishing canoe (paddled with oars) capsized at the Mbita causeway crossing. The canoe had 5 fishermen onboard of which 2 who had donned lifejackets were rescued while 3 went missing. KCGS conducted the search and recovered the missing body.	2 rescued 3 dead
10	11.10.2021	N/A	Kobudho beach, Seme sub-county	Drowning	unknown	A fisherman was reported overdue thus a SAR operation was launched. His body was found and handed over to the police.	1 dead
11	27.10.2021	N/A	Kendu bay pier	Drowning	Unknown	Frank Julius a Tanzanian national drowned while swimming in Kendu bay pier. Residents of Kendu bay conducted search and recovered the body and handed over to local police.	1 Dead
12	17.03.2022	MAMBA	Kisumu	Capsizing	Rough weather	A KCGS boat (MAMBA) capsized in Sango Rota beach off Lake Victoria in Kisumu County. All the five persons on board were rescued without injuries and the boat was recovered then towed to Kisumu pier by KMA 3 boat.	5 rescued

LAKE VICTORIA INCIDENTS SINCE 2021

13	02.01.2022	ATUR	Awana Beach - Homabay	Drowning	Strong waves	A male adult named James Otieno drowned at Awana Beach Homabay County while relocating a wooden canoe named Amr to a berthing area within the beach. The incident is reported to have been caused by strong waves prevailing at the time which threw the fisherman overboard. His body was later retrieved.	1 dead
14	25.06.2022	OSANO DANI	MBITA	Collision	Unknown	An incident occurred at around 1930hrs at the Mbita-Lwanda Kotieno ferry crossing where a wooden motorized boat sunk with 4 fishermen onboard of which 2 were rescued and the remaining 2 went missing. Further updates from KCGS indicated that the incident may have been as a result of a collision between MV Chamaunga and the Wooden motorized boat causing the breaking down and total wreckage of the vessel.	2 Rescued 2 dead
15	26.12.2022		SIRONGO ISLAND-KISUMU	DROWNING	FISHING SPREE	Two brothers reported drowning during a fishing expedition in Sirongo Island, Kisumu county. The incident happened when the two (Dedan Damai 22 and Wycliffe Damai 21) were casting off Sika beach on a Canoe boat. Their boat was	2 dead

LAKE VICTORIA INCIDENTS SINCE 2021

						found floating around Samling area.	
16	01.01.2023	Wooden Canoe	Mulkoba Beach-Port Victoria	Capsizing	Rough weather	Preliminary reports indicated that 7 university students attending a church event within the area decided to hike a ride in a boat which at the time was occupied by an 11 year old boy. In the process while taking selfies, the boat which appeared overloaded got distabilized throwing the occupants overboard. The incident happened approx. 50 metres from the beach. Immediate search rescued 4 including the 11 year old with 3 missing.	4 rescued, three dead bodies.
17	24.03.2023	KRA	Kisumu, Muhuru bay	Sinking	Grounding	A KRA Boat sunk after hitting a stone in L. Victoria, Mgabo beach around Mulani Bay. Five rescued while three persons remained missing that include the vessels Captain, and two police officers. They were later confirmed to have drowned and their bodies recovered after a search operation	5 rescued 3 dead
18	20.04.2023	Unknown	Otomo beach, Siaya County	Drowning	Hippo attack	A lone fisherman was attacked by a hippo that resulted to drowning, one boat attempted to assist but in vain. The body of	1 dead

LAKE VICTORIA INCIDENTS SINCE 2021

						the 57yr old was later found	
19	01.07.2023		Homabay	Man overboard		One person went overboard after while returning from a fishing expedition in Dhuru beach near Homabay pier. His body was recovered the following day.	1 dead
20	04.09.2023		Kisumu-Nyakach	Missing fisherman		A lone fisherman Patrick Oywa 65 years was reported missing on the 29.08.2023 from bala beach Winam gulf. The body was recovered by search team of fishermen on 30.08.2023	1 dead
21	04.09.2023	FV Nyongo	Sango Rota, Nyakach S/County	Drowning	Slipped off	Four fishermen were overwhelmed by strong winds and heavy weather accompanied by heavy downpour at around 0600hrs. The skipper (had no life jacket) slipped and fell into the water.	1 dead
22	07.09.2023	FV TINZIR	Ringiti/Remba island-Homabay	Drowning	Collision	Two fishermen went missing after their boat was involved in a collision with another unknown vessel around Ringiti/Remba. One was rescued by fishermen	2 dead 1 survivor
23	05.10.2023		River Kibos	Drowning		One middle-aged man (Collins Odur Okeyo) with his 5 year old son Glen Washington from Kotunga Village near the dispensary drowned in River Kibos while taking bath.	2 dead
24	14.10.2023		RIAT Airport	Drowning		A 7 year old boy went missing and his body	1 dead

LAKE VICTORIA INCIDENTS SINCE 2021

						was discovered in an open quarry where they were swimming with his friends the previous day.	
25	25.10.2023	Auma Dan Nyadedo	Rusinga Island near Ruoth Island	Went overboard	collision	It was alleged that FV Auma Dan Nyadedo was involved in a collision with MV Uhuru at around 0000hrs. One fisherman went overboard but was rescued. The FV sustained frontal damage and its anchor got stuck with MV Uhuru.	1 rescued
26	27.10.2023	KMA 3	Mbita to Remba	Fainting	collision	At around 1200hrs KMA3 while ferrying a security team from Mbita to Remba, involved in a head-on collision at Galshe lights. Coxswain fainted and rushed to Mbita Dist Hosp.	1 fainted
27	17.11.2023	FV Azimio	OFF Rabuor in Kendubay	Drowning	Strong waves	One fisherman drowned while 2 were rescued after their boat was hit by strong waves while fishing.	1 dead
28	17.11.2023		Kaya Molases Airport area	Drowning	Unknown	The body of a middle aged woman was discovered naked and decomposing opposite Kaya Molases	1 dead
29	29.11.2023		Maboko Island, Ngege beach	Drowning	Strong winds and heavy rains	A 19 year old fisherman drowned after their FV was hit by strong winds. 2 others were rescued	1 dead
30	5.12.2023	Wooden transport Boat	KAO and ANEKO Beaches	Capsizing	Bad weather	5 people drowned and 3 were rescued after their wooden boat capsized at River Kuja.	5 dead 3 rescued

LAKE VICTORIA INCIDENTS SINCE 2021

31	6.12.2023	Transport boat	ANEKO	Drowning	Strong Winds	The body of Mama Lilian Otieno drowned on 3.12.2023 when she fell off the boat from Ogaka to Matanda after encountering strong currents at river Kuja.	1 dead
32	9.01.2024	FV	River Kuja-KAO	Drowning	Strong winds	A university student from Anyora village drowned while fishing after his FV was hit with strong winds	1 dead
33	31.1.2024	FV	Ngira Beach – Nyatike S/County	Drowning	Drunk	Odera Okomo fell off a fishing vessel and drowned while fishing with his friend. The BMU Secretary reported that he was drunk.	1 dead
34	26.2.2024	FV	Sango Rota – Kendubay	capsizing	Heavy weather	Two fishing vessels (sails) capsized after encountering heavy weather at Paga Beach. All the 4 fishermen were rescued	NO casualty
35	26.2.2024	FV	Sirigombe Island Usenge	capsizing	Strong winds	4 fishermen were rescued after their FV encountered strong winds and capsized.	NO Casualty
36	27.2.2024	MV Nyasani	Mageta Island	Near capsize	Strong winds and rain	A transport boat with 36 onboard experienced strong winds and rains while preparing to land at Mageta Island from Usenge. It landed safely.	NO Casualty
37	29.2.2024	FV	OFF Usenge beach	Stolen engine	thugs	4 omena fishermen were attacked by a gang and their engine stolen	NO Casualty
38	6.3.2024	FV	Lake Kanyabo I Alego Usonga	Capsizing	Strong winds	Two fishermen drowned after their boat was hit with strong winds	2 dead

LAKE VICTORIA INCIDENTS SINCE 2021

39	7.3.2024	FV	Nambo beach, Siaya County	Capsize	Strong winds	Omena fishing boat with 4 capsized at Nambo beach. 3 survived but one died after the nets fell on him. It's alleged that he was drunk.	1 dead
40	26.3.2024	FV	Awana Beach, Homabay	Drowning	Jumping off the boat	Mr. Amos Otieno (30) is alleged to have jumped from Omena FV and committed suicide at Awana Beach on Sunday 24 th March 2024. He was together with 3 other fishermen. His body was recovered on 26.3.2024.	1 dead
41	26.3.2024	FV	Kichinjio Beach - Kisumu	Drowning	Fell from boat	Kenedy Owili Okwach (24) drowned after falling from their FV AT Kichinjio Beach on 22.3.2024. He was fishing with 3 others. His body was recovered on 23.3.2024 by fishermen and CoastGuard.	1 dead
42	26.3.2024	UNKNO WN	Kusa Beach, Kisumu County	Drowning	Fell from boat	Mr George Otieno Okumu (53) drowned after his paddle stuck in mud while attempting to sail out and cut papyrus grass, on 25.3.2024. The woman onboard was left stranded for the better part of the morning until he was rescued by fishermen. His body was recovered on 27.3.2024 and taken to Pap Onditi mortuary.	1 dead 1 rescued

LAKE VICTORIA INCIDENTS SINCE 2021

43	30.3.2024	FV	Oseth beach - Nyando	Take on water	rescued	Two teenage boys, 26 and 17 were rescued by fishermen on 30.3.2024 when their FV started taking on water at around 0500hrs. The BMU Chair said since the boat was quite new, the accident might be because of manufacturer's error.	2 rescued
44	01.4.2024	NONE	Mouth of Sondu Miriu	Drowning	-	The body of Mr. Victor Omondi Odhiambo (35) was recovered at the mouth of River Sondu in Lake Victoria. He had drowned 5 days ago. The body was taken to Pap Onditi mortuary.	1 dead
45	2.4.2024	FV	Port Victoria	collision	Chest Injury	William Barasa (40) sustained chest injury and succumbed in hospital after their FV collided with another while fishing.	1 dead
46	11.4.2024	FV	Osiego beach-Bunyala	Capsize	drowning	Mr. Abangi Asebu (39) drowned after their boat capsized on 8 th April 2024 near Asiego – Bunyala. His 4 colleagues were rescued. His body was taken to Got Agulu mortuary.	1 dead

3. Copy of online reported maritime incidents in Lake Victoria Basin

TABLE SUMMARY OF ACCIDENTS IN LAKE VICTORIA IN THE PAST YEARS.

KENYA			
Year	Nature of Accident /Disaster	Type of vessel involved	No of casualties (Dead)
4 th December 2023	Boat capsized as a result of a huge wave rocking it.	Boat	5
June 2023	Boat capsizing.	Boat	6
March 2023	Boat capsized due to prevailing strong winds.	Boat	2
24 th March 2023	Patrol boat capsized.	Speed boat.	3
21 st September 2021	The boat developed a serious crack that allowed entry of water before it capsized.	Boat.	2
18 th November 2020	Boat accident due to bad weather.	Boat.	10
11 th October 2020	Boat capsized due to strong waves and bad weather.	Boat.	6
August 2015	Passenger boat capsized after colliding with a vessel.	Boat.	2
TANZANIA			
6 th November 2022	Passenger plane plunged into the lake due to bad weather.	Air Plain	11
7 th November 2022	Precision air crash due to pilot error.	Air Plain	19
22 nd September 2018	Passenger ferry overturned.	Ferry	Hundreds
UGANDA			
February 2024	Boat capsized	Boat	3
2 nd August 2023	Boat capsized as it was hit by strong winds near Nsazi Island.	Boat	20
5 th June 2023	Boat completely submerged.	Boat	10
25 th November 2018	Pleasure boat sank on the lake during bad weather.	Boat	32

4. Copy of approval of the Terms of Reference for the EIA study



NEMA/TOR/5/2/110

16th April, 2024

Director,
 Kenya Maritime Authority,
 P.O. Box 95076-80104,
MOMBASA

**RE: TERMS OF REFERENCE (TOR) FOR ENVIRONMENTAL IMPACT ASSESSMENT FOR
 THE PROPOSED CONSTRUCTION OF MARITIME RESCUE COORDINATION
 CENTRE IN KISUMU.**

We acknowledge the receipt of your TOR for the above subject.

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 and Social Impact Assessment (ESIA) for **PROPOSED CONSTRUCTION OF MARITIME RESCUE COORDINATION CENTRE IN KISUMU** has been approved on condition that you shall develop and implement a comprehensive stakeholder engagement plan.

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


JOSEPH MAKAU
 For: **DIRECTOR GENERAL**

Our Environment, Our Life, Our Responsibility



5. Copy of approval from KPA to implement the project

Office of the Managing Director



MCS/4/7/72

7th June 2024

Eng. Martin Dzombo Munga
Director General
Kenya Maritime Authority
P.O Box 95076 – 80104

MOMBASA

Dear

 ≤ 4

REF: FORMALIZATION OF LAND ALLOCATION TO THE KENYA
MARITIME AUTHORITY WITHIN KISUMU PORT, FOR THE
CONSTRUCTION OF THE REGIONAL OFFICE AND OTHER
PROJECTS

We refer to the subject matter above and your letter ref: KMA/SS/1/2/6/63 dated the 29th of May 2024.

Kenya Ports Authority (KPA) has no objection on the proposed development of Kenya Lake Victoria Regional Maritime Search and Rescue Coordination Centre (MRCC) within the Kisumu Port as this had earlier been agreed including site identification and considering that this will be regional project implemented by KMA on behalf of the Government of Kenya.

However, we note that the site identified for the waterfront project is adjacent to a site earmarked for the development of the Port's passenger terminal. Arising from this we would require further deliberation on how harmonize the two projects to avoid duplication.

Kenya Ports Authority P.O Box 95009 - 80104 Mombasa, Kenya
Tel: +254 41 2113497/ 2113838
Mobile: +254 709 093497/ 709 093838/ 730 653497
Email: kpamd@kpa.co.ke

www.kpa.co.ke | KenyaPortsAuthority Kenya_Ports

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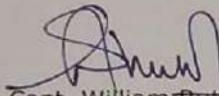
The Authority further wishes to confirm as follows:

1. The site identified is only 1.7 acres
2. The survey and demarcation of boundaries shall be done at a later stage once the waterfront project has been agreed
3. The groundbreaking can progress on the site identified while documentations and other processes are being undertaken

This letter, therefore, serves as a conditional approval subject to the above requirements and any other approval that may be required by other relevant Government agencies.

yours

Sincerely



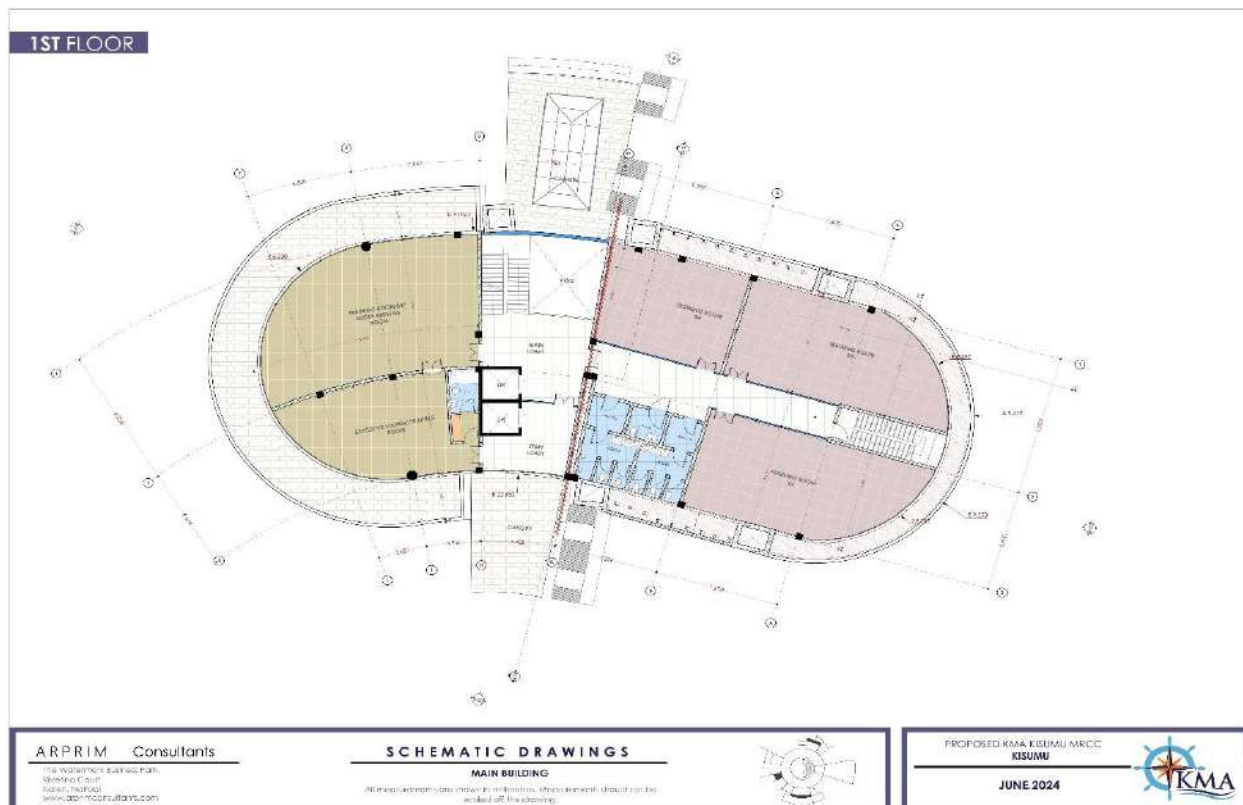
Capt. William Ruto AFNI, MBS

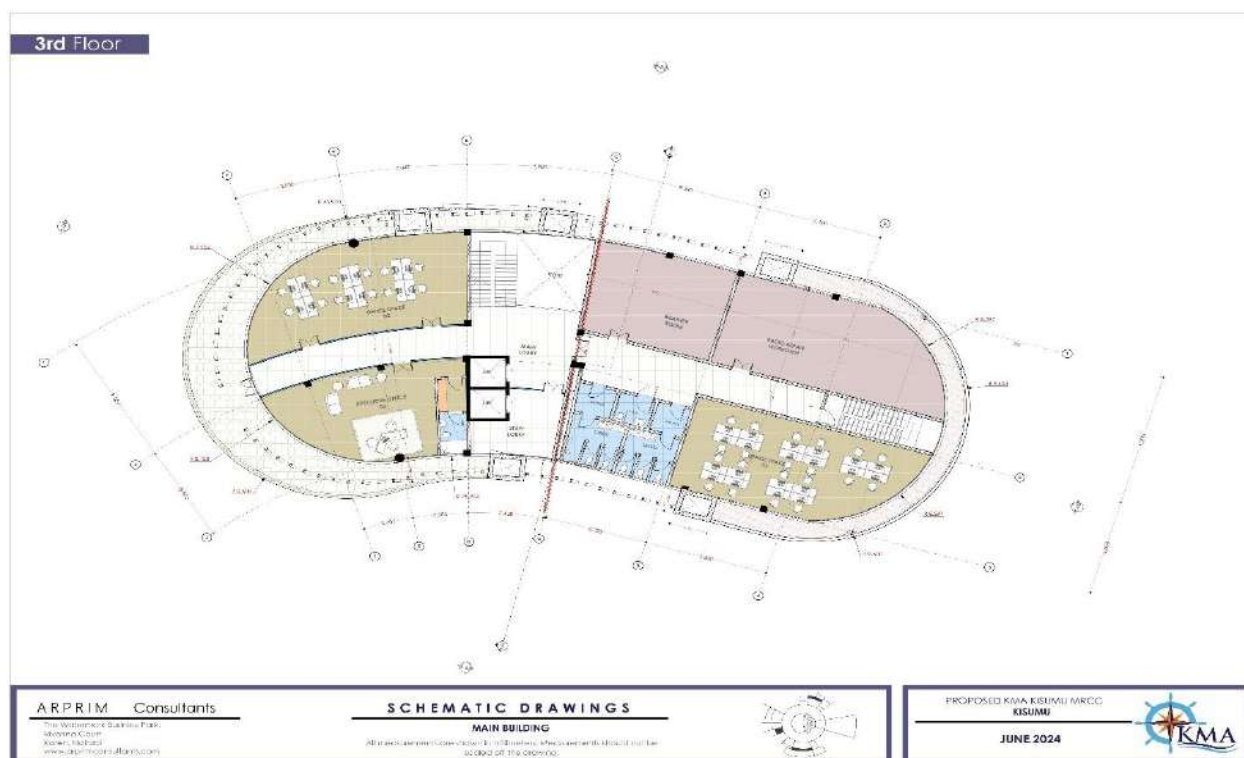
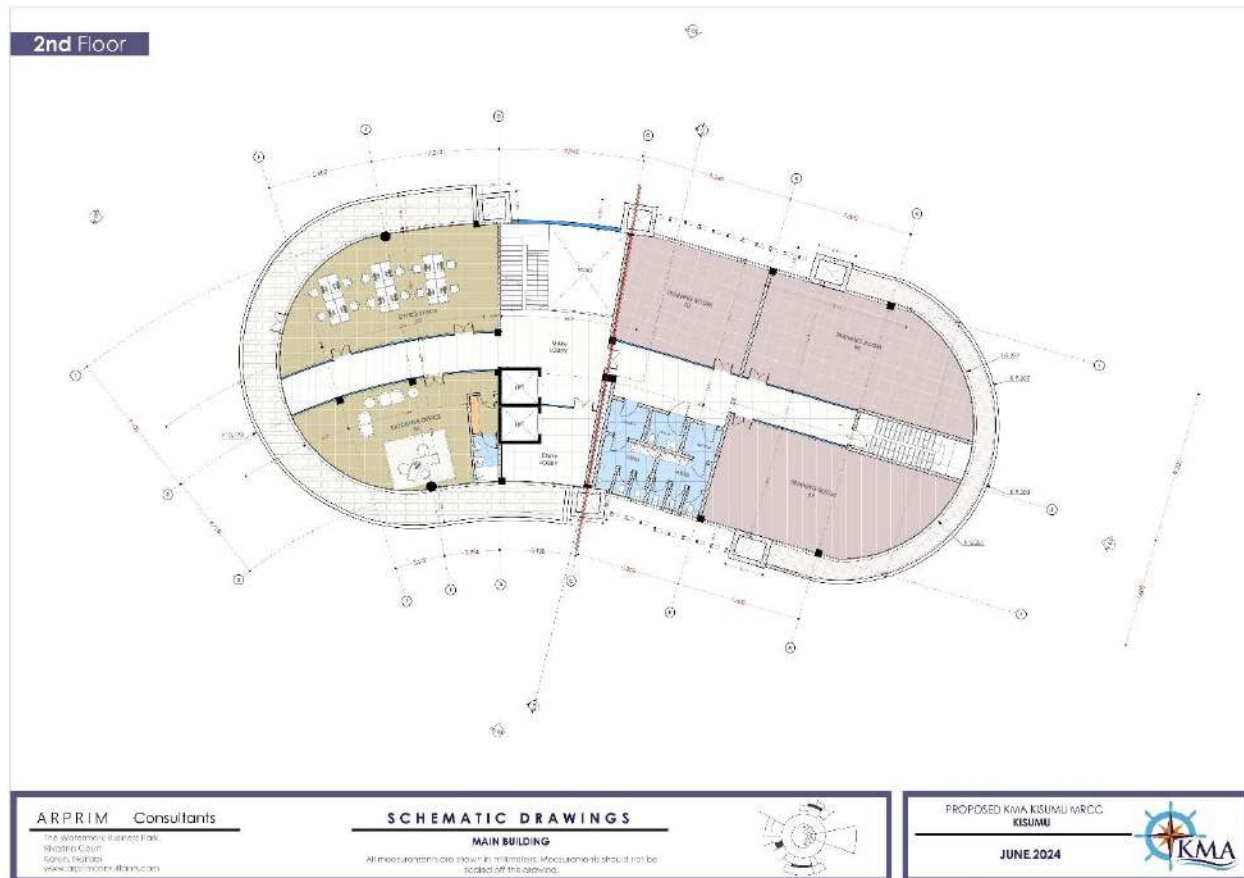
MANAGING DIRECTOR

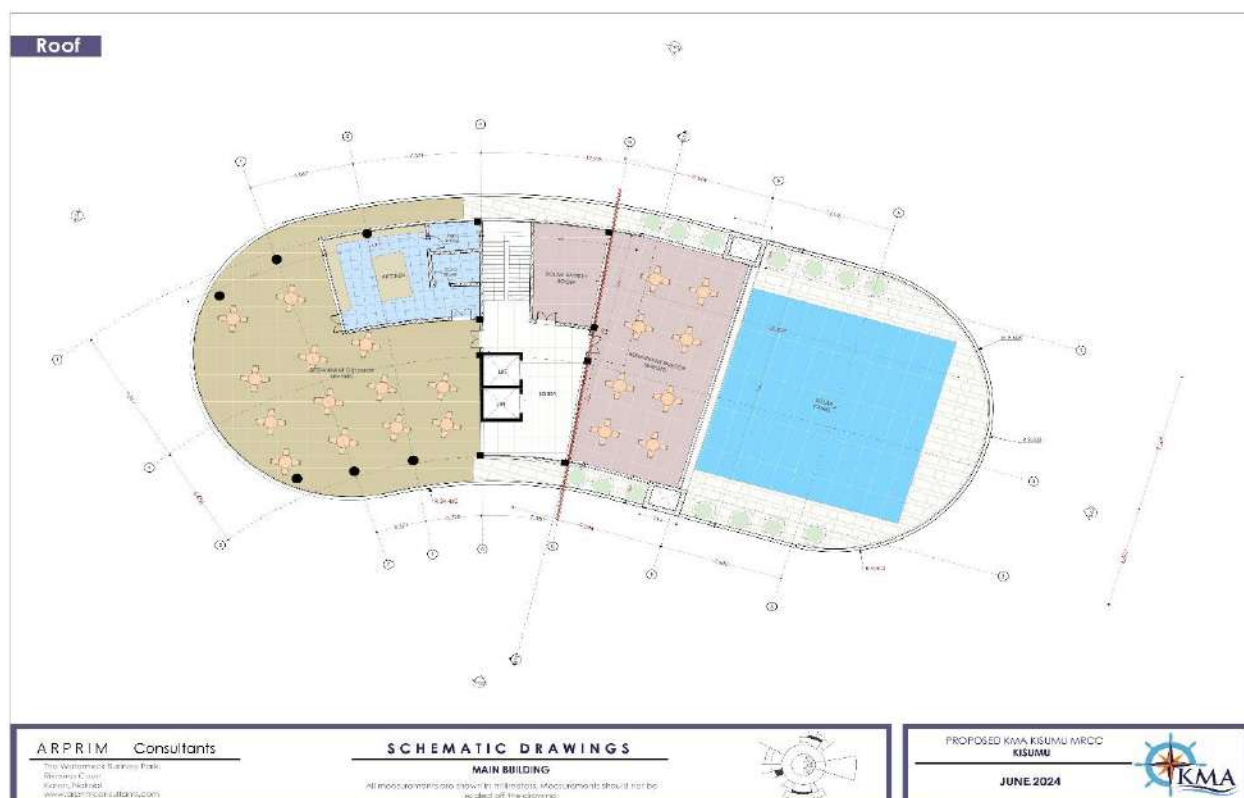
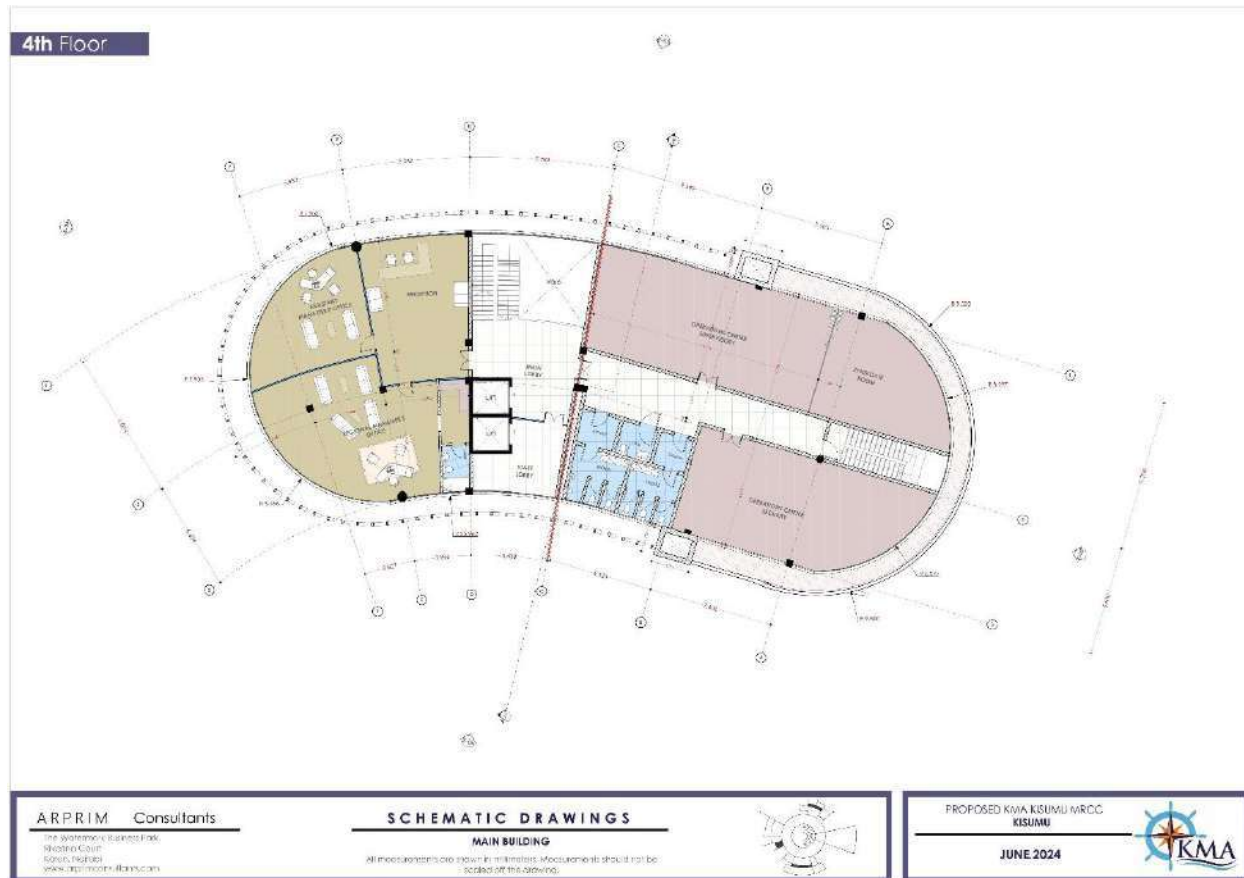


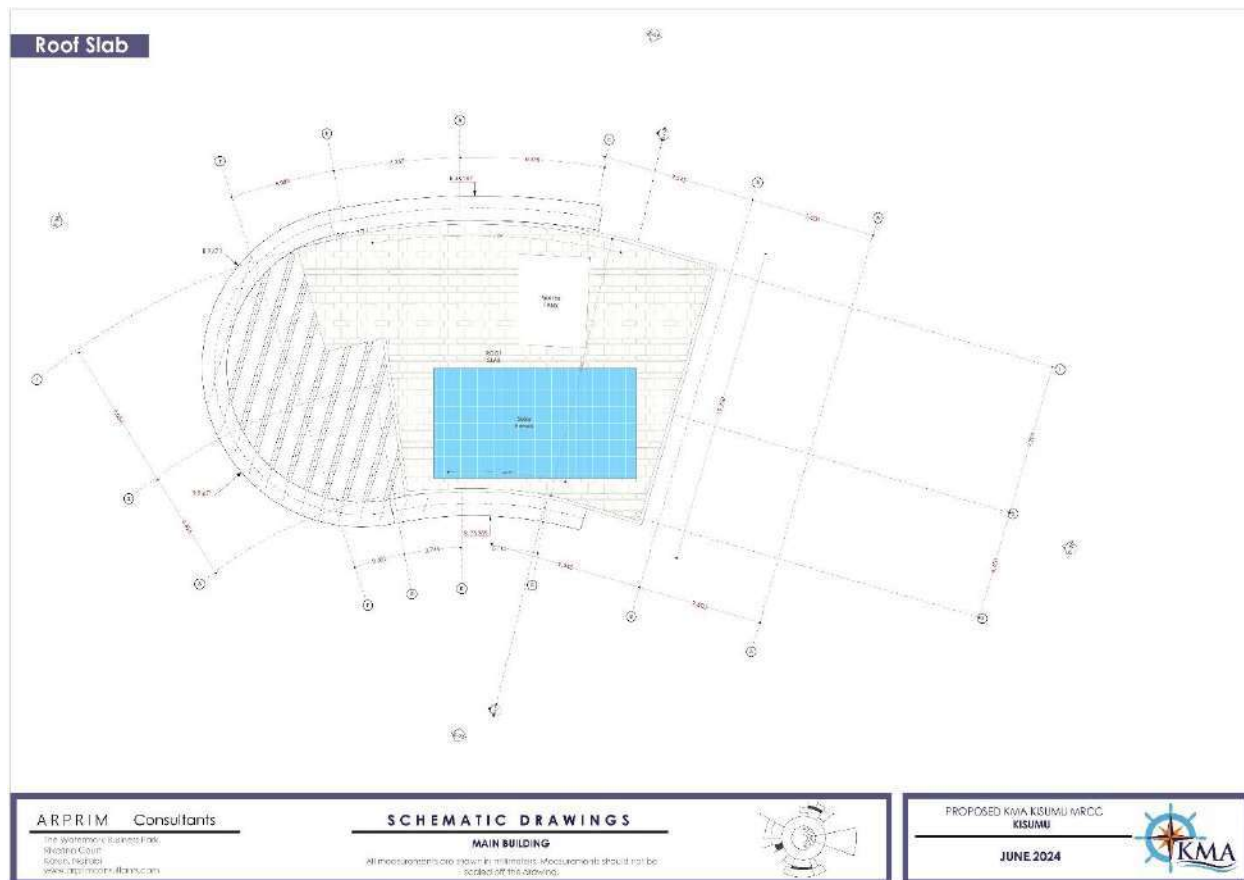
6. Copy of the architectural designs and drawing for the proposed project



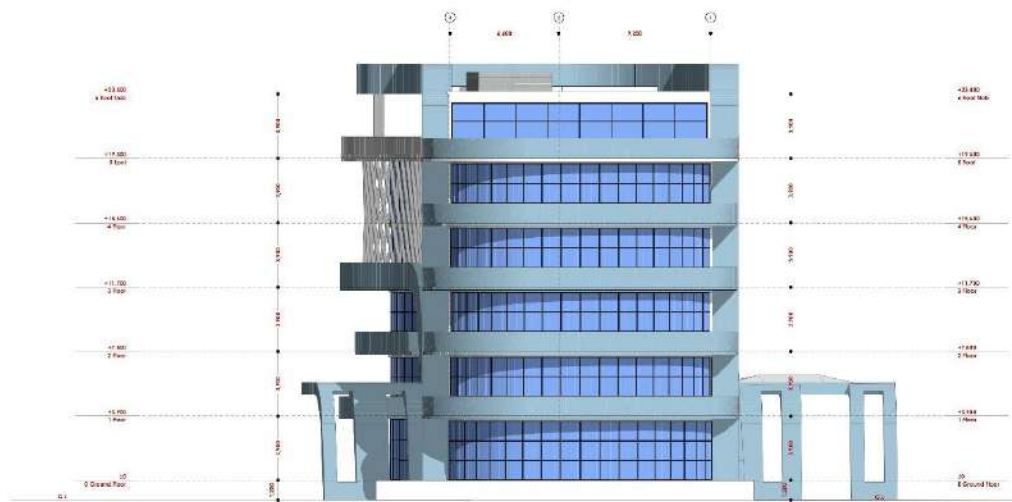








Elevation 02



ARPRIM Consultants

The Watermark Building Firm,
Shauri Moyo,
Kisumu, Kenya
www.arprimkenya.com

SCHEMATIC DRAWINGS

MAIN BUILDING

All measurements are shown in millimeters. Measurements should not be scaled off this drawing.



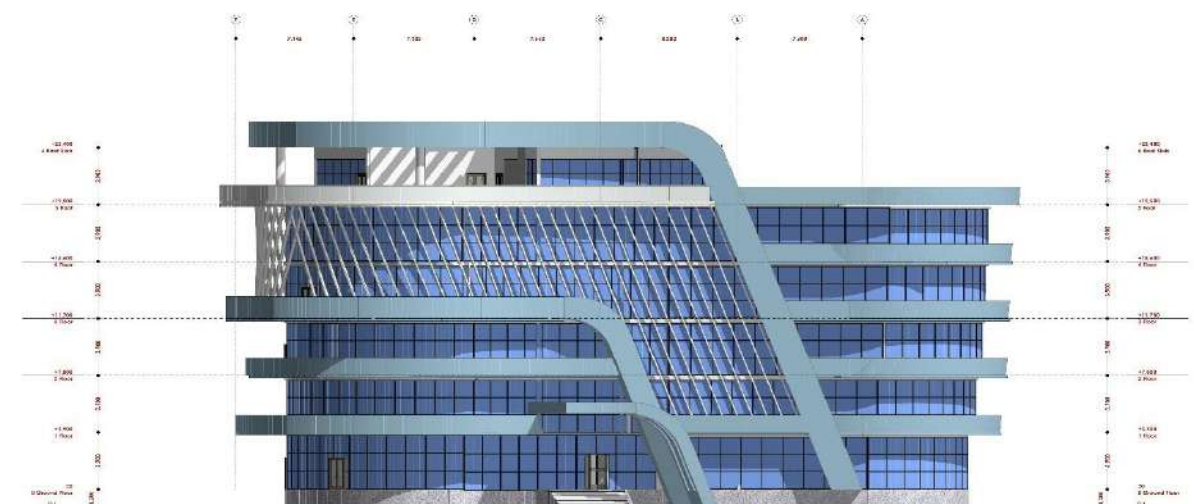
PROPOSED KMA KISUMU MRCC

KISUMU

JUNE 2024



Elevation 03



ARPRIM Consultants

The Watermark Building Firm,
Shauri Moyo,
Kisumu, Kenya
www.arprimkenya.com

SCHEMATIC DRAWINGS

MAIN BUILDING

All measurements are shown in millimeters. Measurements should not be scaled off this drawing.



PROPOSED KMA KISUMU MRCC

KISUMU

JUNE 2024



Elevation 04



ARPRIM Consultants

One Watermark Estate Road,
Shauri Moyo,
Nairobi, Kenya
www.arprim-kenya.com

SCHEMATIC DRAWINGS

MAIN BUILDING

All measurements are shown in millimeters. Measurements should not be scaled off this drawing.

PROPOSED KMA KISUMU MRCC
KISUMU

JUNE 2024



7. Copies of the baseline water quality monitoring report



LAHSENS LIMITED
Lahvens House
P.O. BOX 34153 – 80118
Mombasa, Kenya

ECOLOGICAL FIELD SAMPLING RECORD DATA SHEET

OFFICER/S: VINCENT OMONDI & FREDLINO GINGA

DATE: 14TH JUNE 2024

JOB NO.: 50124-0046 C REV

SITE CODE: KPP/KP

SITE NAME: KISUMU PORT AREA - KISUMU PORT PIER

START TIME: 1050HRS

FINISH TIME: 1105 HRS

Field measurements

Parameter	Results Replicate 1	Results Replicate 2	Average Results
Depth of sample collection (m)	1.0	1.0	1.0
Secchi depth (Perspective degree) (m)	1.5	1.5	1.5
Temperature (°C)	25.9	25.9	25.9
Turbidity (NTU)	30.0	29.5	29.75
Dissolved oxygen (mg/L)	6.80	6.85	6.83
Electrical conductivity (µS/cm)	728	720	724.0
pH	7.86	7.86	7.86
Total Dissolved Solids (TDS) (mg/L)	302	301	301.5
Salinity (PSU)	0.27	0.33	0.30
Oxidation Reduction Potential (ORP) (mV)	+10.9	+10.5	+10.7
Specific Gravity (σt)	0.0	0.0	0.0

DETAILS OF THE EQUIPMENT:

EQUIPMENT ID: Water Quality Analyzer (AP-800 / AM-200).

CALIBRATION STATUS: Within calibration period.

P.O. BOX 34153 – 80118
Mombasa, Kenya

+254 110 093 237
+254 110 093 237

lahvens@lahvens.com
info@lahvens.com

www.lahvens.com



LAHSENS LIMITED
 Lahvens House
 P.O. BOX 34153 – 80118
 Mombasa, Kenya

Field observations

Water quality monitoring and sampling was carried out conclusively at KISUMU PORT PIER monitoring station between 1050 Hrs to 1105 Hrs.

Observation	Details
Weather (e.g. wind, wind direction, cloud cover):	Clear skies & wind speed of 10 kph
Colour and appearance of water	Bluish
Water surface condition	Relatively calm
Water flow, level, tide:	1.9 Km/hr.
Presence of nuisance organisms (e.g. macrophytes, phytoplankton scums, algal mats)?	Absence of nuisance organisms
Presence of oily films on surface or on shoreline?	None
Presence of floating debris or grease?	Few debris observed
Presence of odour or frothing?	None

Quality control remarks

Preparation of equipment was done as per the SOP. Samples were collected into the appropriate containers and stored as per the requirements. Sample containers were labelled aptly and appropriate details filled. Sample preservation, storage, and holding times were chosen according to the test parameters of interest.

Transportation of samples was done via a cooler box filled with ice packs to ensure samples arrived at the laboratory in acceptable conditions with the chain of custody intact. Samples were packed in a way that minimizes the risk of breakage, leakage or spillage during transport.

Technical Expert Signature Client's Rep. Signature

(when sample collected and entries completed)

P.O. BOX 34153 – 80118
 Mombasa, Kenya

+254 110 093 237
 +254 110 093 237

lahvens@lahvens.com
 info@lahvens.com

www.lahvens.com

8. Copies of the baseline soil quality tests

Bureau Veritas Kenya Limited

North Belgravia Place,
Zanzibar Road,
Shimani,
Mombasa,
Kenya
T: +254412220966
laboratory.mombasa@bureauveritas.com

**TEST REPORT****LAHVENS LIMITED**

P.O BOX 34153, Lahvens House 120, , Off Tom Mboya
Rd, Tudor,
MOMBASA, 80118, KENYA

Report No.: 1546605¹

Job No :	M-24-0589	Sampling Date :	14 June 2024
Client Sample Reference :	Soil sediment KMA Sample (Kisumu Port Area)	Sampling Method :	Submitted Sample
Date Received :	15 June 2024	Sample Preservation :	Ambient Temperature
Container Type :	Plastic Container		
Sample Source :	As Supplied		
Date of Analysis :	17 June 2024		
Date Reported :	21 June 2024		
Sample Description :	Soil sample		
Sample Receipt Condition :	Acceptable Condition		

Date Reported: 21/06/2024

Test	Method	Units	Results
Oil and grease	EPA 1664	mg/L	NIL
PCB-028	EPA 1613	ng/g fat	Not detected
Mineral oil saturated hydrocarbons (MOSH)	GC-FID	mg/kg	Not detected

* Indicates that this is not an accredited Test

¹ CORRT: This report supersedes Report No.: 1546604 version (M-24-0589-008)_v12.PDF issued on 21/06/2024. Reason: Specification requirements were removed

Analysis Conducted by: Emp. ID#: 66088

Reported by

Maurice JUMBALE

Reported by

Muhsin Rashid

Page 1 Of 2



The above results relate only to the sample(s) tested at our facility, North Belgravia Place, Zanzibar Road, Shimani Mombasa, Kenya, and the report shall not be reproduced except in full, without written approval of Bureau Veritas Kenya Limited. Kenya. All services are rendered in accordance with Bureau Veritas General Terms and Conditions of Business available on request or at <https://commodities.bureauveritas.com/technical-general-conditions-service>

(M-24-0589-009)_v14.PDF

Bureau Veritas Kenya Limited

North Belgravia Place,
Zanzibar Road,
Shimani,
Mombasa,
Kenya
T: +254412220866
laboratory.mombasa@bureauveritas.com



**BUREAU
VERITAS**

TEST REPORT

Report No.: 1546605¹

LAHVENS LIMITED

**P.O BOX 34153, Lahvens House I20, , Off Tom Mboya
Rd, Tudor,
MOMBASA, 80118, KENYA**

Job No :	M-24-0589	Sampling Date :	14 June 2024
Client Sample Reference :	Soil sediment KMA Sample (Kisumu Port Area)	Sampling Method :	Submitted Sample
Date Received :	15 June 2024	Sample Preservation :	Ambient Temperature
Container Type :	Plastic Container		
Sample Source :	As Supplied		
Date of Analysis :	17 June 2024		
Date Reported :	21 June 2024		
Sample Description :	Soil sample		
Sample Receipt Condition :	Acceptable Condition		

Physical & Chemical Tests & Metal Analysis Date Reported: 21/06/2024

Test	Method	Units	Results
pH	ISO 10390	-	4.80
Organic impurities	ISO 605	%	0.58
Nitrogen	IS EN 16169:2012	%	0.70
Phosphorus	APA 3050 B	mg/kg	822.15
Potassium	APA 3050 B	%	0.21
Lead as Pb	APA 3050 B	mg/kg	5.78
Copper as Cu	EPA 3050 B	mg/kg	14.21
Chromium	APA 3050 B	mg/kg	16.64
Cadmium as Cd	APA 3050 B	mg/kg	0.31
Arsenic as As	EPA 3050 B	mg/kg	0.12

* Indicates that this is not an accredited Test

* CORR1. This report supersedes Report No.: 1546604 version (M-24-0589-008)_v12.PDF Issued on 21/06/2024. Reason: Specification requirements were removed

Analysis Conducted by: Emp. ID#: 66088

Reported by

Justus Amanya

Reported by

Muhsin Rashid

Page 2 Of 2



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(M-24-0589-009)_v14.PDF

9. Copies of the baseline ambient air monitoring report

AMBIENT ATMOSPHERIC QUALITY MONITORING REPORT**ENVIRONMENTAL BASELINE STUDY REPORT FOR
AMBIENT AIR QUALITY MONITORING OF THE
PROPOSED MARITIME RESCUE COORDINATION
CENTER (MRCC), KISUMU COUNTY.****PROJECT INFORMATION:**

PREPARED FOR:
KENYA MARITIME AUTHORITY (KMA),
P.O. BOX 9632 - 40141,
KISUMU, KENYA.

**CLIENT ADDRESS:**

PREPARED BY:
LAHVENS LIMITED
P.O BOX 34153, 80118.
DESIGNATION LAB REF. NO. NEMA/21/2/LAB77/LLL
EMAIL: lahvens@lahvens.com

**TESTING CONSULTANTS:**

DOCUMENT ID: 50124-0046 A
TEST DATES: JUNE 14TH 2024
(FINAL) REPORT ISSUED: JUNE 18TH, 2024

DOCUMENT INFORMATION:

	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046A
		REPORT TITTLE: EBSAAQMR-46A DOI: 14 TH JUNE 2024 PAGE NUMBER P A G E 2

REVIEW AND CERTIFICATION FROM THE TESTING CONSULTANTS

All work, calculations, other activities, and tasks performed and documented in this report were carried out under my direction and supervision. This test project conforms to the requirements of Lahvens Limited's quality manual and EMC (Air Quality) Regulation 2014, Legal Notice 34.

Team Leader: VALENTINE ODUOR
 Signature: 
 Date: 18-06-2024

I have reviewed all testing details, calculations, results, conclusions and other appropriate written material contained herein, and hereby certify that the presented material is authentic and accurate.

Reviewer: LOVANS ROBERT SPOO
 Title: LABORATORY DIRECTOR
 Signature: 
 Date: 18-06-2024

CERTIFICATION FROM THE LEGAL ENTITY OF THE TESTING FACILITY:

I have reviewed the information being submitted in its entirety. Based on the information and belief formed after reasonable inquiry, I certify that the statements and information contained in this submittal are true, accurate and complete.

 Signature Date

 Name Printed Title

 Company Name Company stamp

EBSMR - AMBIENT ATMOSPHERIC CONCENTRATIONS MONITORING - KMA.

R.M.: JUNE 2024

 KMA	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046A REPORT TITLE: EBSAAQMR-46A DOI: 14TH JUNE 2024 PAGE NUMBER P A G E 3 
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EXECUTIVE SUMMARY

Lahvens Limited, a NEMA designated laboratory, carried out the baseline ambient atmospheric environment survey at the proposed MARITIME RESCUE COORDINATION CENTER (MRCC) in KPA's Kisumu port area located near Oilibya Deport Kisumu, Lower Railway, Marine Dr, Kisumu, in Kisumu County on the 14th June 2024. Atmospheric Environment survey was conducted to determine the EXISTING (Do minimum) air pollution around the proposed project for Environmental, Health, Safety and compliance purposes. Air quality remains a valued component in this environmental assessment because of their fundamental significance to the well-being of humans, wildlife and vegetation.

Kenya Maritime Authority (KMA) was set up in June 2004 as the semi-autonomous agency in charge of regulatory oversight over the Kenyan maritime industry. Maritime safety and security is one of the Authority's core functions. Further to the security enhancement as a function, KMA also generally oversee, coordinate and regulate the maritime industry. As the pacesetter of the Kenyan maritime industry, KMA thus strives to strengthen national maritime administration through enhancement of regulatory and institutional capacities for safety and security, fostering effective implementation of international maritime conventions and other mandatory instruments on safety & security, promoting maritime training and education, coordinating Search and Rescue, preventing marine pollution and promoting preservation of the marine environment as well as promoting maritime trade and investments. In an attempt to perform its mandate, KMA seeks to construct a Maritime Rescue Coordination Center (MRCC) in Kisumu to address maritime accidents and disasters in the Lake. The objective of the proposed MRCC project will seek to enhance maritime transportation and safety navigation by reducing maritime accidents, saving lives, improving security, and providing efficient and affordable communication to Lake Victoria communities. Additionally, the project will contribute to provision of safe, efficient transport and safe conduct of fishing activities that are essential in supporting local livelihoods.

Construction of any new facilities can lead to significant air pollution. These emissions are the result of possible demolition work, the movement of machinery or the transport of construction materials. Construction or demolition works deteriorate air quality in three main ways:

Dust nuisance. The circulation of machinery, demolition operations or the loading and unloading of materials release suspended particles (PM_{10} , $PM_{2.5}$ and PM_{11}) that can cause health risks when inhaled, especially among the most vulnerable groups of people.

Atmospheric emissions from machinery. Machinery on a construction site generates noise, dust and gases such as NO_x or CO or SO_2 .

Transport of construction materials. The handling of construction materials also contributes to higher pollution levels, especially in the case of particulate matter.

Air pollution from construction is a real challenge due to the various sources and emanation of different pollutants.

The objectives of environmental atmospheric baseline monitoring will be as follows;

To monitor the existing state of atmospheric air quality environment of the proposed Maritime Rescue Coordination Center, Kisumu county at the predetermined survey locations.

The results of these tests shall be used to demonstrate compliance with a set of emission concentration limit values for prescribed pollutants as specified in the EMC (Air quality) regulations 2014 during licensing and continuous assessments.

 KMA	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046A REPORT TITLE: EBSAAQMR-46A DOI: 14TH JUNE 2024 PAGE NUMBER P A G E 4 
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Report the findings of the survey in a report.

Air pollution from construction is a real challenge due to the various sources and emanation of different pollutants.

This Environmental Baseline Study is designed to characterize the atmospheric resources at the proposed site prior to establishment of the Maritime Rescue Coordination Center. EBS will provide a benchmark and reference against which to compare the environmental conditions influenced by the construction, operation and closure phases of the Maritime Rescue Coordination Center. The information will be used to assess the effectiveness of any proposed mitigation measures and to implement adaptive management, if need be.

The environmental baseline study will collect, assess, and interpret enough physical and chemical atmospheric information to: support the characterization of the atmospheric resource; enable determination of possible impacts; help predict the significance of impacts and the effectiveness of any proposed mitigation; establish thresholds for indicators of ecosystem health; and facilitate the design of monitoring programs.

Well-developed EBS often alleviate heightened perceived concerns within the community during the initial phases of any proposed development, before issues become a serious risk to the project. EBS also creates reassurance in the minds of the public and jurisdictional decision makers that key environmental issues have been identified and will be monitored and mitigated, during and after the project is approved. EBS monitoring can be looked at as an early warning system of impacts that could potentially affect the environment during the project operation phase and long after the project is decommissioned.

Atmospheric environment has been selected as a valued component because of their fundamental significance to the well-being of human health, flora and fauna health. Environmental Baseline Study is a significant component of monitoring programs for some successful development activities. This Baseline Report forms part of a Comprehensive Baseline Study (CBS) of the proposed Project. The CBS is being prepared as part of an environmental Social Impact assessment (ESIA) and approval process.

It is important to accurately determine prevailing air quality conditions against which predicted effects can be gauged and assessed for any environmental effects' assessment.

Ambient air quality survey for this study consists of three representative monitoring locations. Information for the report is presented based on air monitoring completed for 1-hour weighted average per locale. For the purpose of the baseline investigation, samples were taken on site on the 14th day of June 2024 and thereafter the samples were compared against the guidelines and standards while attention given to relevant referencing sites of similar nature.

Ambient air quality data were obtained from a validated and approved air quality monitoring program.

Ambient air quality data were obtained from a validated and approved air quality monitoring program. Mobile and active monitoring was done by use of real time equipment AQM-09 which integrates the main ambient gases and meteorological parameters and particulate counter meter. Temperature is measured by way of a highly accurate Air Chip 3000 while humidity is measured using a capacitive humidity sensor (accuracy < 0.8 % / 0.1 K). The gas detector and particulate matter meters were mounted at about 1 - 2 M above the ground surface. The duration information was used to calculate the gas / pm concentrations.

EBSMR - AMBIENT ATMOSPHERIC CONCENTRATIONS MONITORING - KMA.

R.M.: JUNE 2024

 KMA	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046A REPORT TITLE: EBSAAQMR-46A DOI: 14TH JUNE 2024 PAGE NUMBER P A G E 5 
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FIELD NOTES AND OBSERVATIONS:

Ambient air quality measurements were taken for short term exposure levels. It should however be noted that this exercise is only applicable to the time period when sampling took place and does not take into account seasonal and other local various that might occur during other months and times. However, it is still a good general overview of the existing air quality environment.

Sensitive receptors:

The proposed project site borders the lake shoreline and neighbors Devki Group; mega properties / Shiloah Investment group, CMC Motors-Kisumu, Nissan Kisumu, Swan Centre, and KRC-Kisumu). The frontal side borders the Kisumu-Nairobi railway line operated by KRC.

Potential Pollution causes;

From the site visits and background site description, the following sources have been identified as potential pollution causes at the proposed site;

Exhaust gases:

The survey locations are frequented by marine vessels, motor vehicles, forklifts and personal service vehicles that utilize diesel and petrol. Vehicle and motorcycle exhausts contain a number of pollutants including carbon dioxide (CO₂), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NO_x), sulphur and PM₁₀.

The quantity of each pollutant emitted depends upon the type and quantity of fuel used, engine size, speed of the vehicle and abatement equipment fitted. Once emitted, the pollutants are diluted and dispersed in the ambient air.

Vehicular movement;

Re-suspension of roadside dust from movement of vehicles resulted in generation of relatively higher fraction of finer dust (PM_{2.5}).

Significant atmospheric dust arose from the mechanical disturbance of granular soils materials exposed to the air from the loading and offloading yards moving in and out of the main gates. Pulverization and abrasion of surface materials by application of truck mechanical forces generate substantial amount of dust.

Air Quality Survey Conclusions:

Baseline Atmospheric Environment Monitoring was conducted to characterize the existing environment before implementation (DO MINIMUM) of the proposed MRCC. The conclusions below were drawn from the exercise conducted on the 14th June 2024.

Gaseous Parameters:

All gaseous parameters (carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone and total volatile organic compounds) were measured and quantified at all the three survey locations.

Before the project implementation of the MRCC, all measured gaseous parameters COMPLIED with the EMC (Air quality) regulations 2014 limits.

The ambient air quality data (gaseous) measured around the monitoring locations are considered to be within a typical range of emissions for such neighborhood.

The findings of the gaseous monitoring program indicate that the air quality at Kisumu port area where the project is to implemented is generally good before the proposed MRCC implementation. All pollutants measured are at levels that do not pose Environmental, Health, Safety and compliance concern.

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The practices in place to control and manage gaseous pollutants should be maintained.

Meteorological Parameters:

The monitoring locations in general showed Standard atmospheric environment before project implementation due to the combination of good climate and ambient conditions. Weather and Climatic conditions at the proposed project site provided good dispersion of air contaminants.

Particulate Matter (PM₁₀ and PM_{2.5}):

Particulate parameters concentrations (PM₁₀ and PM_{2.5}) were measured and quantified across the survey stations.

PM_{2.5} and PM₁₀ concentration levels recorded were within the typical range of emissions for similar neighborhood.

The findings of the monitoring program indicate that the particulate matter atmospheric environment is generally good before the proposed MRCC implementation. Particulate pollutants measured are at levels that do not pose Environmental, Health, Safety and compliance concern.

Once construction and operations begin, the client is expected to maintain the background / baseline levels.

Recommendations:

When operations / commissioning take effect, greenhouse gas measurements and sampling should be frequently done in order to build up a robust dust and gaseous management plan.

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DEFINITIONS.

Table 1: List of acronyms

AAQTL	Ambient Air Quality Threshold Limits
AQG	Air Quality Guidelines
CBS	Comprehensive Baseline Study
CO	Carbon monoxide
CO ₂	Carbon dioxide
EA	Environmental Audits
EIA	Environmental Impact Assessment
EMC	Environmental Management and Coordination
EPA	Environmental Protection Authority
GPS	Geographic Positioning System
hpa	Hectopascal
km/hr	Kilometer per hour
µg/m ³	Microgram per cubic meter
mg/m ³	Milligram per cubic meter
MRCC	MARITIME RESCUE COORDINATION CENTER
NEMA	National Environment Management Authority
NO _x	Oxides of Nitrogen
NO ₂	Nitrogen dioxide
PM ₁₀	Particulate matter (<10 microns)
PM _{2.5}	Particulate matter (<2.5 microns)
SO ₂	Sulfur dioxide
QAQC	Quality Assurance / Quality Control
TVOC	Total volatile Organic compounds
TWA	Time Weighted Average
WB	World bank
WHO	World Health Organization
µg/m ³	Micro gram per cubic meter
VOCs	Volatile organic compounds

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1. INTRODUCTION

1.1. Project Summary and Objectives

Lahvens Limited, a NEMA designated laboratory, carried out the baseline ambient atmospheric environment survey at the proposed MARITIME RESCUE COORDINATION CENTER (MRCC) in KPA's Kisumu port area located near Oilibya Deport Kisumu, Lower Railway, Marine Dr, Kisumu, in Kisumu County on the 14th June 2024. Atmospheric Environment survey was conducted to determine the EXISTING (Do minimum) air pollution around the proposed project for Environmental, Health, Safety and compliance purposes. Air quality remains a valued component in this environmental assessment because of their fundamental significance to the well-being of humans, wildlife and vegetation.

Kenya Maritime Authority (KMA) was set up in June 2004 as the semi-autonomous agency in charge of regulatory oversight over the Kenyan maritime industry. Maritime safety and security is one of the Authority's core functions. Further to the security enhancement as a function, KMA also generally oversee, coordinate and regulate the maritime industry. As the pacesetter of the Kenyan maritime industry, KMA thus strives to strengthen national maritime administration through enhancement of regulatory and institutional capacities for safety and security, fostering effective implementation of international maritime conventions and other mandatory instruments on safety & security, promoting maritime training and education, coordinating Search and Rescue, preventing marine pollution and promoting preservation of the marine environment as well as promoting maritime trade and investments. In an attempt to perform its mandate, KMA seeks to construct a Maritime Rescue Coordination Center (MRCC) in Kisumu to address maritime accidents and disasters in the Lake. The objective of the proposed MRCC project will seek to enhance maritime transportation and safety navigation by reducing maritime accidents, saving lives, improving security, and providing efficient and affordable communication to Lake Victoria communities. Additionally, the project will contribute to provision of safe, efficient transport and safe conduct of fishing activities that are essential in supporting local livelihoods.

Construction of any new facilities can lead to significant air pollution. These emissions are the result of possible demolition work, the movement of machinery or the transport of construction materials. **Construction or demolition works deteriorate air quality in three main ways:**

Dust nuisance. The circulation of machinery, demolition operations or the loading and unloading of materials release suspended particles (PM₁₀, PM_{2.5} and PM₁) that can cause health risks when inhaled, especially among the most vulnerable groups of people.

Atmospheric emissions from machinery. Machinery on a construction site generates noise, dust and gases such as NO_x or CO or SO₂.

Transport of construction materials. The handling of construction materials also contributes to higher pollution levels, especially in the case of particulate matter.

The objectives of environmental atmospheric baseline monitoring will be as follows;

- ✦ To monitor the existing state of atmospheric air quality environment of the proposed Maritime Rescue Coordination Center, Kisumu county at the predetermined survey locations.
- ✦ The results of these tests shall be used to demonstrate compliance with a set of emission concentration limit values for prescribed pollutants as specified in the EMC (Air quality) regulations 2014 during licensing and continuous assessments.
- ✦ Report the findings of the survey in a report.

Air pollution from construction is a real challenge due to the various sources and emanation of different pollutants.

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1.2. Facility Description;

The proposed MRCC will be located on a 0.335ha of land in Nyalenda B Sub-Location, Kisumu County at Latitude -0.096504° S and Longitude 34.749406° E. The proposed site can be accessed by road (Obote Rd and Oginga Odinga Rd junction) that connects both the KPA passengers' terminus and the proposed MRCC to the CBD.

Tentatively (as per the current designs) the proposed building will comprise of a basement, ground plus four (4) floors among other features. It should be noted that the design at this stage is preliminary, and the scope might be varied depending on further review by the project consultant and the output of the ESIA study process.

At construction stage the scope of works will include site clearance and leveling, excavations, foundational works, sheet piling, construction of MRCC Building, jetty, ambulance bay, retaining wall, boat spillway, boat shed, oil spills bay, boardwalk, perimeter fence, gate, gate house, generator house, garden area, washroom, ticket Project Boundary 2 (PB-2), goods warehouse, water supply and storage, drainage, revetment works, installation of handrails, power connection, ICT Infrastructure, development and establishment of maritime safety monitoring information system and support MRCC operations and maintenance.

1.3. Appraisal Framework Requirements

Under the Second Schedule of the Environmental Management and Coordination Act (EMCA), Cap 387 of the Laws of Kenya, the project is categorized as a High Risk and thus should undergo Environmental and Social Impact Assessment (ESIA) Study process.

Air quality monitoring is enshrined in the environmental Management Coordination (Air quality) regulations 2014 framework legal notice 34. According to EMC (Air quality) regulations 2014 framework legal notice 34 under preliminary, the interpretation of "monitoring" means any periodic or continuous surveillance or testing to determine the level of compliance with statutory requirements or pollutant levels in various media or in humans, animal, and other living things.

The Constitution of Kenya provides that "every person has a right to a clean and healthy environment and this includes the right to have the environment protected for the benefit of present and future generations." The prevention of atmospheric pollution is recognized as a component of a clean and healthy environment. All development therefore that are proposed to be established should comply with this provisions when their operational phase commences. It is essential therefore to take note through measurement the current / existing air quality conditions before implementation of the proposed project to justify during operations that the environmental media / parameter was not deteriorated as a consequence of the project implementation. Once the baseline values are determined, the industries are then allowed to operate in a manner that does not cause pollution, that might not lead to injury of the body and disruption of peace and comfort enjoyed by the employees and workers in the industrial areas. It is for this reason that there is a need to regulate the levels of air emissions. These regulations are set out by the National Environmental Management Authority (NEMA) to protect people from air pollution and odor.

Environmental Management Coordination (Air quality) regulations 2014 framework legal notice 34, PART XIII-MISCELLANEOUS - section 75 states that "The Authority may in consultation with the relevant lead agencies establish baseline levels of priority air pollutants set out in the Second Schedule.

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In addition, Environmental Audit is required for all existing projects in compliance with Section 54 (A)(2) of the Environmental Impact Assessment (EIA) regulations, 2014 (as amended), promulgated under the National Environmental Management Act, 1998 (act No. 107 of 1998; NEMA). Air quality monitoring is captured as an environmental aspect that needs to be monitored under the Environmental Monitoring and Management plan (EMMP).

According to the EMC (IMPACT ASSESSMENT AND AUDIT) regulations 2003 framework legal notice 101 PART IV, THE ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT section 18 which states that (1) A proponent shall submit to the Authority, an environmental contents of impact assessment study report incorporating but not limited to the environmental following information; - (b) a concise description of the national environmental legislative and regulatory framework, baseline information. PART VI - MISCELLANEOUS PROVISIONS section 43 (2) states that the proposed policy, programme or plan specified in this regulation shall state - (d) an environmental analysis covering: (i) baseline information focusing on areas potentially affected.

The client in adhering to the above extracts and as part of this authorization process contracted Envasses Environmental Consultants Limited to carry out the ESIA study from March -May 2024. Envasses commissioned LAHVENS Ltd to form the Project's Environmental Team (ET). Lahvens Limited were responsible to provide consulting services of existing atmospheric concentrations / environment before implementation of the proposed project.

1.4. Scope of Baseline Air Quality Assessment;

The baseline air quality report includes the National assessments. At the National scale the assessment considers the total mass emission of general pollutants associated with construction activities. These are sulfur dioxide (SO₂), Nitrogen oxide (NO_x), Ozone (O₃), Particulate Matter (PM₁₀ and PM_{2.5}) - particles with aerodynamic diameters of less than 10 and 2.5 microns respectively. Background information on these pollutants and why they are of concern is summarized in section 2 'CONTEXT OF THE AIR QUALITY & MONITORING NETWORK'. The current concentrations of these pollutants are at risk of exceeding their respective Air Quality Limit Values when the project commissions. The estimates of the existing concentrations will be measured and compared to any relevant existing information and when the project commences, will be used as the background data. Relevant available information related to the pre-development ambient air concentration in the environment was looked into while identifying the major existing air emission sources in the environment and the existing sensitive pollution areas in the environment.

1.5. Terms of Reference

As part of the Terms of Reference (ToR), ambient air quality measurements were undertaken in compliance with the EMC (Air quality) regulations 2014 framework legal notice 34.

The following forms the TOR of the air quality survey:

- ✚ Review of the legal context relating to air pollutants;
- ✚ Evaluation of site meteorology;
- ✚ Monitoring of background air quality:
 - Particulate Matter (PM) - particulate matter with aerodynamic diameter less than 10 microns and 2.5 microns (PM₁₀ and PM_{2.5}).
 - Gases - sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and carbon dioxide (CO₂) Total Volatile Organic Compounds (TVOC) and Ozone (O₃).

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1.6. Justification of EBS

This Environmental Baseline Study is designed to characterize the atmospheric resources at the proposed site prior to establishment of the Maritime Rescue Coordination Center. EBS will provide a benchmark and reference against which to compare the environmental conditions influenced by the construction, operation and closure phases of the Maritime Rescue Coordination Center. The information will be used to assess the effectiveness of any proposed mitigation measures and to implement adaptive management, if need be.

The environmental baseline study will collect, assess, and interpret enough physical and chemical atmospheric information to: support the characterization of the atmospheric resource; enable determination of possible impacts; help predict the significance of impacts and the effectiveness of any proposed mitigation; establish thresholds for indicators of ecosystem health; and facilitate the design of monitoring programs.

Well-developed EBS often alleviate heightened perceived concerns within the community during the initial phases of any proposed development, before issues become a serious risk to the project. EBS also creates reassurance in the minds of the public and jurisdictional decision makers that key environmental issues have been identified and will be monitored and mitigated, during and after the project is approved. EBS monitoring can be looked at as an early warning system of impacts that could potentially affect the environment during the project operation phase and long after the project is decommissioned.

Atmospheric environment has been selected as a valued component because of their fundamental significance to the well-being of human health, flora and fauna health. Environmental Baseline Study is a significant component of monitoring programs for some successful development activities. This Baseline Report forms part of a Comprehensive Baseline Study (CBS) of the proposed Project. The CBS is being prepared as part of an environmental Social Impact assessment (ESIA) and approval process.

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2. CONTEXT OF THE AIR QUALITY & MONITORING NETWORKS

Clean air is essential to human health and ecosystems. Five categories of general pollutants were measured at the monitoring networks at the proposed site in Kisumu Port Area. The monitored categories of pollutants were sulphur dioxide (SO₂); oxides of nitrogen (NO_x) (which includes nitric oxide (NO) and nitrogen dioxide (NO₂)); carbon monoxide (CO); Total Volatile Organic Compounds (TVOC); ozone (O₃); particulate matter (PM) (which includes particles less or equal to than 2.5 microns (PM_{2.5}), particles less than or equal to 10 microns (PM₁₀). The EB study includes monitoring over a 3-hour period for the above pollutants.

Construction or demolition works deteriorate air quality in three main ways: **Dust nuisance**. The circulation of machinery, demolition operations or the loading and unloading of materials release suspended particles (PM₁₀, PM_{2.5} and PM₁) that can cause health risks when inhaled, especially among the most vulnerable groups of people; **Atmospheric emissions from machinery**. Machinery on a construction site generates noise, dust and gases such as NO_x or CO; **Transport of construction materials** - the handling of construction materials also contributes to higher pollution levels, especially in the case of particulate matter.

Air pollution from construction is a real challenge due to the various sources and emanation of different pollutants. In this respect, particulate matter is one of the most harmful emissions. Their hazardous nature derives from their size, for example, particles ranging from 10 microns (PM₁₀) to 1 micron (PM₁). In addition to this characteristic, sometimes the nature of the particle must also be taken into account, since, in the case of asbestos, silica or wood, it can represent an added risk factor. However, detailed analyses are necessary to ascertain this.

The environmental impact of a construction site is wide-ranging. In this sense, air quality may be relegated to the background. It is, after all, a temporary condition, generally limited to the period during which the works are being carried out. But this is no excuse for not adopting measures to help reconcile environmental protection and construction or demolition activities. Thus, it should be noted that the environmental impact of construction on the atmosphere can manifest itself in different ways:

- ✦ **Ecological impacts:** pollutants from construction activities can alter the quality of water resources. But they can also affect the vegetation and animal species that make up ecosystems and upset the ecological balance.
- ✦ **Impact on public health:** the emissions mentioned in the previous section may have a significant impact on local communities and inhabited areas in the vicinity of the construction site.
- ✦ **Climate connection:** the soot or black carbon which is part of fine particulate matter (PM_{2.5}) absorbs sunlight, thus contributing to global warming.

Exposure to poor air quality has an immediate and detrimental effect on one's health. According to the World Bank (2016), air pollution is the fatal form of pollution and the fourth leading risk factor of premature deaths globally. About 5.5 million people worldwide are reported to have lost their lives to diseases caused by air pollution. Studies have shown that the impacts of different air pollutants on human health and environment. Zhang et al., 2017a, Zhang et al., 2017b reported sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and fine particulate matter smaller than 10 µm (PM₁₀) can negatively influence consumers' emotional state. Song et al., 2019a, Song et al., 2019b indicated the relationship between average concentration of PM_{2.5} and subject well-being. Manisalidis et al. (2020) stated that carbon monoxide is

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tightly connected to global warming and climate, and sulfur dioxide emissions are associated with environmental adverse effects (such as acidification of soil and acid rain).

2.1. Oxides of Nitrogen (NO_x)

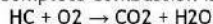
In a combustion process, NO_x is produced through three mechanisms, namely thermal NO_x, fuel NO_x and prompt NO_x. Thermal NO_x is the primary source of NO_x and is formed as a high temperature dissociation and subsequent reaction of nitrogen (N₂) and oxygen (O₂). It is produced in the hottest part of the flame and its formation increases exponentially with the flame temperature. The control of thermal NO_x is generally achieved through reducing the flame temperature, reducing the residence time, or by operating under fuel rich conditions. Fuel NO_x is formed by the reaction of nitrogen compounds chemically bound in liquid or solid fuels with oxygen in the combustion air. In the combustion of such fuels, fuel NO_x can account for up to 50% of the total NO_x emissions. Prompt NO_x is formed from the rapid reaction of atmospheric nitrogen with hydrocarbon radicals, and typically under partially fuel-rich conditions. It can be reduced through combustion staging or by operating under highly oxidizing combustion conditions. NO₂ is the primary component of concern in NO_x emissions. Generally, up to 10% of the NO_x emitted from the combustion of fuel is emitted as NO₂. The remainder is emitted as NO, which is subsequently converted to NO₂ in reactions with various oxidants and ozone as the plume is transported downwind from the source. The rate of NO₂ formation varies with time of day, season, temperature, wind speed, solar radiation and the availability of oxidants to help drive the chemical reactions.

NO₂ is a reddish-brown gas with a pungent odour, which upon reaction with other atmospheric compounds, becomes a major contributor to smog, acid rain, inhalable particulates and reduced visibility. At significant levels and exposure, inhalation may result in irritation and burning to the skin and eyes, nose and throat. Prolonged exposure may result in permanent lung damage.

2.2. Carbon Monoxide (CO)

Carbon monoxide is a colorless and odorless gas which reduces the delivery of oxygen to the body's organs. For those with heart disease, exposure to low doses can result in chest pain. For healthier people, exposure to higher levels affects the central nervous system.

Incomplete oxidation of fuel results in the formation of CO. In simplified terms, the generic stoichiometric combustion equation for complete combustion is:



However, if sufficient oxygen (O₂) is not present to complete the combustion of the hydrocarbon fuel (HC), then the oxidation to carbon dioxide (CO₂) and water (H₂O) is not completed and hence CO is emitted.

2.3. Sulphur Dioxide (SO₂)

Levels of sulphur dioxide (SO₂) in ambient air are typically directly related to the concentration of sulphur in fuel and the quantity of fuel being combusted. Upon combustion, approximately 98% of the sulphur in the fuel will oxidize to form SO₂, with the remaining 2% producing sulphur trioxide (SO₃). The emitted SO₂ can also further oxidize to SO₃ and react with water to produce acid rain in the form of sulphuric acid (H₂SO₄).

Short-term exposures to SO₂ have shown adverse respiratory effects including bronchoconstriction and increased asthma symptoms.

2.4. Ozone (O₃)

Ground-level ozone is not directly emitted into the air, but rather is formed by chemical reactions between NO_x and volatile organic compounds (VOCs) in the presence of ultraviolet (UV) radiation. Ozone is a primary component of smog.

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Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can also worsen bronchitis, emphysema, and asthma as well as reduce lung function and inflame the linings of the lungs, permanently scarring lung tissue under repeated exposure.

2.5. Particulate Matter (PM)

Particulate matter is the term for particles and aerosols found in the air, including dust, dirt, soot, smoke, and liquid droplets, and can be large and dark enough to be seen with the naked eye or so small that they can only be detected with an electron microscope. Particulate matter is one of the most harmful emissions. Their hazardous nature derives from their size, for example, particles ranging from 10 microns (PM_{10}) to 1 micron (PM_1). In addition to this characteristic, sometimes the nature of the particle must also be taken into account, since, in the case of asbestos, silica or wood, it can represent an added risk factor. However, many manmade and natural sources emit particulate matter directly while others emit gaseous pollutants that react in the atmosphere to form particulate matter. The size of the particulate has important health considerations. Particulate matter less than or equal to 10 microns in diameter (PM_{10}) poses a health concern because it can be inhaled into and accumulate in the respiratory system. Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) is believed to pose the greatest health risks as it can lodge deeply into the lungs; a $PM_{2.5}$ particles is approximately 1/30th the average width of a human hair. Typically, these smaller particles are suspended in the air for long periods of time. Total Particulate Matter (TPM) is the term applied to any particle suspended in the atmosphere, but depending on the monitoring method, is typically limited to particulate matter less than 44 microns. Particulate larger than 10 microns is typically associated with a nuisance issue rather than a health issue.

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3. LEGISLATIVE AND ENVIRONMENTAL POLICY FRAMEWORK

3.1. Environmental Management Coordination (Air Quality) regulations 2014

The Kenya Air Quality Regulations 2014 impose limit values as detailed in the SPECIAL ISSUE Kenya Gazette Supplement No.41, Legislative Supplement No.15, Legal Notice No. 34, compliance with the objectives (prevention, control and abatement of air pollution to ensure clean and healthy ambient air) is a legal requirement in Kenya.

Part 65 and 66 details the requirements on monitoring and assessment of ambient air quality, part 85 shows the need for establishment of baseline levels of priority air pollutants listed in the first schedule of the guideline and included PM₁₀, PM_{2.5}, SO₂, NO₂, O₃ and CO. Statutory requirements relevant to this study FIRST SCHEDULE are detailed in Table 2 below:

Table 2: Ambient Air Quality Tolerance Limits

	Pollutant	Time weighted Average	Industrial area	Residential, Rural & Other area	Controlled areas***
1.	Respirable particulate matter (<10 µg/m ³) (RPM)	24 hours**	150µg/Nm ³	100µg/Nm ³	75µg/Nm ³
2.	PM _{2.5}	24 hours	75 µg/m ³	-	-
3.	Sulphur dioxide	Instant Peak		500 µg/m ³	-
4.		Instant peak (10min)		0.191 ppm	-
5.	Non-methane hydrocarbons	instant Peak	700ppb	-	-
6.	Total VOC	24 hours**	600 µg/m ³	-	-
7.	Oxides of Nitrogen	24 hours	100 µg/m ³	0.1 PPM	-
8.		Instant peak		0.5 PPM	-
9.	Nitrogen dioxide	One hour		0.2 ppm	-
		Instant peak		0.5 ppm	-
10.	Carbon monoxide / carbon dioxide	One Hour	10 mg/m ³	4.0 mg/m ³	10 mg/m ³
11.	Ozone	1-Hour	200 µg/m ³	0.12 PPM	-

Extract from the Ambient EMC Air Quality regulations, 2014 (Tolerance Limits)

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4. MONITORING METHODOLOGY

It is important to accurately determine prevailing air quality conditions against which predicted effects can be gauged and assessed for any environmental effects' assessment.

Ambient air quality survey for this study consists of three representative monitoring locations. Information for the report is presented based on air monitoring completed for 1-hour weighted average per locale. For the purpose of the baseline investigation, samples were taken on site on the 14th day of June 2024 and thereafter the samples were compared against the guidelines and standards while attention given to relevant referencing sites of similar nature.

Ambient air quality data were obtained from a validated and approved air quality monitoring program.

4.1. Baseline Study Area;

4.1.1. Sensitive Receptors

The geographical scope of the baseline assessment is currently defined as the proposed Maritime Rescue Coordination Center boundaries and environs, including potentially high risk zones along the routes of any existing surface access. High risk zones include locations with the potential for exceedance of regulatory standards for the protection of human health and/or sensitive habitats, in the initial and / or mature operations years.

The issue of pollutants is particularly pertinent in areas sensitive to change, often referred to as 'sensitive receptors'. Locations for the protection of human health are areas of long term exposure which are more susceptible and shall be considered to include residential properties, hospitals and schools; whereas locations for the protection of sensitive habitats / ecosystems shall be considered to include statutory designated sites (such as sites of special scientific interest (SSSIs), special areas of conservation (SACs) and special protection areas (SPAs) which contain habitat types that are also sensitive to atmospheric quality changes.

The proposed project site borders the lake shoreline and neighbors Devki Group; mega properties / Shiloah Investment group, CMC Motors-Kisumu, Nissan Kisumu, Swan Centre, and KRC-Kisumu). The frontal side borders the Kisumu-Nairobi railway line operated by KRC.

Close proximity of the emission source to the 'sensitive receptor' causes poor air quality because there is less opportunity for dispersion of emissions between the source and receptor resulting in greater concentrations of pollutants. Air quality is evaluated by comparing concentrations of pollutants against the EMC (Air Quality) regulations 2014 Legal Notice 34 first schedule of the Ambient Air Quality Tolerance Limits set at locations where exposure harm to human health and ecosystems is thought to occur.

4.1.2. Existing Atmospheric Environment

The proposed site lies in the lake shoreline, beach and characterized by a flat terrain. The neighborhood depicts mixed land use including residential areas and commercial areas. The main source of existing air pollution are fugitive and diffuse emissions of dust particles and gaseous emissions from the mobile sources such as visiting motor vehicles and other commercial operations from other companies. The anthropogenic emission sources directly associated with the proposed project will be the main concern of the appraisal framework and will be emitted from various sources including; mobile sources (cars and heavy goods vehicles that will be accessing the site to offload materials during construction, combustion of boat emissions), source emissions (generator), other related fugitive and diffuse sources. However, exposure locations will also be influenced by non-related sources including domestic heating around the facility. The emissions concentrations reported herein, will be a combination of the total emissions from the sources and the distance to the receptor which influences the concentrations of pollutants in the air and impacts air quality. As such, the most common ambient atmospheric emission source causing poor air quality within close proximity to sensitive receptors and the site in general will be diffuse and fugitive emissions as the dominant emission sources.

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4.1.3. Monitoring Locations

Baseline atmospheric quality monitoring locations were selected based on the existing facility that could or have the potential to influence the proposed project atmospheric environment. KMA site is characterized in to three sections i.e project boundary from North through South (PBNS1), project boundary from West through East (PBWE2) and the mid-section of the proposed site (MSPS).

Table 3: Description of the measurement locations

Measurement Sites	Receivers	Description of monitoring Locations	Dates of sampling
Project Boundary from North through South (PBNS1) Latitude -0.096632" S and Longitude 34.749084" E	Devki Group; mega properties / Shiloah Investment group, CMC Motors-Kisumu	The proposed project site abuts the lake shoreline and neighbors Devki Group; mega properties / Shiloah Investment group, CMC Motors-Kisumu, Nissan Kisumu, Swan Centre, and KRC-Kisumu). The frontal side borders the Kisumu-Nairobi railway line operated by KRC.	14 TH JUNE 2024.
Project Boundary from West through East (PBWE2) Latitude -0.096522" S and Longitude 34.749387" E	Lake Victoria Shoreline		14 TH JUNE 2024.
Mid-Section of the proposed site (MSPS) Latitude -0.096325" S and Longitude 34.749353" E	Kisumu-Nairobi railway line operated by KRC		14 TH JUNE 2024.

4.2. Baseline Air Quality Assessment process

The National and Local baseline assessments have been undertaken following the processes shown in Figure 1 and Figure 2 below.

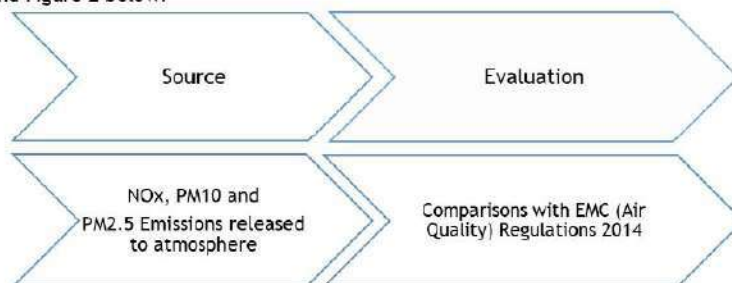


Figure 1: National Baseline Assessment Process

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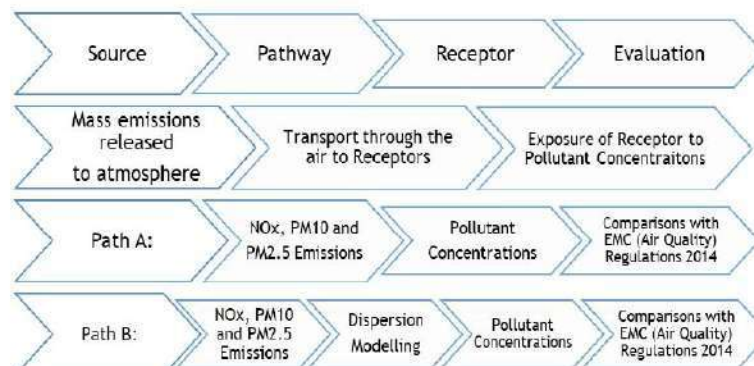


Figure 2: Local / Site Specific Baseline Assessment Process

The local baseline assessment has been undertaken following Process Path A for the first stage assessment.

4.3. Assessment Criteria for gaseous and particulate parameters

Sampling of gases was done using a 24-hour AQM-09 is a device which can monitor the air quality via the value of O₃, SO₂, NO₂, CO, PM_{2.5}, PM₁₀, etc. The target value is converted into voltage signal by operational amplifier circuit, and then filtered through high-precision AD data acquisition system. Finally, the gas concentration is calculated by CPU. Particulates mainly use laser scattering method to produce different scattering light according to different particle diameters under laser scattering conditions. The scattered light intensity is collected by a response device, and the particle 4 concentration is obtained after amplification, filtering and AD acquisition. The obtained gas concentration and particulate matter concentration can be displayed on LCD screen in real time, and can also be transmitted to cloud platform or environmental protection platform through GPRS, 4G LTE and other network signals, so as to realize the monitoring of regional environmental quality. The gas meters were mounted at about 1 - 2 M above the ground surface. The laboratory results and sampling duration information were used to calculate the gaseous concentrations.



Ongoing atmospheric assessment

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4.3.1. Carbon monoxide (CO)

CO monitoring instruments were predominantly gas filter correlation infrared (GFC-IR) absorption analyzers and the electrochemical sensor systems.

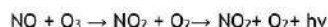
Ambient air was continuously sampled using a pump unit and the CO concentration in the sample air was measured by the absorption of infrared radiation at 4.5 to 4.9 nanometers (nm) wavelength. A reference detection system was used to alternately measure absorption due to CO in the ambient air stream and absorption by interfering species. An infrared detector and amplification system produced output voltages proportional to the CO concentration. The concentration was derived from the Beer-Lambert relation:

$$I_1 = I_0 e^{-ac}$$

where the sample was passed through a cell tube of length 'l'. The analyzer alternately measured the absorption I_0 of the air path with no CO present and the absorption I_1 of the ambient sample, with 'a' being the absorption coefficient, to provide the CO concentration, 'c'.

4.3.2. Nitrogen dioxide (NO₂)

Nitric oxide (NO) in the sample air stream was reacted with ozone (O₃) in an evacuated chamber to produce activated NO₂:



The intensity of the chemiluminescent radiation ($h\nu$) produced is measured using a photomultiplier tube (PMT) or photodiode detector. The detector output voltage is proportional to the NO concentration. The ambient air sample is divided into two streams; in one, ambient NO₂ is reduced to NO using a molybdenum catalyst before reaction. The molybdenum converter should be at least 95 per cent efficient at converting NO₂ to NO. This gas stream gives total NO_x. The second stream measures NO directly by not passing through the molybdenum converter.

Separate measurements are made of total oxides of nitrogen NO_x (= NO + NO₂) and NO. The ambient NO₂ concentration is calculated from the difference (NO₂ = NO_x - NO). This is an important point to remember because the contaminant of interest (NO₂), is actually measured by inference rather than directly, and the efficiency of the molybdenum converter should be checked on a regular basis.

In a chemiluminescent analyzer, ambient air is drawn through the system via a pump and permapure drier unit. NO_x analyzers are equipped with either a single or a double reaction chamber and PMT system. A solenoid valve is used to alternately switch between NO and NO_x measurements, typically at 15-second intervals.

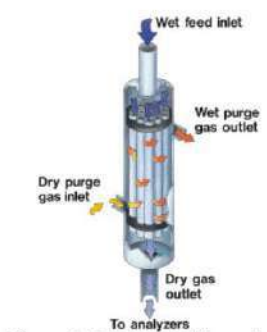


Figure 3: Permapure drier unit.

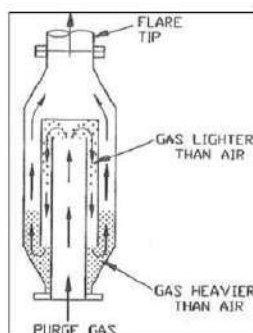
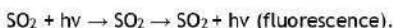


Figure 4: Air purge gas

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4.3.3. Sulphur dioxide (SO₂)

SO₂ monitoring instruments are predominantly molecular UV fluorescence analyzers. This is the recommended SO₂ monitoring method. UV fluorescence systems operate on the principle that an ambient air sample stream exposed to UV light excites SO₂ molecules in the sample to higher, but unstable, excited states. These excited states decay, giving rise to the emission of secondary (fluorescent) radiation:



The fluorescent radiation is detected by a PMT, causing an output voltage proportional to the SO₂ concentration. A permeable membrane 'kicker' is used to remove interfering hydrocarbons (aromatic hydrocarbons also fluoresce) before reaction. Ambient air is drawn through the system via a pump unit, and the analyzer continuously displays current SO₂ concentrations.

4.3.4. Ozone (O₃)

Ozone was measured using a direct reading using the flame-ionisation detector (FID). In the FID, an organic compound is burned in a hydrogen flame giving rise to ions which are attracted to a collector electrode. The resulting electric current is amplified and recorded. The intensity of the signal depends primarily on the number of carbon atoms of the molecule, but to some extent it is also influenced by the character or structure of the chemical. Therefore, the same number of molecules of two different ozone with the same number of carbon atoms can give rise to two different signals. The FID is very stable.

4.3.5. Total Volatile Organic Compounds (TVOC)

Optical gas detection using absorption spectroscopy is based on the Lambert-Beer law (1,2):

$$I(\lambda) = I_0(\lambda) \exp[-a(\lambda)C \cdot L] \quad a[\text{cm}^{-1}]$$

$$I(\lambda) = I_0(\lambda) \exp[-a(\lambda) \cdot C \cdot L] \quad a[\text{ppm} \cdot \text{cm}^{-1}]$$

where: I—light intensity transmitted by the medium with the gas, I₀—intensity of light incident on the medium, C—concentration, a, α—absorption coefficients, and L—optical path length, gas concentration.

The optical methods for volatile organic compounds detection use its absorption characteristics in the infrared range. The strongest bands occur in the area of deformation vibrations and then valence; they are weaker in the range of overtones.

4.4. Tools Equipment and materials used

Below is the equipment used during air monitoring survey:

- ✦ Air quality multiparameter meter.
- ✦ Geographic Positioning System (GPS)
- ✦ Digital camera
- ✦ Calibration certificates
- ✦ Standard Reference materials & Standard operating procedures
- ✦ Equipment manuals.
- ✦ Terms of Reference & Maps of the project area

4.5. Monitoring Frequency

Monitoring of air quality test parameters was done with a frequency of 1 hr / survey location. Once operations are underway, monitoring of air quality parameters should be tested at 3 months' interval.

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4.6. Assumptions

The short-term exposure levels of data collection for PM_{10} , $PM_{2.5}$, SO_2 , NO_x , CO_2 , O_3 and TVOC data collected is considered sufficient to understand the state of atmospheric air quality environment before implementation of the proposed MRCC.

4.7. Data Validity and Acceptability

All data monitored in the study was taken through data replications and quality assurance procedure to ensure that any anomalous readings or questionable data is not incorporated in the final results.

Elements of this procedure account for:

- ✚ Routine calibration and auditing of the analyzers
- ✚ Statistical rendering of outliers

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5. PRESENTATION, DISCUSSION & CONCLUSION OF THE AIR QUALITY SURVEY RESULTS

5.1. Presentation of Results

5.1.1. Summary of singular Air quality measurements

Table 4: Summary results for air quality and environmental measurements

Monitoring Locations	PM _{2.5} µg/m ³	PM ₁₀ µg/m ³	CO mg/m ³	SO ₂ ppm	NO ₂ ppb	NO ppm	O ₃ ppm	TVOC µg/m ³	HUMIDITY %	TEMPS °C
Project Boundary from North through South (PBNS1) -0.096632° S and 34.749084° E	10	11	<0.001	0.051	0.033	<0.001	0.0875	0.001	63	31
Project Boundary from West through East (PBWE2) -0.096522° S and 34.749387° E	27	29	<0.001	0.064	0.037	<0.001	0.07	0.003	64	30
Mid-Section of the proposed site (MSPS) -0.096325° S and 34.749353° E	9	12	<0.001	0.039	0.029	<0.001	0.0867	0.002	59	33

(Source: Site monitoring in June 2024).

5.1.2. Gaseous parameters

Table 5: Average results for gaseous parameters

Monitoring Locations	NO _x		SO ₂		CO		Ozone		REMARKS
	Conc. (ppm)	EMC AQR guide 2014 (ppm)	Conc. (ppm)	EMC AQR guide 2014 (ppm)	Conc. (mg/m ³)	EMC AQR guide 2014 (mg/m ³)	Conc. (ppm)	EMC AQR guide 2014 (ppm)	
PBNS1	0.033	0.8	0.051	0.191	0.001	4.0	0.0875	0.12	Complies
PBWE2	0.037	0.8	0.064	0.191	0.001	4.0	0.07	0.12	Complies
MSPS	0.029	0.8	0.039	0.191	0.001	4.0	0.0867	0.12	Complies

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5.1.3. Particulate matter (PM₁₀)

Table 6: Results for Particulate matter (<10 microns)

Monitoring Locations	PARTICULATE MATTER ≤10 (PM ₁₀)			
	Sampling time	Concentration (µg/m ³)	Guideline (µg/m ³)	Remarks
PBNS1	1 hour	11	-	No guideline for short term emissions
PBWE2	1 hour	29	-	No guideline for short term emissions
MSPS	1 hour	12	-	No guideline for short term emissions

5.1.4. Particulate matter (PM_{2.5})

Table 7: Results for Particulate matter (<2.5 microns)

Monitoring Locations	PARTICULATE MATTER ≤2.5 (PM _{2.5})			
	Sampling time	Concentration (µg/m ³)	Guideline (µg/m ³)	Remarks
PBNS1	1 hour	10	-	No guideline for short term emissions
PBWE2	1 hour	27	-	No guideline for short term emissions
MSPS	1 hour	9	-	No guideline for short term emissions

5.1.5. Environmental parameters

Table 8: Results for Environmental parameters

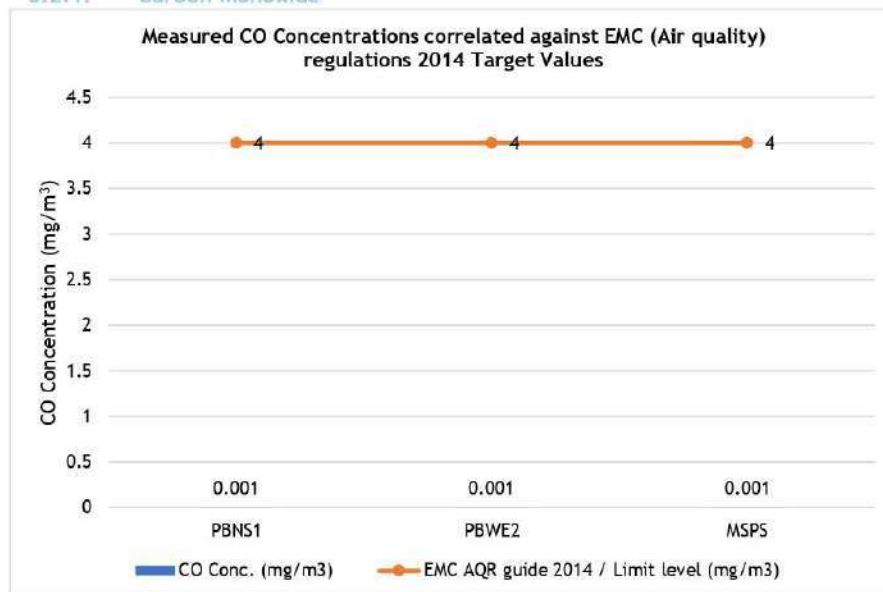
Monitoring Locations	Environmental parameters				Remarks
	Air temps °C	Pressure hPa	Humidity %	Wind Speed km/hr	
PBNS1	31	1010.2	63	14.6 km/hr SE wind	Ambient conditions present
PBWE2	30	1010.2	64	14.6 km/hr SE wind	Ambient conditions present
MSPS	33.0	1010.2	59	14.6 km/hr SE wind	Ambient conditions present

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5.2. Discussions of air quality survey results

Air quality survey was completed for short term exposure levels as the preferred time weighted averages in order to measure and quantify the air pollutant levels so as to determine the current existing conditions. Results of the gaseous concentrations and particulate parameters were thereafter correlated against the Environmental Management Coordination (Air quality) regulations of 2014 as follows:

5.2.1. Carbon Monoxide



The above combined graph was drawn from statistical analysis for 1-hr monitoring per location of atmospheric Carbon monoxide environment as per the requirement of TOR.

CO average concentration across the monitoring locations for the TWA of 1-hour were below the detection limit (0.001 mg/m³) of the testing equipment. There was no 1-hour peak exceedance of the AAQTL of 4.0 mg/m³ thus the frequency of exceedance was zero.

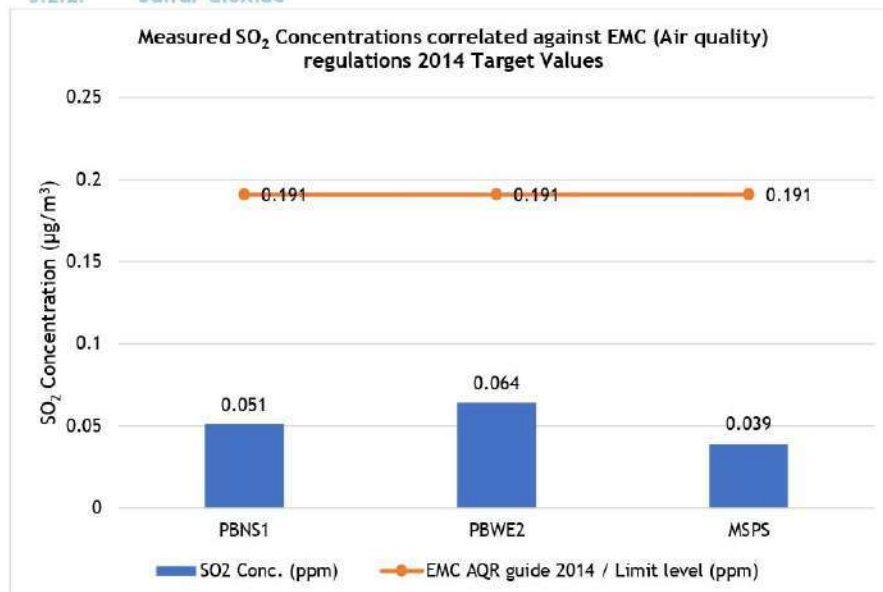
All CO concentrations recorded in the sites BEFORE IMPLEMENTATION OF THE MRCC COMPLIED with the EMC (Air quality) regulations 2014 of 4.0 mg/m³.

The very low carbon monoxide levels do not pose any health concerns. Carbon monoxide is a gas formed by the incomplete combustion of fuels containing carbon. The main outdoor source of carbon monoxide is currently motor vehicles, in particular petrol-engine vehicles.

From the above combined graph results, the levels of CO concentrations before commencement of the proposed project does not negatively influence compliance to regulations, Environment, health and safety of the recipients / receivers.

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5.2.2. Sulfur dioxide



The above combined graph was drawn from statistical analysis for 1-hr monitoring per location of atmospheric sulfur dioxide environment as per the requirement of TOR.

From the above graph, the maximum 1-hour SO₂ average concentration extended to levels 0.064 ppm at the project boundary West to East (PBWE2) of the site while the minimum 1-hour SO₂ average concentration extended to levels of 0.02 ppm at the (mid-section of the project site) MSPS. The average SO₂ concentration at the study area extended to levels of 0.0513 ppm. There was no instant peak exceedance of the AAQTL of 0.191 ppm thus the frequency of exceedance was zero.

The sulfur dioxide concentrations recorded across all survey locations had concentrations exceeding the ambient sulfur dioxide levels of 0.02ppm.

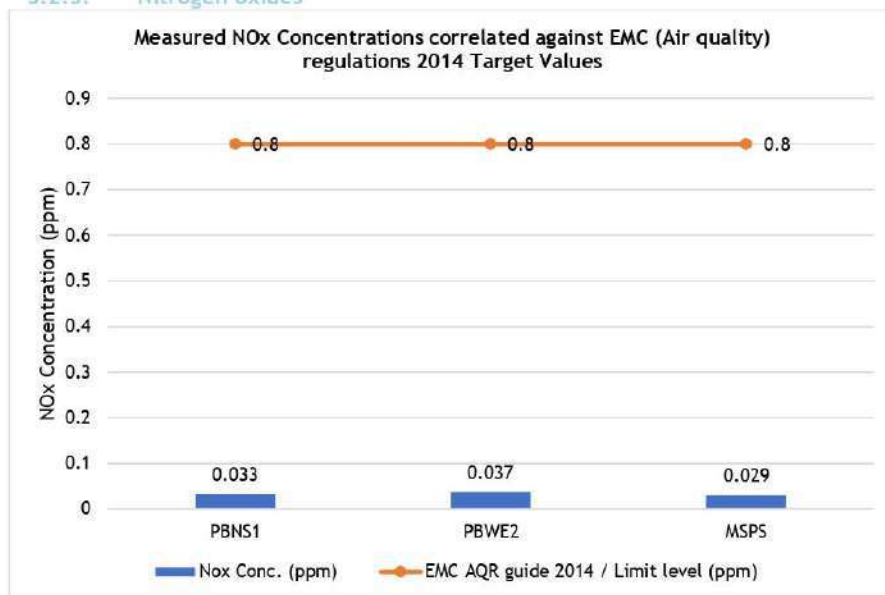
The resultant sulfur dioxide concentrations were correlated with the limit value EMC (Air quality) regulations 2014 maximum limits) for short term exposures. Results showed 100% compliance with the limit values.

Low concentration levels of sulfur dioxide recorded before implementation of the proposed MRCC did not pose any health and safety risks to the sensitive recipients, environment and compliance issues.

Fugitive and diffuse sources i.e. motor vehicles fuel combustion around the project area contribute about 90% of sulfur dioxide recorded at the proposed site.

 KMA	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046A REPORT TITLE: EBSAAQMR-46A DOI: 14 TH JUNE 2024 PAGE NUMBER P A G E 28 
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5.2.3. Nitrogen oxides



The above combined graph was drawn from statistical analysis for 1-hr monitoring per location of atmospheric nitrogen oxides (NO₂+NO) environment as per the requirement of TOR.

From the above graph, the maximum 1-hour NO_x concentration extended to levels of 0.037 ppm at the project boundary West to East (PBWE2) of the site while the minimum 1-hour NO_x concentration extended to levels of 0.029 ppm at the (mid-section of the project site) MSPS. The average NO_x concentration at the study area extended to levels of 0.033 ppm. There was no instant peak exceedance of the AAQTL of 0.8 ppm thus the frequency of exceedance was zero.

The concentration levels of all recorded nitrogen oxide gas within the three-hour survey were below the ambient levels (0.05ppm). The uniform distribution of the Nitrogen oxide concentration reveals that no outlier source influenced the NO_x concentration.

The results for the nitrogen oxide (NO_x) concentrations measured below the air quality guidelines limits. The concentration of NO_x at the survey locations were 100.00% in compliance of the EMC (Air quality) regulations 2014 maximum limits.

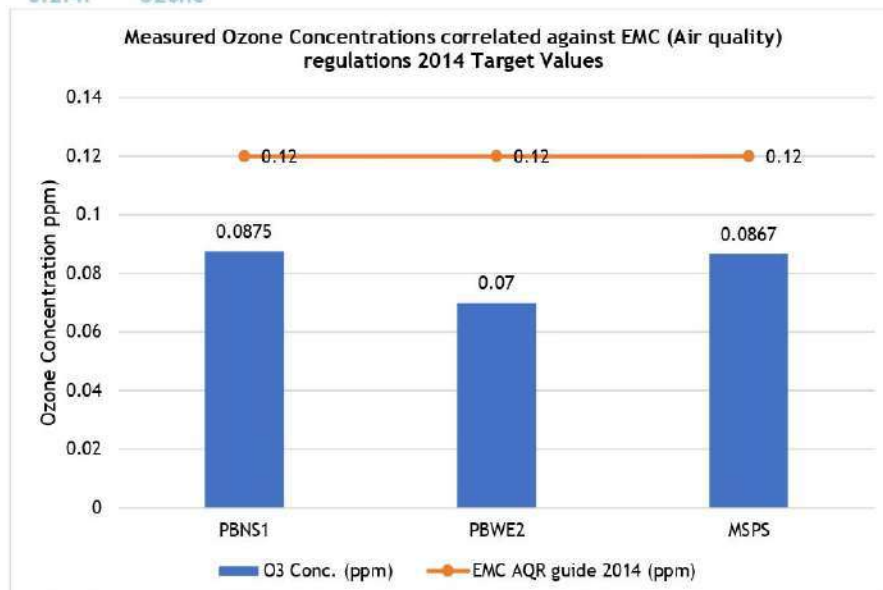
The very low NO_x concentration levels did not pose any health concern to the environment / ecosystem / sensitive receptors and human health.

NO_x is generated due to the oxidation of N₂ in the atmosphere at high temperature and due to oxidation of nitrogen compounds in used fuel or due to the reaction of nitrogen radical with hydrocarbons. 90% of the NO_x at the proposed project site is attributed to fugitive and diffuse motor vehicles combustion of fuel.

Low concentration levels of Nitrogen Oxides recorded before implementation of the proposed MRCC did not pose any health and safety risks to the sensitive recipients, environment and compliance issues.

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5.2.4. Ozone



The statistical analysis for 3-hr monitoring of ozone as outlined in the TOR was completed at three monitoring locations.

From the above graph, the maximum 1-hour ozone concentration extended to levels of 0.0875 ppm at the project boundary North to South (PBNS1) of the site while the minimum 1-hour ozone concentration extended to levels of 0.070 ppm at the mid-section of the project site (MSPS). The average O_3 concentration at the study area extended to levels of 0.081 ppm. There was no exceedance of the 1-hour AAQTL of 0.12 ppm thus the frequency of exceedance was zero.

All ozone concentrations recorded in the project sites complied with the EMC (Air quality) regulations.

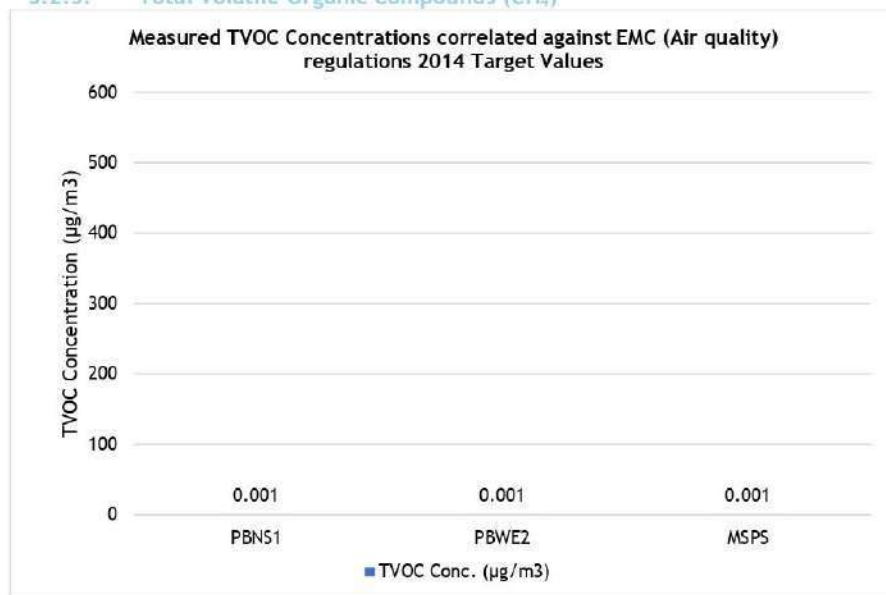
The primary natural source of surface O_3 is the subsidence of stratospheric O_3 from the upper atmosphere. In contrast, the primary anthropogenic source of surface O_3 is photochemical reactions involving the atmospheric pollutant carbon monoxide (CO). Ozone at ground level is primarily formed by a complicated series of chemical reactions initiated by sunlight. NO_x and volatile organic compounds (VOCs), derived mainly from man-made sources, react to form ozone. These substances are produced by combustion, industrial processes and activities such as solvent use and petrol distribution and handling. NO_x and VOCs are the most important precursors of elevated levels of O_3 .

Motor vehicles account for 40% of the ground level ozone at site. These chemical reactions do not take place instantaneously, but over several hours or even days depending on the VOCs, and once ozone has been produced it may persist for several days. Ozone measured at a particular location may therefore have arisen from VOC and NO_x emissions many kilometres away, and may then travel further. Maximum concentrations, therefore, generally occur downwind of the source areas of the precursor pollutant emissions.

Low concentration levels of Ozone recorded before implementation of the proposed MRCC did not pose any health and safety risks to the sensitive recipients, environment and compliance issues.

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5.2.5. Total Volatile Organic Compounds (CH₄)



The statistical analysis for 1-hr monitoring of TVOC as outlined in the TOR was completed at each of the three monitoring locations.

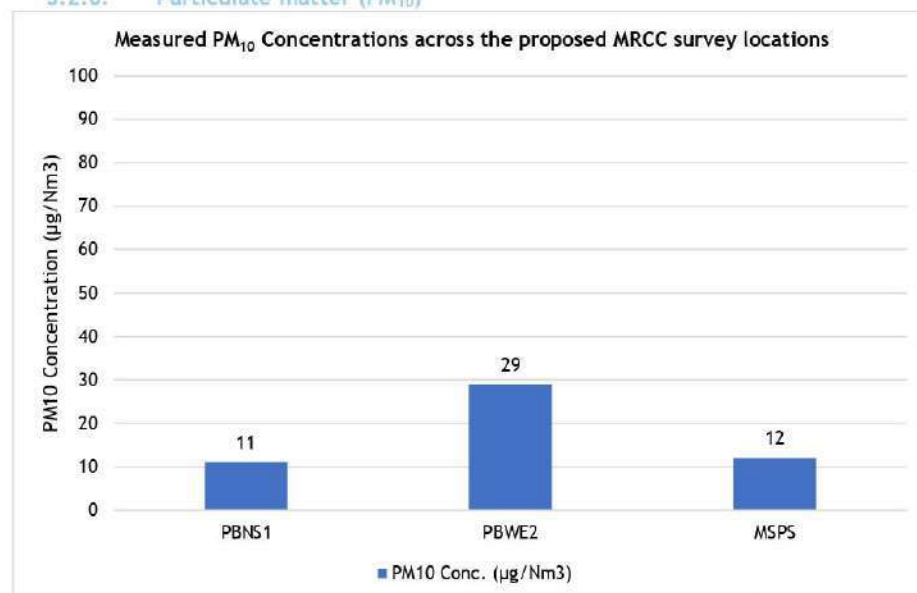
TVOC average concentration across the monitoring locations for the TWA of 1-hour were below the detection limit (0.001 mg/m³) of the testing equipment. There was no peak exceedance of the AAQTL of 600.0 µg/m³ thus the frequency of exceedance was zero.

All TVOC concentrations recorded in the survey locations BEFORE IMPLEMENTATION OF THE MRCC COMPLIED with the EMC (Air quality) regulations 2014 of 600.0 µg /m³.

The concentration values of TVOC recorded were within the typical range of emissions for such neighborhood. Low concentration levels of TVOC recorded before implementation of the proposed MRCC did not pose any health and safety risks to the sensitive recipients, environment and compliance issues.

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5.2.6. Particulate matter (PM₁₀)



The statistical analysis for the combined 3-hr monitoring of Particulate matter <10 µg/m³ as outlined in the TOR was completed.

From the above graph, the maximum 1-hour PM₁₀ concentration across the project boundary West to East (PBWE2) of the site extended to levels of 29.0 µg/m³ while the minimum 1-hour PM₁₀ concentration across project boundary North to South (PBNS1) of the site extended to levels of 11.0 µg/m³. The overall average PM₁₀ concentrations of the project area over the three-hour assessment extended to levels of 17.33 µg/m³.

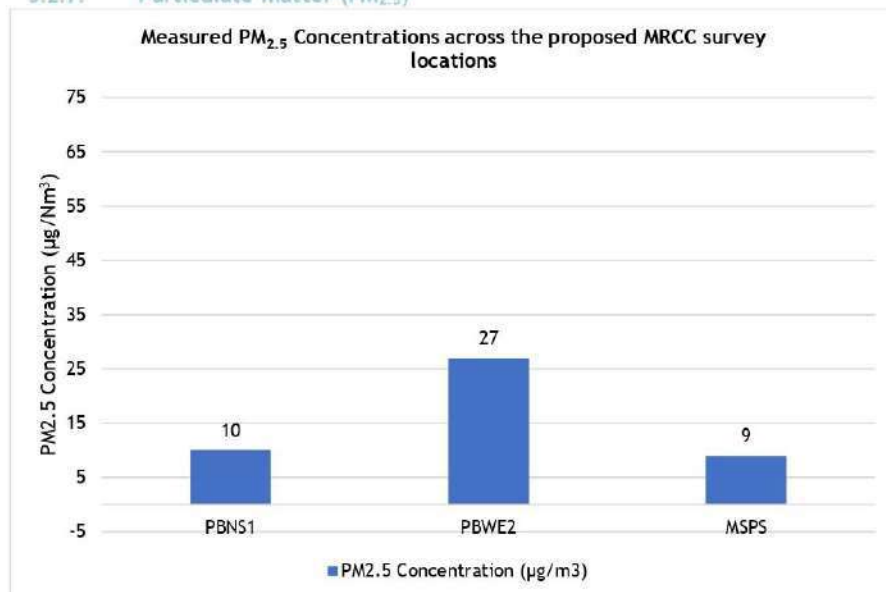
There are no short term guidelines given under the EMC (Air quality) regulations 2014 for comparison of results. No comparisons were made against the regulation. However, the concentration values of PM₁₀ recorded across the survey locations were within typical range of emissions for such neighborhood.

Unlike the individual gaseous pollutants, which are single, well-defined substances, particles (PM₁₀) in the atmosphere are composed of a wide range of materials arising from a variety of sources. Concentrations of PM₁₀ comprise: primary particles, arising from combustion sources (mainly motor vehicles emissions, which in the proposed site contribute ~70%); secondary particles, mainly sulphate and nitrate formed by chemical reactions in the atmosphere; and coarse particles, suspended soils and dusts, biological particles and particles from construction work and marram roads. The relative contribution of each source type varies from day to day, depending on meteorological conditions and quantities of emissions from mobile and static sources.

From the above combined graph results, the levels of PM₁₀ concentrations before project implementation does not negatively influence the Environment, health and safety and compliance status of the site before implementation of the proposed MRCC.

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5.2.7. Particulate matter (PM_{2.5})



The statistical analysis for the 1-hr monitoring of particulate matter PM_{2.5} as outlined in the TOR was completed at three survey locations.

From the above graph, the peak 1-hour PM_{2.5} concentration extended to levels of 27.0 µg/Nm³ at the project boundary West to East (PBWE2) of the site. Similarly, the minimum 1-hour PM_{2.5} concentration extended to levels of 9.0 µg/Nm³ at the mid-section of the project site (MSPS).

There are no short term guidelines given under the EMC (Air quality) regulations 2014 for comparison of results. No comparisons were made against the regulation. However, the concentration values of PM_{2.5} recorded seems to be within the typical range of emissions for such neighborhood.

The main sources of atmospheric particulate matter were primarily the combustion of fuel during motor vehicle mobility.

The fine particle fraction (PM_{2.5}) is composed predominantly of primary and secondary particles. Particles in the range from PM_{2.5} - PM₁₀ generally consist of coarse particles.

From the above combined graph results, the levels of PM_{2.5} before project implementation does not negatively influence the Environment, health and safety and compliance status of the recipients / receivers before implementation of the proposed MRCC.

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5.3. FIELD NOTES AND OBSERVATIONS:

Ambient air quality measurements were taken for short term exposure levels. It should however be noted that this exercise is only applicable to the time period when sampling took place and does not take into account seasonal and other local various that might occur during other months and times. However, it is still a good general overview of the existing air quality environment.

5.3.1. Sensitive receptors

The proposed project site borders the lake shoreline and neighbors Devki Group; mega properties / Shiloah Investment group, CMC Motors-Kisumu, Nissan Kisumu, Swan Centre, and KRC-Kisumu). The frontal side borders the Kisumu-Nairobi railway line operated by KRC.

5.3.2. Potential Pollution causes;

From the site visits and background site description, the following sources have been identified as potential pollution causes at the proposed site;

Exhaust gases:

The survey locations are frequented by marine vessels, motor vehicles, forklifts and personal service vehicles that utilize diesel and petrol. Vehicle and motorcycle exhausts contain a number of pollutants including carbon dioxide (CO₂), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NO_x), sulphur and PM₁₀.

The quantity of each pollutant emitted depends upon the type and quantity of fuel used, engine size, speed of the vehicle and abatement equipment fitted. Once emitted, the pollutants are diluted and dispersed in the ambient air.

Vehicular movement;

Re-suspension of roadside dust from movement of vehicles resulted in generation of relatively higher fraction of finer dust (PM_{2.5}).

Significant atmospheric dust arose from the mechanical disturbance of granular soils materials exposed to the air from the loading and offloading yards moving in and out of the main gates. Pulverization and abrasion of surface materials by application of truck mechanical forces generate substantial amount of dust.

5.4. Air Quality Survey Conclusions

Baseline Atmospheric Environment Monitoring was conducted to characterize the existing environment before implementation (DO MINIMUM) of the proposed MRCC. The conclusions below were drawn from the exercise conducted on the 14th June 2024.

Gaseous Parameters:

All gaseous parameters (carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone and total volatile organic compounds) were measured and quantified at all the three survey locations.

Before the project implementation of the MRCC, all measured gaseous parameters COMPLIED with the EMC (Air quality) regulations 2014 limits.

The ambient air quality data (gaseous) measured around the monitoring locations are considered to be within a typical range of emissions for such neighborhood.

The findings of the gaseous monitoring program indicate that the air quality at Kisumu port area where the project is to implemented is generally good before the proposed MRCC implementation. All pollutants measured are at levels that do not pose Environmental, Health, Safety and compliance concern.

The practices in place to control and manage gaseous pollutants should be maintained.

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Meteorological Parameters:

The monitoring locations in general showed Standard atmospheric environment before project implementation due to the combination of good climate and ambient conditions. Weather and Climatic conditions at the proposed project site provided good dispersion of air contaminants.

Particulate Matter (PM₁₀ and PM_{2.5}):

Particulate parameters concentrations (PM₁₀ and PM_{2.5}) were measured and quantified across the survey stations.

PM_{2.5} and PM₁₀ concentration levels recorded were within the typical range of emissions for similar neighborhood.

The findings of the monitoring program indicate that the particulate matter atmospheric environment is generally good before the proposed MRCC implementation. Particulate pollutants measured are at levels that do not pose Environmental, Health, Safety and compliance concern.

Once construction and operations begin, the client is expected to maintain the background / baseline levels.

5.5. Recommendations

When operations / commissioning take effect, greenhouse gas measurements and sampling should be frequently done in order to build up a robust dust and gaseous management plan.

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6. REFERENCES

- 1) Environmental Management and Coordination Act (EMCA) 1999 (amended 2015).
- 2) Environmental Management Coordination (Air Quality) Regulations 2014 (Legal Notice No.34).
- 3) Environmental Protection Agency. (1976) Quality Assurance Handbook for Air Pollution Measurement Systems - Volume 1 Principles. EPA-600/9-76-005, Research Triangle Park, NC.
- 4) Quality Assurance and Quality Control (QA/QC) Procedures for UK Air Quality Monitoring under 2008/50/EC and 2004/107/EC
- 5) U.S. Environmental Protection Agency (2000) Guidance for Data Quality Assessment - Practical Methods for Data Analysis, EPA Report QA G-9 QA00 Update, Washington DC, July 2000. This document can be downloaded from website: <http://www.epa.gov/quality/qs-docs/g9-final.pdf>
- 6) U.S. Environmental Protection Agency. (1998) EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5, Report EPA/600/R-98/018, EPA Project Boundary 2 (PB-2) or Research and Development, Washington DC. This document can be downloaded from website: <http://www.epa.gov/swerust1/cat/epaqag5.pdf>.

 KMA	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046A REPORT TITLE: EBSAAQMR-46A DOI: 14 TH JUNE 2024 PAGE NUMBER: P A G E 36
		

APPENDIX A: EQUIPMENT CALIBRATION CERTIFICATES

Calibrate report

Product	Air Quality Monitor System		Model	AQM-09	
Quantity	1pcs		Cali date	May. 31, 2023	
Product No.	OC202305315000061				
Appearance	☒ Clean ☒ Non corrosive ☒ No damage				
Gas type	NO2:ppb	SO2:ppb	CO:ppm	O3:ppb	H2S:ppm
	VOC:ppm	NO:ppb	PM2.5:ug/m³	PM10:ug/m³	TSP: ug/m³
	Noise:dB	Wind veloc: m/s	Wind direct: °		
	Temperature and humidity: °C/%RH				
Accuracy	± 3%F.S				
resolution	0.1ppm	1ppb	1ug/m³		
Response time	≤ 30S				
Survey range	NO2:0-2000ppb		SO2:0-2000ppb		CO:0-200ppm
	O3:0-2000ppb		H2S:0-100ppm		VOC:0-50ppm
	NO:0-2000ppb		PM2.5:0-1000ug/m³		PM10:0-1000ug/m³
	Noise:030-130dB		TSP:0-1000ug/m³		
	Windveloc:0-30m/s		Winddirect:0-360°		
	Temperature: -20-50℃		Humidity:0%-100%RH		
Signal output mode	4G LTE				
Power supply voltage	AC 240V/50Hz				
Power dissipation	≤ 30W				
Working temperature and humidity range	-20℃-50℃ / 0%RH-100%RH				
Testing condition indoor	Temperature: 25℃ Humidity: 60%RH				
Calibration gas	CO SO2 O3 NO2 H2S C4H8 NO				
Cali gas test	1.CO: Cali gas concentration: <u>100</u> ppm		Inspect concentration: <u>99.7</u> ppm		
	2.SO2: Cali gas concentration: <u>1200</u> ppb		Inspect concentration: <u>1198</u> ppb		
	3.O3: Cali gas concentration: <u>1600</u> ppb		Inspect concentration: <u>1589</u> ppb		
	4.NO2: Cali gas concentration: <u>1000</u> ppb		Inspect concentration: <u>1000</u> ppb		
	5.NO: Cali gas concentration: <u>1000</u> ppb		Inspect concentration: <u>998</u> ppb		
	6.H2S: Cali gas concentration: <u>50</u> ppm		Inspect concentration: <u>49.8</u> ppm		
	7.C4H8: Cali gas concentration: <u>11.5</u> ppm		Inspect concentration: <u>11.5</u> ppm		
	8.PM2.5:Measured value: <u>35</u> ug/m³		PM10:Measured value: <u>39</u> ug/m³		
	TSP:Measured value: <u>42</u> ug/m³		Noise: Measured value: <u>46.5</u> dB		
	9.Wind veloc:Measured value: <u>1.4</u> m/s		Wind direct:Measured value: <u>317</u> °		
	10.Temperature: Measured value: <u>24.4</u> °C		Humidity:Measured value: <u>63</u> %RH		
Test result	Qualified				
Remark					

Quality judgment:

Tester: xiu tai chen

Company: Henan Oceanus Import & Export Co., Ltd.

OQC : chang Yang

Date:May.31, 2023

Auditor: yan hui wang

 KMA	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046A REPORT TITLE: EBSAAQMR-46A DOI: 14 TH JUNE 2024 PAGE NUMBER P A G E 37 
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APPENDIX B: LABORATORY DESIGNATION CERTIFICATES


nema
NATIONAL ENVIRONMENTAL MANAGEMENT AUTHORITY

Mobile Lines: 0724-253 398, 0723-363 010, 0735-013 046
 Telkom Wireless: 020-2101370, 020-2183718
 Incident Lines: 0786-101100, 0741-101100

P.O. Box 67839, 00200
 Popo Road, Nairobi, Kenya
 E-mail: dgonema@nema.go.ke
 Website: www.nema.go.ke

NEMA/21/2/LAB 77/LLL **20th April, 2023**

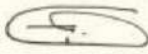
Lahvens Limited Laboratory
Lahvens House,
P.O. Box 34153-80118
MOMBASA.

RE: LABORATORY DESIGNATION BY NEMA.

Pursuant to your application for designation, your laboratory was inspected and evaluated based on ISO 17025 for laboratory competence to carry out tests and samplings.

The Lahvens Limited Laboratory qualified and has in principle been designated to undertake **Air Quality Analysis (Stack Emission and Ambient Air) and Noise Level Measurements** subject to the attached terms and conditions.

However, pursuant to section 119 of EMCA 1999 the Gazettement will take effect once the Authority places a notice in the Kenya Gazette.


DAVID ONGARE
For: DIRECTOR GENERAL

Our Environment, Our Life, Our Responsibility


 ISO 9001:2015 Certified

10. Copies of the baseline acoustic level report

AMBIENT ACOUSTIC LEVELS TEST REPORT.**ENVIRONMENTAL BASELINE STUDY REPORT FOR
AMBIENT ACOUSTIC EMISSIONS LEVELS
MONITORING OF THE PROPOSED MARITIME RESCUE
COORDINATION CENTER (MRCC), KISUMU COUNTY.****PROJECT INFORMATION:**

PREPARED FOR:
KENYA MARITIME AUTHORITY (KMA),
P.O. BOX 9632 - 40141,
KISUMU, KENYA.

**CLIENT ADDRESS:**

PREPARED BY:
LAHVENS LIMITED
P.O BOX 34153, 80118.
DESIGNATION LAB REF. NO. NEMA/21/2/LAB77/LLL
EMAIL: lahvens@lahvens.com

**TESTING CONSULTANTS:**

DOCUMENT ID: 50124-0046 B
TEST DATES: JUNE 14TH 2024
(FINAL) REPORT ISSUED: JUNE 18TH, 2024

DOCUMENT INFORMATION:

	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT ACOUSTIC EMISSIONS LEVELS MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046B REPORT TITLE: EBSAAQMR-46B DOI: 14 TH JUNE 2024 PAGE NUMBER P A G E 2 
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DOCUMENT REVIEW PAGE

This Technical report titled ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT ACOUSTIC EMISSIONS LEVELS MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY, was authored by Lahvens Limited in accordance to the EMC (Excessive Noise and Vibration Regulations) (control) 2009, Legal Notice 61.

REVISION HISTORY

REV	DATE	DESCRIPTION
03	18-06-2024	Issuance of Final Report
02	17-06-2024	Re-submission to close the given comments and approvals
01	16-06-2024	1 st draft issue of the soft copy submitted for review
Accepted by		
Reviewed & Approved by	LOVANS ROBERT SPOO - LABORATORY DIRECTOR. N.E.R. NO.: 7165	 18-06-2024
Prepared by	VINCENT AGIN - FIELD ATTENDANT	 18-06-2024
	VALENTINE AGUTU - FIELD ATTENDANT	 18-06-2024
PROJECT:	Name:	Date:

DOCUMENT & PROJECT PARTICULARS

DOCUMENT REF: 50124-0046 B	CLASSIFICATION: A - UNCLASSIFIED (OPEN REPORT)	CONTRACT NO. AS PER EECL TOR.	REVISION: 00 FINAL
TEST FIRM CONTACT PERSON: LOVANS SPOO: (254 - 728716948)	PROJECT: THE PROPOSED MARITIME RESCUE CO- ORDINATION CENTER (MRCC)		NUMBER OF PAGES: 31
AUTHOR(S): VINCENT OKUMU, VALENTINE AGUTU		QUALITY CONTROLLER: LOVANS ROBERT SPOO	
ABSTRACT (ENGLISH TITLE): Kenya Maritime Authority through Envasses Environmental Consultants contracted Lahvens Limited to form part of the Project's Environmental Team (ET). LAHVENS Limited was commissioned to provide consulting services of environmental baseline Acoustic emissions level assessment before implementation of the Maritime Rescue Coordination Center in Kisumu County.			
KEY WORDS: EBS Acoustic Emissions Level Monitoring and Consultant Reporting.			
ABSTRACT (in ENGLISH)		PUBLICATION TYPE: Digital document (pdf)	

EBS REPORT OF AMBIENT ACOUSTIC LEVELS MONITORING FOR KMA

R.M.: MAY 2024

	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT ACOUSTIC EMISSIONS LEVELS MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.:	50124-0046B
		REPORT TITLE:	EBSAAQMR-46B
		DOI:	14 TH JUNE 2024
		PAGE NUMBER	P A G E 3
			

REVIEW AND CERTIFICATION FROM THE TESTING CONSULTANTS:

All work, calculations, other activities, and tasks performed and documented in this report were carried out under my direction and supervision. This test project conforms to the requirements of Lahvens Limited's quality manual and EMC (Excessive Noise and Vibration Regulations) (control) 2009, Legal Notice 61.

Team Leader: VALENTINE ODUOR
 Signature: 
 Date: 18-06-2024

I have reviewed all testing details, calculations, results, conclusions and other appropriate written material contained herein, and hereby certify that the presented material is authentic and accurate.

Reviewer: LOVANS ROBERT SPOO
 Title: LABORATORY DIRECTOR
 Signature: 
 Date: 18-06-2024

CERTIFICATION FROM THE LEGAL ENTITY OF THE TESTING FACILITY:

I have reviewed the information being submitted in its entirety. Based on the information and belief formed after reasonable inquiry, I certify that the statements and information contained in this submittal are true, accurate and complete.

 Signature

 Date

 Name Printed

 Title

 Company Name

 Company stamp

	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT ACOUSTIC EMISSIONS LEVELS MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046B REPORT TITLE: EBSAQM-46B DOI: 14th JUNE 2024 PAGE NUMBER: P A G E 4 
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EXECUTIVE SUMMARY

Lahvens Limited, a NEMA designated laboratory, carried out the baseline ambient Acoustic environment survey at the proposed MARITIME RESCUE COORDINATION CENTER (MRCC) in KPA's Kisumu port area located near Oilibya Deport Kisumu, Lower Railway, Marine Dr, Kisumu, in Kisumu County on the 14th June 2024. Acoustic Environment survey was conducted to determine the EXISTING (Do minimum) noise pollution around the proposed project for Environmental, Health, Safety and compliance purposes.

Kenya Maritime Authority (KMA) was set up in June 2004 as the semi-autonomous agency in charge of regulatory oversight over the Kenyan maritime industry. Maritime safety and security is one of the Authority's core functions. Further to the security enhancement as a function, KMA also generally oversee, coordinate and regulate the maritime industry. As the pacesetter of the Kenyan maritime industry, KMA thus strives to strengthen national maritime administration through enhancement of regulatory and institutional capacities for safety and security, fostering effective implementation of international maritime conventions and other mandatory instruments on safety & security, promoting maritime training and education, coordinating Search and Rescue, preventing marine pollution and promoting preservation of the marine environment as well as promoting maritime trade and investments. In an attempt to perform its mandate, KMA seeks to construct a Maritime Rescue Coordination Center (MRCC) in Kisumu to address maritime accidents and disasters in the Lake. The objective of the proposed MRCC project will seek to enhance maritime transportation and safety navigation by reducing maritime accidents, saving lives, improving security, and providing efficient and affordable communication to Lake Victoria communities. Additionally, the project will contribute to provision of safe, efficient transport and safe conduct of fishing activities that are essential in supporting local livelihoods.

Construction of any new facilities can lead to significant noise pollution. These emissions are the result of possible demolition work, the movement of machinery or the transport of construction materials. According to the World Health Organization (WHO), excessive noise from construction seriously harms human health and interferes with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, cause heart attacks, reduce performance and provoke annoyance responses and changes in social behavior. The overlooked threat of noise pollution can cause a number of short and long-term health problems, such as sleep disturbance, cardiovascular effects, poorer work and school performance, hearing impairment and more. According to OSHA, Exposure to loud noise kills the nerve endings in our inner ear. More exposure will result in more dead nerve endings.

Acoustic Environment Monitoring was conducted to determine the extent of pollution around KMA economic and industrial operations for Environmental, Health, Safety and compliance purposes before the implementation of the proposed Maritime Rescue Coordination Center in Kisumu County. The results will thereafter be used to assess compliance through comparisons against the Environmental Management Coordination (excessive noise and vibration controls) regulations 2009. A report on the findings will then be prepared and published.

Noise environment remains a valued component in this environmental assessment because of their fundamental significance to the well-being of humans and wildlife.

	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT ACOUSTIC EMISSIONS LEVELS MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046B REPORT TITLE: EBSAAQMR-46B DOI: 14 TH JUNE 2024 PAGE NUMBER P A G E 5 
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This report identifies baseline information relating to acoustic emissions levels within study area in Kisumu county. The baseline provides the 'do minimum' (without the proposed MARITIME RESCUE COORDINATION CENTER) scenario taking account of the proposed changes to the land use.

The baseline acoustic emissions report considers the total emission of key acoustic parameters associated with MARITIME RESCUE COORDINATION CENTER activities. These are Noise equivalent levels (LAeq), maximum noise levels recorded (Lmax) and minimum noise recorded (Lmin). The current concentrations of these pollutants are at risk of exceeding their respective Limit Values when the project commissions. The estimates of the existing concentrations will be measured and compared to any relevant existing information and when the project commences, will be used as the background data. Relevant available information related to the pre-development ambient acoustic emissions level in the environment was looked into while identifying the major existing acoustic emission sources in the environment and the existing sensitive pollution areas in the environment.

Reference is made to the EMCA Legal Notice 61 First Schedule Extract, Acoustics – Determination of noise exposure and estimation of noise-induced hearing impairment recognizing the fact that any person emitting noise in excess of noise emission standards commits an offence therefore legalizing the process of compliance with the set emission goals, permissible standards, control strategies and technologies for noise emission as mandatory.

Acoustic Environmental Baseline Study is a significant component of monitoring programs for successful development activities. This Environmental Baseline Study is designed to characterize the acoustic environment at the proposed project site prior to commencement of construction of the proposed MARITIME RESCUE COORDINATION CENTER. EBS will provide a benchmark and reference against which to compare the acoustic conditions influenced by the construction and operation of the rescue center. The information will be used to assess the effectiveness of any proposed mitigation measures and to implement adaptive management, if needed.

A baseline noise survey consisting of an operator attended noise measurements (OANM) was performed on the proposed site in Kisumu County. Lahvens Limited operated three mobile stations along the project boundary walls (3) as part of its noise levels monitoring networks on the 14th June 2024.

Acoustic / Noise emission survey was achieved via initial examination of existing noise sources of significance. Noise levels was evaluated using a Sound Level Meter Model UT - 351, C150107874 class 2. SLM was mounted on at 2.0m above ground level and at least 3.5m away from any sound reflecting surfaces at a boundary position and measurements taken at timed intervals of 15 minutes every one-hour period and stored in SLM's memory. The sound level meter was placed on the microphone to reduce any wind interference during measurements. The sound level meters, were within their calibration period, at the time of monitoring. In addition, the equivalent noise level (Leq), the maximum sound pressure level (Lmax) and the minimum sound pressure level (Lmin) during that measurement period were recorded.

Factors such as time, duration and predictability of the noise emission, amplitude and frequency of the noise emission, nature of the source, location of noise sensitive receptors, ambient and background noise level, nature and character of the locality, presence of special acoustic characteristics and the incongruity or familiarity of the noise during noise survey and site placement were put into consideration.

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Field Observations:

Sensitive Receptors;

The proposed project site borders the lake shoreline and neighbors Devki Group; mega properties / Shiloah Investment group, CMC Motors-Kisumu, Nissan Kisumu, Swan Centre, and KRC-Kisumu). The frontal side borders the Kisumu-Nairobi railway line operated by KRC.

Close proximity of the emission source to the 'sensitive receptor' causes acoustic pollution because there is less opportunity for dispersion of emissions between the source and receptor resulting in greater noise emissions. Noise / Acoustic levels is evaluated by comparing emissions against the EMC (Excessive Noise and Vibration Regulations) (control) 2009 Legal Notice 61, first schedule of the Noise Exposure Standards Limit values set at locations where exposure harm to human health and ecosystems is thought to occur.

Existing Acoustic Environment;

The proposed site lies in the lake shoreline, beach and characterized by a flat terrain. The neighborhood depicts mixed land use including residential areas and commercial areas. The main source of existing noise pollution are the mobile sources such as visiting motor vehicles, fugitive motorcycle emissions and environmental noise. The acoustic emission sources directly associated with the proposed project will be the main concern of the appraisal framework and will be emitted from various sources including; construction equipment, mobile sources (cars and heavy goods vehicles that will be accessing the site to offload materials during construction, boat transport), source emissions (generators) and environmental noise.

The emissions concentrations reported herein, will be a combination of the emissions from the sources and the distance to the receptors which influence the levels of noise emissions and quality of life. As such, the most common ambient acoustic emission source within close proximity to sensitive receptors and the site in general will be fugitive emissions as the dominant emission sources.

RESULTS AND CONCLUSIONS:

Noise measurements was initiated to obtain and quantify the prevailing and existing ambient acoustic levels before implementation of the Maritime Rescue Coordination Center and auxiliary facilities. The obtained acoustic results were thereafter correlated against the Environmental Management Coordination (Excessive noise and vibration regulations) 2009 to ascertain compliance.

The highest diurnal noise emissions recorded at the Project Boundary from West through East (PBWE2) of the site extended to levels of 54.7 dBA while the lowest diurnal noise emission recorded at the Mid-Section of the proposed site (MSPS) extended to levels of 50.3 dBA. The average Leq noise levels in the proposed Maritime Rescue Coordination Center and auxiliary facilities averaged 52.5 dBA. The average noise levels along all the survey locations complies with the EMC noise and vibrations regulations of 2009.

The average diurnal noise equivalent levels (Leq) along all the three survey locations complied with the EMC noise and vibration regulations 2009 before commencement of the Maritime Rescue Coordination Center and auxiliary facilities.

This ambient noise measurement report documented the current noise levels and meteorological conditions for the proposed Maritime Rescue Coordination Center and auxiliary facilities as follows:

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The quantity of noise measured and recorded along the project boundaries complied with the EMC noise and vibration regulations 2009 maximum Noise Level Permitted (Leq) during the day before implementation of the Maritime Rescue Coordination Center and auxiliary facilities development.

Baseline results obtained along the project boundaries show that the survey location was a noise insignificant area hence the levels do not pose threat to the sensitive receptors before implementation of the proposed Maritime Rescue Coordination Center and auxiliary facilities development.

Ambient conditions existed at the time of the diurnal survey.

Environmental noise (Wind breeze) and noise emissions from motor vehicles / bikes were the main sources of noise emissions.

KPA Kisumu was marked with no project related activities during the measurements.

The levels of noise recorded from existing operations does not pose any Environmental, Health and Safety concerns before implementation of the Maritime Rescue Coordination Center and auxiliary facilities.

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DEFINITIONS.

Table 1: List of acronyms

dBA	Decibels (A) weighted
CBS	Comprehensive Baseline Study
EMC	Environmental Management and Coordination
EBS	Environmental Baseline Study
GPS	Geographic Positioning System
hpa	Hectopascal
km/hr	Kilometer per hour
Leq	Noise equivalent noise
Lmax	Maximum Sound Level
Lmin	Minimum Sound Level
MRCC	Maritime Rescue Coordination Center
NEMA	National Environment Management Authority
OSHA	Occupational Safety and Health Administration's
SLM	Sound Level Meter
TWA	Time Weighted Average
WB	World bank
WHO	World Health Organization

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1. INTRODUCTION

1.1. Project Summary and objectives:

Lahvens Limited, a NEMA designated laboratory, carried out the baseline ambient Acoustic environment survey at the proposed MARITIME RESCUE COORDINATION CENTER (MRCC) in KPA's Kisumu port area located near Oilibya Deport Kisumu, Lower Railway, Marine Dr, Kisumu, in Kisumu County on the 14th June 2024. Acoustic Environment survey was conducted to determine the EXISTING (Do minimum) noise pollution around the proposed project for Environmental, Health, Safety and compliance purposes.

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Acoustic Environment Monitoring was conducted to determine the extent of pollution around KMA economic and industrial operations for Environmental, Health, Safety and compliance purposes before the implementation of the proposed Maritime Rescue Coordination Center in Kisumu County. The results will thereafter be used to assess compliance through comparisons against the Environmental Management Coordination (excessive noise and vibration controls) regulations 2009. A report on the findings will then be prepared and published.

Noise environment remains a valued component in this environmental assessment because of their fundamental significance to the well-being of humans and wildlife.

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1.2. Project Description

The proposed MRCC will be located on a 0.335ha of land in Nyalenda B Sub-Location, Kisumu County at Latitude -0.096504" S and Longitude 34.749406" E. The proposed site can be accessed by road (Obote Rd and Oginga Odinga Rd junction) that connects both the KPA passengers' terminus and the proposed MRCC to the CBD.

Tentatively (as per the current designs) the proposed building will comprise of a basement, ground plus four (4) floors among other features. It should be noted that the design at this stage is preliminary, and the scope might be varied depending on further review by the project consultant and the output of the ESIA study process.

At construction stage the scope of works will include site clearance and leveling, excavations, foundational works, sheet piling, construction of MRCC Building, jetty, ambulance bay, retaining wall, boat spillway, boat shed, oil spills bay, boardwalk, perimeter fence, gate, gate house, generator house, garden area, washroom, ticket office, goods warehouse, water supply and storage, drainage, revetment works, installation of handrails, power connection, ICT Infrastructure, development and establishment of maritime safety monitoring information system and support MRCC operations and maintenance.

1.3. Purpose of this report

This report identifies baseline information relating to acoustic emissions levels within study area in Kisumu county. The baseline provides the 'do minimum' (without the proposed MARITIME RESCUE COORDINATION CENTER) scenario taking account of the proposed changes to the land use.

1.4. Appraisal Framework Requirements

Under the Second Schedule of the Environmental Management and Coordination Act (EMCA), Cap 387 of the Laws of Kenya, the project is categorized as a High Risk and thus should undergo Environmental and Social Impact Assessment (ESIA) Study process.

According to the EMC (IMPACT ASSESSMENT AND AUDIT) regulations 2003 framework legal notice 101 PART IV, THE ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT section 18 which states that (1) A proponent shall submit to the Authority, an environmental contents of impact assessment study report incorporating but not limited to the environmental following information; - (b) a concise description of the national environmental legislative and regulatory framework, **baseline information**. PART VI - MISCELLANEOUS PROVISIONS section 43 (2) states that the proposed policy, programme or plan specified in this regulation shall state - (d) an environmental analysis covering: (i) **baseline information focusing on areas potentially affected**. Noise / Acoustic emissions levels was earmarked as one of the baseline parameter to be assessed and monitored.

Section 3 of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009, General Prohibitions states as follows;

(1) Except as otherwise provided in these Regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

(2). In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered: (a) time of the day; (b) proximity to residential area; (c) whether the noise is recurrent, intermittent or constant; (d) the level and intensity of the noise; (e) whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,

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(f) whether the noise can be controlled without much effort or expense to the person making the noise.
 (3). Any person who contravenes the provisions of this Regulation commits an offence.

Section 5 of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009, on Permissible noise levels states as follows;

"No person shall make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property."

In order to comply with the above extracts, Lahvens Limited was commissioned by the client through the firm of experts (Envasses Environmental Consultants Limited) to form the Project's Environmental Team (ET) to monitor a field baseline study of acoustic emissions prior to project implementation, to gain insight into construction-related emissions (of L_{max}, L_{min} and L_{Aeq}), the existing acoustic emissions impacts that result from current ongoing activities, and opportunities to mitigate potential impacts. The findings from this assessment will also support public and stakeholder communication. It will also determine the baseline acoustic environment before implementation of the proposed project.

This Baseline Report forms part of a Comprehensive Baseline Study (CBS) of the proposed Project. The CBS is being prepared as part of an environmental Social Impact assessment (ESIA) and approval process.

1.5. Scope of work

The baseline acoustic emissions report considers the total emission of key acoustic parameters associated with MARITIME RESCUE COORDINATION CENTER activities. These are Noise equivalent levels (L_{Aeq}), maximum noise levels recorded (L_{max}) and minimum noise recorded (L_{min}). The current concentrations of these pollutants are at risk of exceeding their respective Limit Values when the project commissions. The estimates of the existing concentrations will be measured and compared to any relevant existing information and when the project commences, will be used as the background data. Relevant available information related to the pre-development ambient acoustic emissions level in the environment was looked into while identifying the major existing acoustic emission sources in the environment and the existing sensitive pollution areas in the environment.

1.6. Terms of Reference

Reference is made to the EMCA Legal Notice 61 First Schedule Extract, Acoustics – Determination of noise exposure and estimation of noise-induced hearing impairment recognizing the fact that any person emitting noise in excess of noise emission standards commits an offence therefore legalizing the process of compliance with the set emission goals, permissible standards, control strategies and technologies for noise emission as mandatory.

The scope of work was outlined as follows:

- ✚ Review of the legal context as it relates to noise emissions.;
- ✚ Evaluation of site meteorology;
- ✚ Monitoring of background noise including the noise equivalent levels Leq.

1.7. EBS Justification

Acoustic Environmental Baseline Study is a significant component of monitoring programs for successful development activities. This Environmental Baseline Study is designed to characterize the acoustic environment at the proposed project site prior to commencement of construction of the proposed

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MARITIME RESCUE COORDINATION CENTER. EBS will provide a benchmark and reference against which to compare the acoustic conditions influenced by the construction and operation of the rescue center. The information will be used to assess the effectiveness of any proposed mitigation measures and to implement adaptive management, if needed.

Well-developed EBS often alleviate heightened perceived concerns within the community during the initial phases of any proposed development, before issues become a serious risk to the project. EBS also creates reassurance in the minds of the public and jurisdictional decision makers that key environmental issues have been identified and will be monitored and mitigated, during and after the project is approved. EBS monitoring can be looked at as an early warning system of impacts that could potentially affect the environment during the project operation phase and long after the project is decommissioned.

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2. ACOUSTIC EMISSIONS OVERVIEW AND NETWORKS

According to the National Environment Management Authority (NEMA), “construction” includes erection, alteration, repair, dismantling, demolition, structural maintenance, painting, mowing, land-clearing, earth-moving, landscaping, grading, excavating, laying of pipes and conduits whether above or below ground level, road, railway and highway building, concreting, installation and alteration of equipment, and the structural installation of construction components and materials in any form or for any purpose that includes any work in connection with the construction”. The proposed project falls under the construction sector.

As per Oxford Definition, noise is a sound, especially one that is loud or unpleasant or that causes disturbance. Noise is generally considered as undesirable sound and sound can be considered undesirable due to amplitude or volume of loudness, category of noise, occurrence time of the day and resonance created. Noise is regarded as a pollutant under the EMC (Excessive Noise and Vibration Regulations) (control) 2009.

It is therefore fundamental to note that ambient noise levels are essential to human health and ecosystems. The repercussions of construction noise are extensive and encompass both the workers and the surrounding environment. Construction noise can disrupt the peace of residential neighborhoods, affecting the quality of life for residents. This disruption can lead to complaints and strained relationships between the construction project and the community.

Acoustic environment has been selected as a valued component because of their fundamental significance to the well-being of human health and fauna health.

Construction site generates noise with activities like demolition, excavation, building works, machinery involved, material unloading etc. The noise generated from such activities is found loud and irritant at times. Such activities generate noise exceeding the Occupational Safety and Health Administration’s (OSHA) limit given of 90dB. Continuous exposure to such loud noise can cause various physical, psychological, and mental illnesses. This hassle can affect the workers, as well as the residences, commercial complexes or school colleges surrounding the ongoing construction sites.

Construction Related Noise Generators could include the following: -

- Various Machineries / Equipment are involved at various stages of construction. Right from the Excavation until Finishes, various machineries are involved which help to carry out the work with lesser labors and at a faster speed by also achieving the required quality.
- Labors Talks / yelling: - Some of the activities like Plastering, curtain wall installation, fixing trusses at sites involve laborers working at different heights. In such cases, the talk happens by yelling, shouting for the instructions.

Noise Pollution due to Construction Machineries is a major hazard observed on Modern Construction sites where extensive machineries are used for the Speed and Quality. Noise generated from the heavy machineries and the power tools varies between 80dB to 120dB. OSHA states permissible noise exposure limit is 90 dBA (29 CFR 1926.52), whereas the American Conference of Industrial Hygienists has a noise threshold limit value of 85 dBA. NEMA through the EMC (Excessive Noise and Vibration Regulations) (control) 2009 states the permissible levels to be 60 dBA.

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The level of ambient sound usually varies continuously with time. A human's subjective response to varying sounds is primarily governed by the total sound energy received. The total sound energy is the average level of the fluctuating sound, occurring over a period of time, multiplied by the total time period. In order to compare the effects of different fluctuating sounds, one compares the average sound level over the time period with the constant level of a steady, non-varying sound that will produce the same energy during the same time period. The average of the fluctuating noise levels over the time period is termed L_{eq} , and it represents the constant noise level that would produce the same sound energy over the time period as the fluctuating noise level.

In order to compare the effects of different fluctuating sounds, one compares the average sound level over the time period with the constant level of a steady, non-varying sound that will produce the same energy during the same time period. The average of the fluctuating noise levels over the time period is termed L_{eq} , and it represents the constant noise level that would produce the same sound energy over the time period as the fluctuating noise level.

The atmospheric conditions, interference from other objects and ground effects also play an important role in the resulting noise levels. For example, "hard" ground, such as asphalt or cement transmits sound differently than "soft" ground, such as grass. The first ground type promotes transmission of sound, thus producing louder sound levels farther from the source. In general terms, the above effects increase with distance, and the magnitude of the effect depends upon the frequency of the sound. The effects tend to be greater at high frequencies and less at low frequencies. For example, "hard" ground, such as asphalt or cement transmits sound differently than "soft" ground, such as grass. The first ground type promotes transmission of sound, thus producing louder sound levels farther from the source. In general terms, the above effects increase with distance, and the magnitude of the effect depends upon the frequency of the sound. The effects tend to be greater at high frequencies and less at low frequencies.

Section 3 of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations requires determination as to whether the noise is recurrent, intermittent or constant.

Continuous noise in construction persists for an extended period of time. Unlike impulsive noise which comes in bursts, continuous noise is steady and unvarying, similar to a drone or a hum that stays constant over time. Machinery or processes that operate without interruption often produce this noise. Some examples of continuous noise in construction include the humming of generators, the constant whir of an operating excavator, the steady drone of ventilation systems, or the ongoing rumble of cement mixers. This persistent background noise exposure can be harmful to workers over a long period of time.

Impulsive noise, on the other hand, is characterized by sudden, loud bursts of sound that are often of high intensity but short duration. These noises are typically more jarring and noticeable than continuous noise due to their abrupt and disruptive nature. Impulsive noise adds to the overall noise level at a construction site, and its spread can significantly impact people at varying distances.

In construction settings, impulsive noise can come from a variety of sources. The loud bang of a pile driver pounding into the ground, the explosive bursts from powder-actuated tools, or the pounding of jackhammers are all examples of impulsive noise.

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It is assumed that the measurement location represents other dwellings in the area (similar environment and sensitive receptors). Some numerous factors that could impact on ambient sound levels at the time of monitoring could include; the distance to closest trees, number and type of trees as well as the height of trees; available habitat and food for birds and other animals; distance to residential dwelling, locomotive sources (motorbikes, trucks & personal vehicles) and type of equipment used at dwelling (compressors, aircons, generators) was considered.

Noise is often measured by use of equivalent noise levels (Leq).

Leq is the preferred method to describe sound levels that vary over time, resulting in a single decibel value, which considers the total sound energy over the period of time of interest.

Leq noise levels often fluctuate over a wide range with time. For example, in the middle of the night the level might go down as low as 30 dB (A) with occasional passing vehicles of 70dB (A) or more. Later comes the dawn chorus followed by the general noises of the day before relative peace returns in the late evening. Alternatively, it may be an activity with different noise emissions throughout the day or week, with deliveries, intermittent compressors, and lots of varying noisy processes on top of the routine production noise levels. This is where the Leq noise or equivalent continuous noise level meter comes in. The meter follows all the fluctuations, stores them in its memory and at the end of the measurement calculates an 'average energy' or Leq value. When we say average, this is not a simple arithmetic average because we are measuring in decibels which are logarithmic values. The SLM converts the dB values to sound pressure levels, adds them all up then divides by the number of samples and finally converts this equivalent level back to decibels - dBs.

LAeq - It is common practice to measure noise levels using the A-weighting setting built into all sound level meters. In which case the term is properly known as LAeq and the results should say so - for example LAeq = 73 dB or Leq = 73 dB.

Leq noise levels are logarithmic (dB) values and cannot be added directly. A doubling of sound level results in a measured increase of 3 dB, four identical sources in a room would increase the noise level by 6 dB and so on. This works both ways, say 10 similar machines in a room produce 100 dBA then removing one machine completely will only reduce the overall noise level to 0.5 dBA, you would need to silence or remove 50% of the machines to achieve a 3 dB reduction.

Other Parameters

- ✚ Lmax: Maximum Sound Level: level during a measurement period or a noise event and is not necessarily peak.
- ✚ Lmin: Minimum Sound Level: during a measurement period or a noise event.

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3. ACOUSTIC LEGISLATIVE AND POLICY FRAMEWORK

3.1. EMC (Excessive Noise and Vibration Regulations) (control) 2009

The legislative controls relevant to noise emissions associated with any development is outlined in the EMCA Legal Notice 61 First Schedule Extract, Acoustics – Determination of occupational noise exposure and estimation of noise-induced hearing impairment. The standard recognizes that any person emitting noise in excess of noise emission standards commits an offence. It legalizes the process of Environmental Impact Assessment and compliance with the set emission goals, permissible standards, and control strategies and technologies for noise emission as mandatory. With establishment of noise emission standards, it will be a requirement to obtain temporary permits from the National Environmental Management Authorities allowing for emissions of noise in excess of established standards for a period not exceeding three months.

Noise Exposure Standards (First Schedule)

Table 2: EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

ZONE		Sound Level Limits dB (A)		Noise Rating Level (NR)	
		$L_{eq, 14 h}$		$L_{eq, 14 h}$	
		DAY	NIGHT	DAY	NIGHT
A	Silent Zone	40	35	30	25
B	Place of worship	40	35	30	25
C	Residential: Indoor	45	35	35	25
	Outdoor	50	35	40	25
D	Mixed Residential (with some commercial and places of entertainment)	55	35	50	25
E	Commercial	60	35	55	25

Source: EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 Legal Notice 61

The survey location falls under Zone D; mixed residential with some commercial and places of entertainment.

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4. ACOUSTIC SURVEY METHODOLOGY

A baseline noise survey consisting of an operator attended noise measurements (OANM) was performed on the proposed site in Kisumu County. Lahvens Limited operated three mobile stations along the project boundary walls (3) as part of its noise levels monitoring networks on the 14th June 2024.

4.1. Baseline Study Area;

4.1.1. Sensitive Receptors

The geographical scope of the baseline assessment is currently defined as the proposed Maritime Rescue Coordination Center and auxiliary facilities' boundaries and environs, including potentially high risk zones along the routes of any existing surface access. High risk zones include locations with the potential for exceedance of regulatory standards for the protection of human health and/or sensitive habitats, in the initial and / or mature operations years. The issue of noise / acoustic pollution is particularly pertinent in areas sensitive to change, often referred to as 'sensitive receptors'. Locations for the protection of human health are areas of long term exposure which are more susceptible and shall be considered to include residential properties, hospitals and schools; whereas locations for the protection of sensitive habitats / ecosystems shall be considered to include statutory designated sites (such as sites of special scientific interest (SSSIs), special areas of conservation (SACs) and special protection areas (SPAs) which contain habitat types that are also sensitive to acoustic changes.

The proposed project site borders the lake shoreline and neighbors Devki Group; mega properties / Shiloah Investment group, CMC Motors-Kisumu, Nissan Kisumu, Swan Centre, and KRC-Kisumu). The frontal side borders the Kisumu-Nairobi railway line operated by KRC.

Close proximity of the emission source to the 'sensitive receptor' causes acoustic pollution because there is less opportunity for dispersion of emissions between the source and receptor resulting in greater noise emissions. Noise / Acoustic levels is evaluated by comparing emissions against the EMC (Excessive Noise and Vibration Regulations) (control) 2009 Legal Notice 61, first schedule of the Noise Exposure Standards Limit values set at locations where exposure harm to human health and ecosystems is thought to occur.

4.1.2. Existing Acoustic Environment

The proposed site lies in the lake shoreline, beach and characterized by a flat terrain. The neighborhood depicts mixed land use including residential areas and commercial areas. The main source of existing noise pollution are the mobile sources such as visiting motor vehicles, fugitive motorcycle emissions and environmental noise. The acoustic emission sources directly associated with the proposed project will be the main concern of the appraisal framework and will be emitted from various sources including; construction equipment, mobile sources (cars and heavy goods vehicles that will be accessing the site to offload materials during construction, boat transport), source emissions (generators) and environmental noise.

The emissions concentrations reported herein, will be a combination of the emissions from the sources and the distance to the receptors which influence the levels of noise emissions and quality of life. As such, the most common ambient acoustic emission source within close proximity to sensitive receptors and the site in general will be fugitive emissions as the dominant emission sources.

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4.1.3. Monitoring Locations

Baseline atmospheric quality monitoring locations were selected based on the existing facility that could or have the potential to influence the proposed project acoustic environment. KMA site is characterized in to three sections i.e project boundary from North through South (PBNS1), project boundary from West through East (PBWE2) and the mid-section of the proposed site (MSPS).

Table 3: Description of the measurement locations

Measurement Sites	Receivers	Description of monitoring Locations	Dates of sampling
Project Boundary from North through South (PBNS1) Latitude -0.096632" S and Longitude 34.749084" E	Devki Group; mega properties / Shiloah Investment group, CMC Motors-Kisumu	The proposed project site abuts the lake shoreline and neighbors Devki Group; mega properties / Shiloah Investment group, CMC Motors-Kisumu, Nissan Kisumu, Swan Centre, and KRC-Kisumu). The frontal side borders the Kisumu-Nairobi railway line operated by KRC.	14 TH JUNE 2024.
Project Boundary from West through East (PBWE2) Latitude -0.096522" S and Longitude 34.749387" E	Lake Victoria Shoreline		14 TH JUNE 2024.
Mid-Section of the proposed site (MSPS) Latitude -0.096325" S and Longitude 34.749353" E	Kisumu-Nairobi railway line operated by KRC		14 TH JUNE 2024.

4.2. Equipment Placement

Acoustic / Noise emission survey was achieved via initial examination of existing noise sources of significance. Noise levels was evaluated using a Sound Level Meter Model UT - 351, C150107874 class 2. SLM was mounted on at 2.0m above ground level and at least 3.5m away from any sound reflecting surfaces at a boundary position and measurements taken at timed intervals of 15 minutes every one-hour period and stored in SLM's memory. The sound level meter was placed on the microphone to reduce any wind interference during measurements. The sound level meters, were within their calibration period, at the time of monitoring. In addition, the equivalent noise level (Leq), the maximum sound pressure level (Lmax) and the minimum sound pressure level (Lmin) during that measurement period were recorded. Factors such as time, duration and predictability of the noise emission, amplitude and frequency of the noise emission, nature of the source, location of noise sensitive receptors, ambient and background noise level, nature and character of the locality, presence of special acoustic characteristics and the incongruity or familiarity of the noise during noise survey and site placement were put into consideration. Furthermore, as each individual measurement was being taken, the nature of the noise climate in the area was assessed and recorded. This comprised an auditory observation by the surveyor, as well as identifying those noise incidents which influenced the sound level meter readings during the measurement period.

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Ongoing diurnal acoustic level measurements at the proposed boundaries (source: Fieldwork June, 2024)

4.3. Acoustic analysis

4.3.1. Parameters and score criteria

After finding various activities, aspects and impacts, identification of the significant aspects was done. It entirely depended on the management of the system or industry to give a scaling factor. The table 4 below shows six factors naming as A to F (top row) and column 1 to 6 shows rating scheme with minimum as 1 and maximum marks as 10 depending upon their severity.

4.3.2. Procedure of significance evaluation

For evaluation processes, the various activities of the measurement sites are rated based on parameters and score criteria and a benchmark of 75 units is taken as a deciding factor. If the total unit of any aspect for an activity comes out to be more than 75, then the aspect can be considered as significant otherwise insignificant.

Table 4: Parameters and score criteria

A-Quantity 1-5	B-Occurrence 1-6	C-Impact 1-6	D-Detection 1-5	E-Controls 1-5	F-Legislation 1and10
5-High	6-Continuous	6-Fatal to human life	5-More than 24 hours	5-Absence or no effective controls	10-Not meeting control limits
3-Moderate	5-Several times a day	5-Health effects	4-Within 24 hours	4-Mechanism in place but not reliable	1-In Compliance
1-Low	4-Once a day	4-Affects flora and fauna	3-Within 8 hours	3-Control needs human intervention	---
---	3-Once a week	3-Resource consumption	2-Within 1 hour	2-Has in-built secondary control	---
---	2-Once a month or less frequent	2-Discomfort, Acid rain, nuisance	1-Immediately	1-Available and effective at source.	---
---	1-Very Rare	1-Negligible visual impacts.	---	---	---

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4.4. Tools and Equipment

- ✚ Sound Level Meter Model meter UT-351 IEC 61672 - 1:2013 class 2
- ✚ Geographic Positioning System (GPS)
- ✚ Digital camera

4.5. Assumptions

The short term (1-hr per site) noise emissions survey and data collection for L_{eq} , L_{max} and L_{min} is considered sufficient to understand background acoustic conditions at each location.

4.6. Data Validity and Acceptability

All data recorded in the study was taken through data replications and quality assurance procedure to ensure that any anomalous readings or questionable data is not incorporated in the final results.

Elements of this procedure account for:

- ✚ Routine calibration and auditing of the analyzers and Statistical rendering of outliers.

4.7. Monitoring Frequency

Monitoring of acoustic emissions levels was done with a frequency of 1 hr / survey location. Once MRCC are underway, monitoring of acoustic emissions parameters should be done at 3 months' interval.

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5. RESULTS PRESENTATION, DISCUSSIONS AND CONCLUSION.

5.1. PRESENTATION OF RESULTS

5.1.1. Summary of singular noise measurements

Table 5: Results for Diurnal singular noise measurements

Measured Sound Pressure Level (Noise) (dBA)				EMC Noise Regulation 2009	Site Notes / Remarks
14 th June 2024.				Day time	
Locations	Leq	Lmax	Lmin	Leq	
Project Boundary from North through South (PBNS1) Latitude - 0.096632" S and Longitude 34.749084" E	52.5	73.2	46.7	55	The prevailing weather was sunny at the time of acoustic survey. Wind speed averaged about 11 km/hr South East wind. Measurements are taken to quantify prevailing ambient acoustic levels. Leq noise levels complied with the EMC 2009 noise permissible levels. No site related activities were ongoing during measurements. Environmental noise including Wind breeze and fugitive noise from motor vehicles were the likely sources of noise emissions. Ambient conditions were extant at the time of the survey.
Project Boundary from West through East (PBWE2) Latitude - 0.096522" S and Longitude 34.749387" E	54.7	69.8	48.2	55	The prevailing weather was sunny at the time of acoustic survey. Wind speed averaged about 11 km/hr South East wind. Measurements are taken to quantify prevailing ambient acoustic levels. Leq noise levels complied with the EMC 2009 noise permissible levels. No site related activities were ongoing during measurements. Environmental noise including Wind breeze and fugitive noise from motor vehicles were the likely sources of noise emissions. Ambient conditions were extant at the time of the survey.
Mid-Section of the proposed site (MSPS) Latitude - 0.096325" S and Longitude 34.749353" E	50.3	70.4	47.7	55	The prevailing weather was sunny at the time of acoustic survey. Wind speed averaged about 11 km/hr South East wind. Measurements are taken to quantify prevailing ambient acoustic levels. Leq noise levels complied with the EMC 2009 noise permissible levels. No site related activities were ongoing during measurements. Environmental noise including Wind breeze and traffic noise were the likely sources of noise emissions. Ambient conditions were extant at the time of the survey.

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5.2. Summary of average diurnal noise equivalents (Leq)

5.2.1. Tabular presentation of test of Leq noise equivalents.

Table 6: Summary results for diurnal noise equivalents

Monitoring locations	Diurnal LAeq average results	Maximum noise level permitted (Leq) in dB (A) Day (0601-2000) hrs	Comments
PBNS1	52.5	55	Complies
PBWE2	54.7	55	Complies
MSPS	50.3	55	Complies

5.2.2. Tabular presentation of test of significance

Table 7: Determination of diurnal noise significance of results

MEASUREMENT SITE	ASPECT	CONDITION/A	IMPACT	QUANTITY A	OCCURRENCE	IMPACTS	DETECTION	CONTROL	LEGISLATION	TOTAL A "B" C "D"	REMARKS SIG / INSIG
PBNS1	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG
PBWE2	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG
MSPS	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG

5.3. DISCUSSIONS OF RESULTS

Noise measurements was initiated to obtain and quantify the prevailing and existing ambient acoustic levels before implementation of the Maritime Rescue Coordination Center and auxiliary facilities. The obtained acoustic results were thereafter correlated against the Environmental Management Coordination (Excessive noise and vibration regulations) 2009 to ascertain compliance.

5.3.1. Presentation of singular noise results

Diurnal noise results

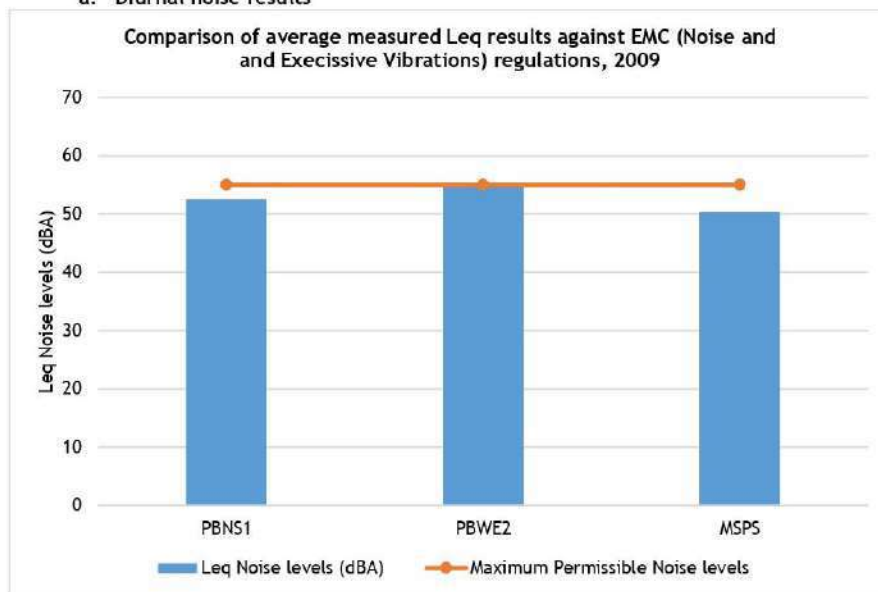
The highest diurnal noise emissions recorded at the Project Boundary from West through East (PBWE2) of the site extended to levels of 54.7 dBA while the lowest diurnal noise emission recorded at the Mid-Section of the proposed site (MSPS) extended to levels of 50.3 dBA. The average Leq noise levels in the proposed Maritime Rescue Coordination Center and auxiliary facilities averaged 52.5 dBA. The average noise levels along all the survey locations complies with the EMC noise and vibrations regulations of 2009.

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5.3.2. Correlation of average noise monitoring results against the noise regulations

Correlation of results against the Environmental Management Coordination (Excessive noise and vibration control regulations) 2009 to ensure compliance was done and presentation of the combined charts are as follows:

a. Diurnal noise results



- The average diurnal noise equivalent levels (Leq) along all the three survey locations complied with the EMC noise and vibration regulations 2009 before commencement of the Maritime Rescue Coordination Center and auxiliary facilities.

5.3.3. Determination of significance

Determination of noise significance of results was done vide correlation against the EMC (Excessive noise and vibration regulations) 2009 to ensure compliance amongst other aspects.

- Diurnal noise Leq averages were rated as insignificant having scored <75 units based on parameters and score criteria; therefore, the proposed Maritime Rescue Coordination Center and auxiliary facilities was characterized as noise insignificant area before its implementation.
- From the results of determination of significance, there is no threat to the noise receivers (residential homes, commercial premises, tourist hotels and the Lake Victoria habitat) of the noise emissions before implementation of the Maritime Rescue Coordination Center and auxiliary facilities.

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5.4. CONCLUSION.

This ambient noise measurement report documented the current noise levels and meteorological conditions for the proposed Maritime Rescue Coordination Center and auxiliary facilities as follows:

- ✦ The quantity of noise measured and recorded along the project boundaries complied with the EMC noise and vibration regulations 2009 maximum Noise Level Permitted (Leq) during the day before implementation of the Maritime Rescue Coordination Center and auxiliary facilities development.
- ✦ Baseline results obtained along the project boundaries show that the survey location was a noise insignificant area hence the levels do not pose threat to the sensitive receptors before implementation of the proposed Maritime Rescue Coordination Center and auxiliary facilities development.
- ✦ Ambient conditions existed at the time of the diurnal survey.
- ✦ Environmental noise (Wind breeze) and noise emissions from motor vehicles / bikes were the main sources of noise emissions.
- ✦ KPA Kisumu was marked with no project related activities during the measurements.
- ✦ The levels of noise recorded from existing operations does not pose any Environmental, Health and Safety concerns before implementation of the Maritime Rescue Coordination Center and auxiliary facilities.

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6. REFERENCES

- 1) Environmental Management and Coordination Act (EMCA) 1999 (amended 2015).
- 2) Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009 (Legal Notice No.61).

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R.M.: MAY 2024

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APPENDIX B: LABORATORY DESIGNATION CERTIFICATES

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	FOR AMBIENT ACOUSTIC EMISSIONS LEVELS	REPORT TITLE:	EBSAAQMR-46B
	MONITORING OF THE PROPOSED MARITIME	DOI:	14 TH JUNE 2024
	RESCUE COORDINATION CENTER (MRCC)	PAGE NUMBER	P A G E 29
LOCATED IN THE KISUMU PORT AREA, NEAR			
OILIBYA DEPORT KISUMU, LOWER RAILWAY,			
KISUMU COUNTY			

APPENDIX A: EQUIPMENT CALIBRATION CERTIFICATES



SONIC QUALITY INSPECTORS LTD
P.O. BOX 6063-00200, Nairobi-Kenya, Tel: +254-20-6007509 / +254 722-732142
E-Mail: sonicinspections@yahoo.com or mail@sonicinspections.com
website: www.sonicinspections.com

CALIBRATION CERTIFICATE (CENTRE NO. KENAS/CL/002)

Page 1 of 2 pages

REQUESTED BY : LAHVENS LIMITED.
ADDRESS : P.O. BOX 34153 - 80118 MOMBASA, KENYA.
EQUIPMENT : SOUND LEVEL METER
TYPE/MODEL : UT351
SERIAL No. : 00000627
STICKER No. : 10909
MANUFACTURER : UNI-T
DATE CALIBRATED : 06-01-2024
CERTIFICATE No. : SQI/LAHVENS/24/001

1.0 REFERENCE STANDARD AND EQUIPMENT USED
The sound level meter was calibrated according to Kenya Standard KS OIML 58: 1998
Fluke SM-70 sound level meter standard s/no. S4564D4 was used in the calibration of the Sound Level Meter.

2.0 CALIBRATION PROCEDURE
Procedure number SQI/TCP/023 (measurement procedure for the calibration of Sound Level Meters) was followed in the calibration of the Sound Level Meter.

3.0 TRACEABILITY
This calibration certificate documents traceability of calibration standards used which are traceable to the National Standard Institute KEBS, to realize units of measurement according to the International System of Units (SI).

4.0 This certificate is valid until 6th January, 2025.

Calibrated by: *[Signature]* Date: 06-01-2024
Checked by: *[Signature]* Date: 01/1/2024
Signed: *[Signature]* Date: 01/1/2024
TECHNICAL MANAGER

Calibration certificate without signature and official SQI stamp is invalid. This certificate has been issued without any alteration. This Certificate is only valid for the instrument calibrated/tested and for the period indicated there in.

BRITISH SAFETY COUNCIL
KENAS
NAC-MRA

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CERTIFICATE No: SQI/LAHVENS/24/001
Page 2 of 2 pages

5.0 CALIBRATION RESULTS

STANDARD VALUE IN dB	UUT READING IN dB	CORRECTION IN dB
30-80dB		
35.5	35.2	0.3
45.8	45.4	0.4
56.4	55.9	0.5
71.0	70.3	0.7
79.3	79.5	-0.2
50-100 dB		
51.1	51.3	-0.2
60.4	60.8	-0.4
70.2	70.6	-0.4
80.2	80.9	-0.7
91.1	91.4	-0.3
95.6	96.6	-1.0
80-130 dB		
81.5	81.4	0.1
91.2	90.3	0.9
102.2	101.2	1.0
113.2	112.3	0.9
126.5	125.6	0.9

Comments: The absolute tolerance and uncertainty combined satisfied the MPE of the instrument under calibration

5.1 UNCERTAINTIES

The Uncertainty of the calibration results for the given range of sound level measurements is ± 1.5 dB.

The reported expanded uncertainty is stated as expanded uncertainty of measurement multiplied by coverage factor $K=2$, providing a confidence level of approximately 95%.

-0-0-0-








	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT ACOUSTIC EMISSIONS LEVELS MONITORING OF THE PROPOSED MARITIME RESCUE COORDINATION CENTER (MRCC) LOCATED IN THE KISUMU PORT AREA, NEAR OILIBYA DEPORT KISUMU, LOWER RAILWAY, KISUMU COUNTY	REPORT REF NO.: 50124-0046B REPORT TITLE: EBSAAQMR-46B DOI: 14TH JUNE 2024 PAGE NUMBER: P A G E 31 
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APPENDIX B: LABORATORY DESIGNATION CERTIFICATES



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Mobile Lines: 0724-253 398, 0723-363 010, 0735-013 046
Telkom Wireless: 020-2101370, 020-2183718
Incident Lines: 0786-101100, 0741-101100

P.O. Box 67839, 00200
Pepo Road, Nairobi, Kenya
E-mail: dgsnema@nema.go.ke
Website: www.nema.go.ke

NEMA/21/2/LAB 77/LLL

20th April, 2023

Lahvens Limited Laboratory
Lahvens House,
P.O. Box 34153-80118
MOMBASA.

RE: LABORATORY DESIGNATION BY NEMA.

Pursuant to your application for designation, your laboratory was inspected and evaluated based on ISO 17025 for laboratory competence to carry out tests and samplings.

The Lahvens Limited Laboratory qualified and has in principle been designated to undertake **Air Quality Analysis (Stack Emission and Ambient Air) and Noise Level Measurements** subject to the attached terms and conditions.

However, pursuant to section 119 of EMCA 1999 the Gazettement will take effect once the Authority places a notice in the Kenya Gazette.



DAVID ONGARE
For: **DIRECTOR GENERAL**

Our Environment, Our Life, Our Responsibility



EBS REPORT OF AMBIENT ACOUSTIC LEVELS MONITORING FOR KMA

R.M.: MAY 2024

11. Copies of acknowledged meeting invitation letters

1



**ENVASSES
ENVIRONMENTAL
CONSULTANTS
LIMITED**

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

12th June 2024

1. Deputy County Commissioner, Kisumu Central Sub -county
Ministry of Interior and National Administration,
Kisumu.
2. The Director,
Kenya Maritime Authority,
Kisumu station
3. The Manager,
Kenya Ports Authority,
Kisumu, Kenya.
4. The Manager,
Kenya Shipyard Limited,
Kisumu, Kenya
5. The Managing Director,
Kenya Railways Corporation,
Kisumu, Kenya
6. The Chairman,
Kichinjio Beach Management Unit (BMU),
Kisumu, Kenya
7. The Directors,
Mega Properties (Shiloah Investment Ltd),
P.O Box. 2501-40100, Kisumu, Kenya.
8. The Directors,
Swan Centre Ltd,
Kisumu, Kenya
9. The Branch Manager,
CMC Motors Group,
P.O. Box. 508-30100, Kisumu, Kenya



Received 18/6/24

*Received on 18/6/24.
SAFA JOHN.*



2

10. The Director,
Devki Steel-Kisumu Town,
P.O Box 33319-00600,
Nairobi, Kenya.
11. The Branch Manager,
Nissan,
Kisumu, Kenya
12. Neighbor to the proposed project site (KMA Site)
Kisumu, Kenya

Dear Sir/Madam,

RE: INVITATION TO A STAKEHOLDER MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED CONSTRUCTION OF MARITIME RESCUE COORDINATION CENTRE-KISUMU

Kenya Maritime Authority (KMA) intends to construct a Maritime Rescue Coordination Centre (MRCC) in Kisumu to enhance maritime transportation and navigation safety and provide efficient communication to Lake Victoria communities. Pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of Laws of Kenya, KMA has contracted Envasses Environmental Consultants Limited to carry out Environmental and Social Impact Assessment study for the proposed project.

As a key stakeholder and in consistent with Regulation 17 (2b) of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, you are invited to a kick-off meeting on **Wednesday, 19th June 2024 at 9:00am at Selella Resort, Kisumu**. The agenda of the meeting is to sensitize stakeholders and obtain their preliminary comments on the proposed project.

We look forward to your participation.

Yours Sincerely,



Mr. Simon Nzuki
Chief Executive Officer





**ENVASSES
ENVIRONMENTAL
CONSULTANTS
LIMITED**

Raili House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

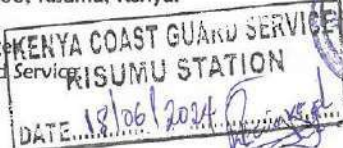
Our REF: Envasses/KMA/SHW 1/06/2024

12th June 2024

1. The Regional Commissioner-Nyanza
Ministry of Interior and National Administration,
Kisumu.
2. Deputy County Commissioner- Kisumu Central Sub -county
Ministry of Interior and National Administration,
Kisumu.
3. The Executive Secretary,
Lake Victoria Basin Commission,
New Nyanza Regional Headquarters,
P.O Box 1510-40100, Kisumu, Kenya.
4. The County Director of Environment Kisumu,
National Environment Management Authority,
P.O. Box 4279- 40103, Kisumu, Kenya.
5. County Executive Committee Member -Kisumu County,
Department of Environment and Natural Resources,
P.O. Box 2738- 40100, Kisumu, Kenya.
6. The Director,
Kenya Maritime Authority,
Kisumu station
7. The Managing Director,
Kenya Ports Authority
Mombasa-Kenya
8. The Manager,
Kenya Ports Authority,
Kisumu, Kenya.
9. The Manager,
Kenya Shipyard Limited,
Kisumu, Kenya
10. The Managing Director,
Kenya Railways Corporation,
Kisumu, Kenya
11. Regional Coordinator,
State Department for Blue Economy and Fisheries,
Nyanza and Western Regions,
P.O. Box 1084-40100, Kisumu, Kenya.



Page 2

12. The Director,
Lake Victoria Regional Office,
Kenya Fisheries Service,
P.O. Box 1084-40100, Kisumu, Kenya. *Received Barry Agaro*
13. The Centre Director,
Kenya Marine and Fisheries Research Institute,
P.O. Box 1881-40100, Kisumu, Kenya. 
14. The General Manager,
Kenya Coast Guard Service,
Kisumu, Kenya. 
15. The Director,
Kenya Wildlife Service,
P.O. Box 1193-40100, Kisumu, Kenya. 
16. Regional Manager,
Water Resources Authority,
P.O. Box 666 - 40100, Kisumu, Kenya.
17. Director,
Communications Authority of Kenya- Kisumu Regional Office,
Kisumu, Kenya.
18. The General Manager,
Kenya Power and Lighting Company Limited *Celtone*
Kisumu, Kenya
19. Director,
Directorate of Occupational Safety and Health Services, *Thomas Wakesa*
P.O. Box 34120 - 40100, Kisumu, Kenya. *18th June 2024.*
20. The Chairman,
Kichinjio Beach Management Unit (BMU),
Kisumu, Kenya
21. The Director,
Osiendela (Friends of the Lake).
P.O. Box 4580-40100, Kisumu, Kenya. *Richard Oyoo*
20th June 2024.
- * 22. The Directors,
Mega Properties (Shiloah Investment Ltd),
P.O. Box. 2501-40100, Kisumu, Kenya.
- * 23. The Directors,
Swan Centre Ltd,
Kisumu, Kenya 
- * 24. The Branch Manager,
CMC Motors Group,
P.O. Box. 508-30100, Kisumu, Kenya

Page 3

25. The Director,
Devki Steel-Kisumu Town,
P.O Box 33319-00600, Nairobi, Kenya.

26. The Branch Manager,
Nissan,
Kisumu, Kenya

27. Neighbor to the proposed project site (KMA Site)
Kisumu, Kenya

Dear Sir/Madam,

RE: INVITATION TO A STAKEHOLDER MEETING TO REVIEW AND VALIDATE THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE MARITIME RESCUE COORDINATION CENTRE (MRCC) NEW SITE.

As you aware, we have been contracted by KMA to prepare the Environmental and Social Impact Assessment (ESIA) study for the proposed Kisumu Maritime Rescue Coordination Centre (MRCC). Between March and May this year we prepared the ESIA report for a potential site in Dunga area which upon analysis of alternatives was found to be unsuitable.

A new site has since been identified within Kisumu Port and we have prepared a draft ESIA for it. The purpose of this letter is therefore to invite you to a stakeholder meeting to;

1. Review the draft ESIA Study Report on Friday, 21st June 2024 at Selella Resort, Kisumu starting at 9am
2. Validate the final ESIA Study Report on Tuesday, 25th June 2024 at Selella Resort, Kisumu starting at 9am

Please purpose to attend.

Yours Sincerely,



Mr. Simon Nzuki
Chief Executive Officer



12. Copies of stakeholder engagement meeting programmes



Environmental and Social Impact Assessment Study for the Proposed Construction of Maritime Rescue Coordination Centre in Kisumu Port

Task: Kick-Off Stakeholder Meeting

Date: 19th June 2024

Venue: Selella Resort, Kisumu

Programme

Time	Activity	Facilitator
9:00am	Arrival and registration of participants	Envasses
9:30am	Prayer and introductions	Envasses
9:45am	Opening remarks and project overview	1. Kisumu Central Administration 2. Kenya Ports Authority 3. Kenya Maritime Authority/KSL
10:00am	Tour of the project site	Kenya Maritime Authority/KPA/ Envasses
10:30am	Tea Break	Selella Resort, Kisumu
11:00am	Presentation on the ESIA study process	Envasses
11:45am	Plenary discussions	
12:45pm	Way forward and AOB	
1:00pm	Lunch break and departure	Selella Resort, Kisumu



Environmental and Social Impact Assessment Study for the Proposed Construction of Maritime Rescue Coordination Centre in Kisumu Port

Task: Stakeholder Meeting to review draft ESIA Study Report

Date: 21st June 2024

Venue: Selella Resort, Kisumu

Programme

Time	Activity	Facilitator
9:00am	Arrival and registration of participants	Envasses
9:30am	Prayer and introductions	Envasses
9:40am	Opening remarks and project overview	KMA
9:50am	Presentation of the Draft ESIA Study Report	Envasses
10:30am	Tea Break	
11:00am	Tour of the project site	KMA/KPA/Envasses
11:30am	Plenary discussions	Envasses
12:30pm	Way forward and AOB	Envasses
1:00pm	Lunch Break and departure	Selella Resort, Kisumu



Environmental and Social Impact Assessment Study for the Proposed Construction of Maritime Rescue Coordination Centre in Kisumu Port

Task: Stakeholder Meeting to validate ESIA Study Report

Date: 25th June 2024

Venue: Selella Resort, Kisumu

Programme

Time	Activity	Facilitator
10:00am	Arrival and registration of participants	Envasses Environmental Consultants Limited
10:15am	Prayer and introductions	Envasses Environmental Consultants Limited
10:20am	Opening remarks by KMA	Kenya Maritime Authority
10:30am	Review of comments on draft ESIA Study Report	Envasses
11:00am	Tea Break	Selella Resort, Kisumu
11:30am	Presentation on final ESIA Study Report	Envasses
11:45am	Plenary discussions	Envasses
12:15pm	Validation ESIA Study Report	
12:45pm	Way forward and AOB	
1:00pm	Lunch break and departure	Selella Resort, Kisumu

13. Proceedings of the kick off stakeholder meetings held on 19th April and 19th June 2024



Environmental and Social Impact Assessment Study for the Proposed Construction of Maritime Rescue Coordination Centre-Kisumu.

Proceedings of Stakeholder Meeting to Validate ESIA Study Report held at
Acacia Premier Hotel, Kisumu

29th April 2024

Proponent	Firm of Experts
Kenya Maritime Authority P.O. Box 95076-80104, Mombasa.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya.

Meeting Agenda

The stakeholder meeting to validate the KMA Maritime Rescue Coordination Centre ESIA Study Report for was held at Acacia Premier Hotel, Kisumu and the agenda was as follows:

1. Prayer and introductions
2. Opening remarks by KMA
3. Review of stakeholder comments on ESIA Study Report as per the meeting held on 23rd April 2023
4. Presentation on final ESIA Study Report
5. Plenary discussions
6. Validation ESIA Study Report
7. Way forward and AOB

1. Prayer and introductions

The meeting started at 10:20am with a word of prayer from Mr. Thomas Wekesa (Directorate of Occupational Safety and Health Services (DOSHS))-Kisumu and thereafter introductions. A total of 28 participants drawn from KMA, KMFRI, WRA, KeFS, NGAO, KCGS, DOSHS, OSIENALA, neighbours to the project site and the local community members among others participated in the meeting (Figure 1, Annexure 1).



Figure 1: Participants during the stakeholder meeting to validate ESIA Study Report (Source: Stakeholder meeting, April 2024)

2. Opening Remarks

Mr. Michael Mbaru, the Ag. Assistant Director-Marine Environment Protection-KMA thanked the participants for attending the ESIA study validation meeting. He noted that currently the country is experiencing flood disasters in various areas including the Lake Region due to heavy rainfalls and KMA is working closely with other government agencies and affected community to enhance safety. He added that the proposed MRCC in Kisumu and planned future ones in other riparian counties (i.e., Homabay, Migori, Siaya and Busia Counties) will provide support by enhancing coordination on search and rescue operations within L. Victoria Basin. Regarding the ESIA study process, he thanked stakeholders for their input during the kick-off and draft review meetings and urged them to further review the ESIA study report prior to validation of its comprehensiveness.

He informed the meeting that KMA will continuously engage with the stakeholders to address their concerns and comments throughout the implementation of the project and at operational phase.

3. Review of comments on the draft ESIA Study Report

Ms. Fridah Khamalishi from Envassess Environmental Consultants Limited informed the participants that kick-off and stakeholder meetings to review ESIA Study Report were previously held on 16th April 2024 and 23rd April 2024 respectively. she took the participants through the comments provided during the meetings (Table 1 & 2).

Table 1: Summary of issues raised and responses provided during kick-off stakeholder meeting

Issues raised during kick-off meeting	Response provided
Inclusion of all key government agencies and stakeholders in finalization of project designs	– Recommendation will be forwarded to KMA for action
Project site seems inadequate to accommodate all the project components	– Reclamation of the riparian area will be undertaken
Prioritize locals for available job opportunities	– Locals will be prioritized when employment opportunities occur during the project cycle
Water quality degradation and pollution	– Installation of bio digester, and use of silt curtains as well as monitoring water quality
Change of aesthetics within the project area	– Preliminary designs have incorporated landscaping and gardening area.
Impacts of climate change & lake level rise	– Climate proofing the MRCC infrastructure against flooding and lake level rise
Risks of flooding and/ or backflow of water during heavy rainfall	– Hydrogeological assessment findings to inform the project designs

Table 2: Summary of issues raised and response provided during stakeholder meeting to review draft ESIA Study Report

Issues raised during review of draft ESIA Report	Response provided
Baseline data to include that there's no fish landing site at the project shoreline	– Information was incorporated in ESIA Study report
Integration of blue economy in project implementation and continuous stakeholder engagement	– Recommendations will be forwarded to KMA for consideration
Provision of alternative routes to the shoreline and fodder areas for local livestock	– Sensitization of locals on alternative routes and fodder areas
Mitigation measures for earthquake impacts	– Geotechnical investigation will be carried out and structural plans will incorporate the findings – Use of quality material and appropriate building technology to withstand the effects of earthquake
Siltation of River Aleora flowing along the eastern part of the project boundary	– Project designs to incorporate appropriate setback distances to the River as per the Water Quality Regulations, 2006
Creation of employment opportunities esp. for youth	– Youth and locals will be prioritized in employment
Corporate Social Responsibility (CSR)	– KMA will continue offering marine education and training within the Lake Basin
Existence of crocodiles within the shoreline of the project area	– Liaise with KWS to prevent human-wildlife conflicts during the project cycle

Issues raised during review of draft ESIA Report	Response provided
Inclusion of Migingo Island in SAR operations	- KMA is in process of seeking full coverage of L. Victoria during SAR in collaboration with Uganda & Tanzania MRCC's therefore, Migingo Island will form part of KMA SAR area
Expansion of access road to the site	- Relevant government agencies and consultation with the neighbours will be undertaken to ensure the access road is enhanced to service all interests
Relocation of inhabitants within the project area	- No relocation will be undertaken
Inclusion of papyrus reeds harvesting and bird watching activities under the socio-economic section of the ESIA baseline	- The information was incorporated in the ESIA Study Report
Inclusion of lake level rise in project designs	- Project designs have considered lake level rise
Any compensation to injured workers at site	- The construction site will be registered as a workplace and KMA ensure compliance with provisions of OSHA, 2007

4. Presentation on final ESIA Study Report

Ms. Fridah projected the Final ESIA study report and showed the participants that all the comments obtained from the two stakeholder meetings had been incorporated in the final ESIA Study Report. She also stated that proceedings of the stakeholders' meetings were prepared and those of the validation meeting will be finalized to form part of annexures of the ESIA Study Report. The meeting participants were then requested to confirm if all the comments had been documented and addressed in the ESIA Study Report to which they responded affirmatively.

5. Plenary Discussions

Mr. Edward Midimu from DOSHS-Kisumu requested that the final ESIA Study Report be shared to the stakeholders for their records and future reference. He further suggested inclusion of WIBA 2007 and its regulations and update bathymetry map from 2017 to current date in the report. He further urged the proponent to include emergency exit staircase (attached to the outside area of the main building block) in the project designs as per OSHA guidelines. In response, Ms. Fridah informed them that final ESIA Study Report will be available on NEMA website or Kisumu County NEMA office for reference and further comments if any after submission to NEMA. She also stated that any additional document required by the stakeholders will be shared through KMA. Regarding the project designs and incorporating the changes recommended by the stakeholders, Mr. Michael Mbaru from KMA responded that finalization of the project designs is at advanced stage and will consider the comments accordingly.

Mr. Maurice Misodhi, Vice Chair of Dunga BMU noted that River Auji/Ugwi/Aleora was not included in the baseline information of the report. He urged KMA to ensure that the status quo of the access road is maintained and/or improved upon completion of the project. Additionally, he requested KMA to include the local BMU and community in the project implementation committee to ensure their participation in the project and continuous engagement. In response, Ms. Fridah incorporated R. Aleora in baseline hydrology information of the project area and stated that a revised map showing location of the river will be incorporated later in the report. Mr. Mbaru further informed the participants that the access road to the site will be upgraded to tarmac or cabro paved. Ms. Diana representative of Kenya Shipyard Limited (the contractor) responded that

project management committees will be formulated in consultation with KMA and locals after groundbreaking and commencement of construction works.

Mr. Collins Odhiambo from WRA noted that the provided baseline information in hydrology needs to be updated to include names of all rivers and streams relevant to the project area rather than Lake Victoria. He further inquired on when the hydrological assessment report will be available for stakeholders to give further comments as well as pegging of the riparian area. In response, Ms. Fridah stated that all the rivers in the area will be included in the study report. Further Mr. Mbaru from KMA stated that the hydrological survey will be undertaken after finalization of project designs in collaboration with WRA to provide specific information on water recharge quantities and flooding risks to the MRCC.

Mr. Tom Migudi from Kenya Coast Guard Service suggested inclusion of Department of Immigration Service in the report and future stakeholder engagements especially at operational phase. Mr. Mbaru further suggested the inclusion of Civil Aviation (Amendment) Act, 2016 and Kenya Civil Aviation Authority (KCAA) as responsible institution in the report as the authority will play key role in installation of communication infrastructure at the MRCC.

Mr. Nicholas Didi, Secretary of Dunga BMU, on behalf of the local fishermen noted that although he agreed with the consultant's conclusion of lack of any fish landing site at the project shoreline, he suggested the inclusion of the nearby landing site (Pap Ondiek, not legally gazetted) located about 4km opposite the project shoreline. He reiterated the need to safeguard birds' habitat to maintain bird watching activities within the area. In response, Mr. Mbaru stated that the project designs will incorporate development of support infrastructure to enhance tourism within the project area. Additionally, Ms. Diana Aguku from Kenya Shipyards Limited (the contractor) stated that some of papyrus reeds will be cleared to pave way for construction works and locals will be allowed to harvest them.

Mr. Nicholas Didi with support from other participants stated that seasonally there are cases of development of floating macrophytes island that hinders navigation. He inquired on mitigation measures put in place to ensure it doesn't hinder the MRCC operations. He suggested KMA to consider alternative routes to the MRCC during the SAR since he noted that the implementation of the EWS might be ineffective in cases of rapid proliferation and drifting aquatic macrophytes. In response, Mr. Mbaru appreciated the feedback and mentioned that KMA will collaborate with KPA to designate alternative routes to the MRCC. He further inquired with Kenya Shipyard Limited whether there's possible technology to develop a marine vessel that can maneuver through the aquatic macrophytes. Mr. Midimu and Mr. Odhiambo suggested the inclusion of helipad in the project designs to assist rescuing lake users esp. those trapped within floating islands of aquatic macrophytes.

Mr. Collins Otieno, youth coordinator and resident of Dunga area inquired on the plans/management action in place with regards to water transport during the operational phase. In response, Mr. Mbaru noted that the facility will be used mainly for coordination on search and rescue operations and will not offer any port or cargo storage services. He added that in instances where the rescued individual or vessel had goods, the individual will liaise with relevant agencies or private services for storage and handling of the cargo.

Mr. Caleb Omondi, a Dunga resident, wanted to know if KMA will provide training to locals and embrace the local knowledge during Search and Rescue operations. He stated that in most scenarios

some government agencies in SAR operations lack enough expertise to ensure safety and reduce fatalities. He went ahead and gave examples of areas in the country where locals played a key role in successful SAR operations. In response, Mr. Mbaru stated that the operation activities of MRCC will involve various stakeholders including locals to ensure the agency fulfills its mandate in coordination on SAR.

6. Validation of the ESIA Study Report

All the stakeholders validated the ESIA Study Report subject to inclusion of their final comments.

7. Way Forward and AOB

Ms. Fridah thanked the participants for their participation during the meeting and informed them that their final comments will be incorporated in the ESIA Study. Further she informed them that the validation meeting proceedings will be prepared and the final ESIA report submitted to NEMA for decision making. In addition, she informed the participants that the ESIA Study Report will be advertised in Kenya Gazette, newspapers with nationwide circulation and local radio station inviting the public including the stakeholders to submit oral and written comments on the proposed MRCC.

8. Closing Remarks

Ms. Lena Jobita, the Area Chief –Nyalenda B sub location thanked the proponent for the proposed project and noted that it will enhance safety and security within the area. She urged KMA to work closely with the community for the successful MRCC implementation.

Mr. Musodhi thanked the proponent for choosing Dunga area to construct the MRCC and involving the community in the proposal. He urged KMA and the contractor to implement the suggestions provided by the stakeholders. He added that the local fishermen support the construction of the MRCC and mentioned the need to expedite the implementation process since Dunga Beach fishermen are facing maritime navigational challenges.

9. Closing and Prayer

The meeting ended at 1:40pm with a word of prayer from Mr. Maurice Misodhi, Vice Chairman of Dunga BMU.

Signed: _____

Date: 29th April 2024

Jack Otieno
Envasses Environmental Consultants Limited
Meeting Secretary





ENVASSES
ENVIRONMENTAL
CONSULTANTS
LIMITED

Environmental and Social Impact Assessment Study for the Proposed Construction of Maritime Rescue Coordination Centre in Kisumu

Task: Stakeholder Meeting to Validate ESIA Study Report

Date: 29th April 2024

Venue: Acadia Premier Hotel, Kisumu

Attendance list

NO.	NAME	AFFILIATION	TELEPHONE NO./EMAIL	SIGNATURE
1.	ALFRED WAKESIO	KOPS	0742741304	
2.	GEORGE OTIENO AGWENA	KOPS	0799339412	
3.	PETROLINA CHEPCHUMBA BORE	SABESF	0708620586	
4.	EMMANUEL MDIMU	DOSHIS	0721277487	
5.	THOMAS WAKESIO	DOSHIS	0719621854	

NO.	NAME	AFFILIATION	TELEPHONE NO. /EMAIL	SIGNATURE
6.	MAURICE MISODHI	DUNGA BMU	0720065472	
7.	TOM MICHABI	KCGS	0700626132	
8.	AGUKO DINDA AMOO	Kenya Shipyards Limited	0741375994	
9.	Colinus Odhiambo	W.R. Pasumo Authority	0723877748	
10.	NICHOLAS OWITI DIDI	DUNGA BMU - SECRETARY	0724662534	
11.	Michael Nbari	KMA	0722176561	
12.	Dr. Nyamathi Joseph	KMA	0722690268	
13.	LENA ATIENO JAGATA	N.G.A.O	0718687490	
14.	GODFREY OGONDA	OSIENACA	egonda.ogondanet@gmail.com 0728772863	
15.	Tackline Njau	Neighbour	0710577785	
16.	DANIEL NGERA	WRA	0720-105318	
17.	Benceard Omandu	Dunga resident	0746091382	
18.	HELMAN J.O OCHOLA	Dunga resident	0708459894	

NO.	NAME	AFFILIATION	TELEPHONE NO./EMAIL	SIGNATURE
19.	Maria Owler	DWRP	0729141824	
20.	FREDRICK OWITI	DWRP	0741809553	
21.	Shadaly	DWRP	0740506060	
22.	Caleb Osonde	Bmv (L.Victoria)	0715710203	
23.	Stella	WATER		
24.	Catharine Othman	Youth Leader	071524546	
25.	ARINA O'g	0711524546	071524546	
26.	DAN MATHA	0721228728		
27.	JASHA	0711524546		
28.	Jack Othman	0744 Envoys Ltd	0711385457	
29.	Faidah Khamlichu	Envoys Ltd	0704063064	
30.				
31.				



**Environmental and Social Impact Assessment Study for the
Proposed Construction of Maritime Rescue Coordination
Centre in Kisumu Port, Kisumu County.**

**Proceedings of the kick-off stakeholder meeting held at Selella
Resort, Kisumu**

19th June 2024

Consultant	Firm of Experts
Kenya Maritime Authority, P.O Box 95076-80104, Mombasa, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya.

Introduction

KMA intends to construct a Maritime Rescue Coordination Centre (MRCC) in Kisumu. The objective of the project is to enhance coordination on search and rescue operations in Lake Victoria Basin. The project components will include MRCC building, jetty, boat spill way and auxiliary facilities. Pursuant to Section 58 of the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya, KMA has contracted Envasses Environmental Consultants Limited to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed project.

Accordingly, pursuant to Regulation 17 of the Environmental Management and Co-ordination (Impact Assessment and Audit) Regulations, 2003 the consultants in collaboration with KMA organized and held a stakeholders' kick-off meeting on 19th June 2024 at Selella Resort, Kisumu. The purpose of the meeting was to sensitize stakeholders on the proposed project and seek their comments on the proposed project.

The agenda of the meeting was as follows:

1. Prayer and Introduction
2. Opening Remarks and Project Overview Presentation
3. Presentation on the ESIA Study Process
4. Plenary Discussions
5. Way Forward and AOB

1. Prayer and introductions

The meeting started at 10:15 a.m. with a word of prayer from Mr. Maurice Omondii, Member of Kichinjio Beach Management Unit (BMU). After prayers, Ms. Fridah Khamalishi from Envasses Environmental Consultants Limited welcomed the participants and proceeded to introductions. The meeting had a total of 14 participants drawn from Kenya Maritime Authority (KMA), National Government Administration Officer (NGAO)-Kisumu Central, Kenya Shipyard Limited (KSL), Kenya Railway Corporation (KRC), Kichinjio BMU, neighbors to the project site i.e., Mega Properties Ltd, Swan Centre) and the consultant (Figure 1 & Annexure 1).



Figure 1: Participants during the kick-off stakeholder meeting (Source: Stakeholder Meeting, 19th June 2024).

2. Opening Remarks from Kenya Maritime Authority

Mr. Albert Kosgei from KMA elaborated on the government institution's mandates and its roles in ensuring successful project implementation to enhance safety and well-being of the Lake Victoria communities. He stated that the project in collaboration with other government agencies such as KWS and KCGS will help reduce accidents and loss of lives from boat collisions, natural disasters, and human-wildlife conflict rescue within L. Victoria. He added that the project will as well be implemented in the neighboring counties i.e., Tanzania and Uganda to enhance regional rescue coordination.

3. Project site tour

The consultant then led the participants on a tour of the project site and once at the site they were explained on the proposed project scope and site layout plans. Ms. Fridah stated that the project will be implemented in two phases i.e., phase 1 will involve construction of a MRCC building, parking area and waste management systems while phase 2 second phase will include reclamation of riparian land for marine works (construction of jetty and boat spill way). She noted that description of the project components was based on preliminary designs and final project designs will also be informed by the output of the ESIA Study

4. Presentation on ESIA Study Process and Project Disclosure

Ms. Khamalishi gave an overview of the ESIA Study process for the proposed project. She further, cited the legal basis of the meeting as per Regulation 17 (2b) of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003 where public participation in the ESIA process is a mandatory requirement. She added that the ESIA Study process was guided by the requirements of Sec. 58 of the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya and the Terms of Reference (TORs) as approved by NEMA. In this regard, she noted that the ESIA study will among other elements, provide a description of the proposed project, baseline environmental and social conditions of the project area, environmental and social risk assessments during construction, operation and possible decommissioning phase of the project, relevant policy, legal and institutional frameworks and development of Environmental and Social Management and Monitoring Plans (ESMMP) for implementation of the project.

She also informed the participants that three stakeholder consultation meetings will be undertaken, and their views and concerns will be incorporated in the final report prior to submission at NEMA for decision making. She added that publication of the ESIA Study Report will be done on Kenya Gazette, (2) newspapers with wider nation-wide circulation and local radio pursuant to Regulation 17 (2a) of Legal Notice 101 of 2003. This she noted would still provide stakeholders with an avenue to enrich their contribution to the ESIA study process.

5. Plenary Discussions

Mr. George Wandera, the social expert from Envasses Environmental Consultants Limited stated that stakeholders play crucial role in the success of project implementation. He pointed out that their views and concerns about the project enhances its sustainability and reiterated that every project has its benefits and attendant negative environmental and social impacts so is the proposed MRCC. He noted that the tour to the project site allowed the stakeholders to appreciate both the scope and extend of the project site and the environmental as well as social issues that might manifest during the project cycle. He then invited the participants to give their views, concerns and comments regarding the proposed project;

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Mr. Maurice Omondi, member of Kichinjio BMU wanted to know whether BMUs will be given alternative route to access their fishing landing site. He informed the participants that currently the BMU members uses the access road at the project site to access the landing site. Mr. Suku Sherwin from Katangi Developers Limited also inquired whether KMA will restrict public access off C. Obote Road on the during project implementation. He noted that earlier, there were restrictions on entry through the port entrance, making it difficult for people in neighboring commercial complexes to access their operational areas. He emphasized the need for the proponent to guarantee that such restrictions will not be reinstated once the project is implemented. In response, Ms. Fridah stated that the concerns and recommendations will be forwarded to KMA for clarification and response.

Mr. Suku Sherwin stated that there will be noise and air pollution especially during construction phase, risk of increased insecurity and pollution cases once the project commences and inquired on the mitigation measures the proponent would implement to address these concerns. In response, Ms. Fridah stated the project design has incorporated waste management system and the proponent will be advised to install dust screens around the project area, ensure trucks hauling soil and loose construction materials are covered, limit construction works to day time and comply with set limits and standards set out under Air Quality Regulations, 2014 and Noise and Excessive Vibration Pollution (Control) Regulations, 2009 to mitigate air and noise pollution and fence the site, hire security marshals to enhance security, install bio-digester to manage sanitation waste flows from the MRCC building and develop an effective waste management plan.

Mr. Suku Sherwin, also noted that based on the topography of Kisumu the location of the proposed project site is within the storm drainage system of the Kisumu Central Business District. As a result, there is a risk of flooding and water backflow that should be considered prior to project implementation. He added that the shoreline along the proposed site is considered a fish breeding site and as a result the development of the proposed site could result in water pollution hence degrading the breeding grounds. In response, Ms. Fridah stated that the issue on storm water and drainage systems will be forwarded to KMA for considerations while on protecting the fish breeding grounds the proponent will ensure proper waste management, develop a water quality monitoring plan to ensure compliance and collaborate with KMFRI & KeFS to enhance protection of fish breeding grounds near the proposed project shoreline.

Mr. Brian Kolongo from Kenya Railways Corporation wanted to know whether required procedure for acquiring the land for the proposed project was undertaken. He urged the proponent to ensure compliance with the distance for the railway reserve along the Kisumu-Nairobi railway line within the project site and consider the issue of lake level rise in the project designs to ensure its viability. Mr. Suku further sought clarification on landownership. In response, Ms. Fridah and Mr. Kosgei from KMA informed the participants that letter of approval had already been obtained from KPA to implement the project on the site within the port. They further informed the participants that recommendation for further consultation with KRC and compliance with railway reserve boundaries will be forwarded to the KMA management for considerations.

Mr. Willis Ochieng, Senior Chief-Kisumu township location emphasized on need for the proponent to ensure security within the project area is maintained. He inquired on sustainability of the project including assurance that in future the project will not be relocated due to unresolved issues. He urged the proponent to collaborate with the relevant agencies to ensure successful project implementation. Mr. Ochieng, further requested that the site engineers/contractor allow local food vendors to access the site to supply food to the workers during construction. Ms. Diana Awuor from Kenya Shipyards Limited (proposed project contractors) noted that any food vendor supplier

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should tender for the services through the KSL website and should ensure compliance with tender requirements and food handling standards recommended by DOSHS.

Mr. Suku Sherwin, from Katangi Developers Limited, inquired about the rationale behind selecting the proposed site for the maritime rescue center. He noted that most lake activities occur at Dunga Beach and questioned whether this site was the most suitable choice. He further sought clarification on the route that trucks would use to transport materials and excavated soil heaps disposal site. In addition, he raised concerns about the proximity of the proposed site to a railway line, which could lead to blockages hindering prompt patient transportation in emergency situations. In response, Ms. Fridah stated that the proposed Dunga site was considered inadequate to accommodate the project components including accessibility and impacts of lake level rise. She added that the trucks will utilize the access road at C. Obote Junction and proponent will be advised to ensure compliance with set standards for air and noise levels, excavated soil be used for backfilling and leveling the site and the construction debris disposed by NEMA licensed waste handler.

On issue of railway operations, Mr. Kolongo responded that along the railway line, the train always has the right of way. Ms. Diana suggested that KMA and KRC develop a Memorandum of Understanding (MOU) to enhance co-existence of the MRCC and railway operations. Ms. Racheal noted that there might be blockage on railway line due to build dust hence possibility of trains getting stuck and urged the proponent to provide alternative access route to and from the proposed site. Ms. Fridah reiterated that the feedback on the projected blockage at the railway line is noted and will be forwarded to KMA for consideration.

6. Way forward

Ms. Khamalishi stated that the views and issues raised by the stakeholders will be incorporated in the ESIA Study Report. Additionally, she mentioned that a second stakeholder meeting will be held on Friday, 21st June 2024 at Seella Resort, Kisumu to review the draft ESIA Study Report. She urged participants to attend the meeting and keep time.

7. Closure of the meeting

There being no other business, the meeting ended at 2.20pm with a word of prayer from Mr. Maurice Omondi, member of Kichinjio BMU.

Signed:



Date: 19th June 2024

Mr. Jack Otieno,
Envasses Environmental Consultants Limited,
Meeting Secretary



Annexure 1: List of participants



Environmental and Social Impact Assessment Study for the Proposed Construction of Maritime Rescue Coordination Centre-New Site in Kisumu

Task: Kick-off Stakeholder Meeting

Date: 19th June 2024

Venue: Selesia Resort, Kisumu

Attendance list				
NO.	NAME	AFFILIATION	TELEPHONE NO./EMAIL	SIGNATURE
1.	Diana Amode Aduho	KENTA SHIPYARDS LIMITED	0741343794 dianaamode11@gmail.com	
2.	Philip Otingo	SKAN CENTRE LTD	0727-510616	
3.	SOU Shemai	MATANGI DEVELOPERS LTD	07223722741	
4.	MURIEL CHERNOI CIRINDU	Kichajia Bony	07028651438	
5.	COLLINS OMONDI, GARI	Kichajia Bony	0739101920	

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NO.	NAME	AFFILIATION	TELEPHONE NO./EMAIL	SIGNATURE
6.	Moses ODHINGO	KICTITE BNU	079099952	
7.	Abel Kosgei	KMA	0722267877	
8.	Rachael Kangwa	Kenya Railways	0790792215	
9.	George Wandera	Envasses Consultants Ltd	0729632854	
10.	Jack Otieno	Envasses Consultants Ltd	0711385457	
11.	Brian Ydongo	Kenya Railways	0711862386	
12.	Muganda Lemir Reben	Ushirimo	0798694661	
13.	Willis Anyona Odiong	DKO	0726546141	
14.	Fidel Kiamalishi	Envasses Consultants	0704063064	
15.				
16.				
17.				
18.				

14. Proceedings of the stakeholder meeting to review draft ESIA Report held on 21st June 2024**Environmental and Social Impact Assessment Study Report
for the Proposed Construction of Maritime Rescue
Coordination Centre in Kisumu**

Proceedings of Stakeholder Meeting to Review Draft ESIA Study Report Held at Selella Resort,
Kisumu on 21st June 2024

Proponent	Firm of Experts
Kenya Maritime Authority, P.O Box 95076-80104, Mombasa, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya.

Meeting Agenda

The Kenya Maritime Authority (KMA) and the consultant, Envasses Environmental Consultants Limited organized and held a Stakeholder Meeting to review the draft ESIA Study Report for the proposed construction of a Maritime Rescue and Coordination Centre (MRCC) held at Selella Resort, Kisumu on the 21st June 2024. The agenda of the meeting was as follows;

1. Prayer and introductions
2. Opening Remarks and Project Overview
3. Presentation on the draft ESIA Study Report
4. Plenary Discussions
5. Way Forward and AOB

1. Prayer and Introduction

The meeting began with a word of prayer from Mr. Philip Otingo, a representative from Swan Centre Ltd at 9:51 a.m. Ms Fridah Khamalishi from Envasses welcomed the participants and proceeded to introductions. A total of 23 participants drawn from KMA, KRC, Kichinjio BMU, Kenya Shipyards Limited (KSL), KPA, KPLC, Mega Properties Ltd/Katangi Developers Ltd, Swan Centre, and the local community, among others, participated in the meeting (Figure 1 & Annexure 1).



Figure 1: A section of the participants during the stakeholder meeting to review the draft ESIA study report at Selella Resort in Kisumu held on 21st June 2024.

2. Opening Remarks and Project Overview Presentation

Ms. Khamalishi informed the members that the meeting was a follow-up to the stakeholders' kick-off meeting held on June 19, 2024, at Selella Resort regarding the Environmental and Social Impact Assessment (ESIA) for the proposed Maritime Rescue and Coordination Centre (MRCC). She explained that the purpose of the meeting was to review the draft ESIA Study Report for the MRCC and welcomed Mr. Michael Mbaru, Ag- Director of Marine Environment Protection, to give the opening remarks on behalf of KMA.

Mr. Mbaru thanked the participants for attending and for their previous collaboration in the ESIA study process. He explained that KMA chose the proposed site within the port, opposite the planned KPA passengers' terminus, due to its accessibility via the Obote and Oginga Odinga road junction, the availability of suitable land, supporting infrastructure, and potential synergies with the port. He emphasized KMA's commitment to successfully implement the project to ensure the safety and well-being of the riparian communities. He noted that the MRCC would benefit the Lake Victoria basin community and the country by improving communication among lake users and strengthening regional collaboration in safety and rescue operations with other MRCC centers in Tanzania and Uganda. This collaboration will facilitate the reporting and response to distress calls on the lake. He also mentioned that the MRCC will partner with other relevant agencies such as KPA, KCGS, KRC, and KWS, whose activities are interconnected with the MRCC.

3. Presentation on the draft ESIA Study Report

Ms. Fridah Khamalishi reviewed the stakeholder discussions from the two kick-off meetings held in April and June 2024 at the initially proposed MRCC sites. She informed the participants that the views and concerns raised during these meetings were noted and included in the draft ESIA study report. She also explained why Kisumu Port was chosen over the Dunga site for constructing the MRCC.

She outlined the four phases of stakeholder engagement in the ESIA study. The first phase involves a stakeholder mapping exercise. Phase two consists of stakeholder consultation meetings, which inform the ESIA process, particularly in identifying the project's environmental and social impacts. Phase three involves submitting the final report to NEMA for review. The final phase involves publicizing the ESIA study report to the public through local media and the Kenya Gazette, as the project is categorized as high risk.

Ms. Khamalishi then highlighted the terms of reference (TOR), which provides the guideline for the ESIA report and proceeded to present the ESIA study report and gave a detailed presentation on the draft Environmental and Social Impact Assessment (ESIA) Study Report for the MRCC in Kisumu. She informed the participants that KMA provided Terms of Reference (TORs) to the consultant to guide the ESIA process consistent with the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya. Additionally, Ms. Fridah mentioned that the Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003 informed the approach and methodology used in data collection, analysis, and reporting. In this regard, the scope of draft ESIA Study Report was presented to the participants in the following format.

1. Background Information
2. ESIA Approach and Methodology
3. Policy, Legal and Institutional Frameworks including Multi-Lateral Agreements (MEAs)
4. Project description
5. Baseline studies and findings including physical, biological and socio-economic environment
6. MRCC building and marine works (jetty & lake wall) impacts
7. Stakeholder consultations and key issues
8. Environmental and Social Management Plans (ESMPs)
9. Environmental Monitoring Plans
10. Conclusion and Recommendations

Ms. Fridah discussed each of the scope required by EMCA Cap 387 of Laws of Kenya and consistent with the Terms of Reference for the ESIA Study.

4. Plenary Discussions

Mr. George Wandera, the sociologist from Envasses Environmental Consultants Limited, thanked Ms. Khamalishi for her presentation and invited stakeholders to share their comments on the ESIA study report.

Mr. Collins Odhiambo from the Water Resources Authority acknowledged the proposed project and thanked the consultant and proponent for their continuous stakeholder engagements. He emphasized that the project's design should include a comprehensive stormwater drainage system to prevent flooding due to the site's topography and runoff from the Central Business District areas into the lake. In response, Mr. Mbaru from KMA assured Mr. Odhiambo that the designs would incorporate input from licensed engineers to ensure the adequacy of the stormwater drainage system and mitigate any potential flooding.

Mr. Godfrey Ogonda from Osenala expressed his organization's support for the proposed project, recognizing its potential to enhance the safety and well-being of riparian communities.

Mr. Maurice Omondi, a Kichinjio Beach Management Unit (BMU) Member thanked the proponent and consultant for providing sufficient feedback on the issue of the access road which is shared between the BMU and the proposed site. He said that the BMU supports the project and encouraged the proponent to ensure that all due procedures were followed to ensure sustainability of the project. In response to the issue of the access road to Kichinjio BMU landing site, Mr. Mbaru from KMA mentioned that there are ongoing deliberations between the County Government of Kisumu, KMA, KRC, and KPA to settle on an ideal route solution for them. Besides, he informed the Kichinjio BMU members that the current access road portrayed by the Google map is non-existent based on the survey map acquired from the land's office. As a result, an alternative route will be provided to ensure Kichinjio BMU landing site is accessible to its members throughout the project cycle.

Eng. William Tenai, from KPA responded to a concern on land ownership raised during the kick-off meeting. He noted that the proposed project is located within Block 7, which is a piece of land that was allocated to KPA through a presidential directive. Consequently, KPA has given KMA a letter of approval to develop the MRCC within the proposed project site.

Mr. Godfrey Ogonda from Osenala enquired if there are planned expansions by KRC near the proposed project site which will in turn affect the operations of the proposed MRCC in the future. Mr. Brian Kolongo from Kenya Railways Corporation noted that there are no planned expansion. However, Mr. William Tenai from KPA noted that should there be an expansion project in the future by KRC, the operations of MRCC will not be affected since infrastructures established by KMA, KPA, KSL, and KRC will be able to co-exist.

Mr. Moses Odhiambo a Kichinjio BMU member noted that the current culverts within the proposed project site are not functional to which Eng. Tenai responded that KPA and KMA will review their status with a view to improve storm water flow.

Mr. Collins Odhiambo from WRA enquired if KRC has ensured that the proposed project designs comply with the required railway reserve distances. Eng. Tenai from KPA noted that based on the current preliminary design, the required railway reserve distance has been observed.

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Mr. Suku Sherwin from Katangi Developers Limited noted that buildings within Kisumu County are required to face the lake. As a result, many developments have located their windows facing the lake. Therefore, he wanted to know if the proposed project four-storey building would affect the lake view of the commercial buildings neighboring it. Mr. Michael Mbaru from KMA responded the designs of the buildings will be submitted to the Kisumu County offices for approval as per the Building Code and would also be consistent with the KPA Master Plan.

Mr. Polycarp Okuku from KWS Impala station enquired if the proponent and consultant have incorporated the issue of human-wildlife conflicts in the report since the lake hosts a variety of dangerous fauna including hippos and crocodiles. Mr. Michael Mbaru from KMA noted that the issue had been captured in the report and urged KWS to provide recommendations on the best ways to manage the human-wildlife conflicts throughout the project cycle, as the proponent and the consultant are not experts in handling human-wildlife conflict. Mr. Okuku responded that the proponent should ensure that the security of both wildlife and humans is considered at all times, reporting on wildlife sightings and notifying KWS on incidents throughout the project cycle.

Further Mr. Polycarp Okuku noted that the poor waste management could negatively affect water quality and wildlife. He reiterated that littering has been a huge problem within the lake ecosystem and therefore, the proponent should develop and implement effective waste management systems for the MRCC.

Mr. Collins Odhiambo from WRA enquired whether port facilities usually comply with riparian requirements under the Water Resources Regulations, 2021. Mr. Michael Mbaru from KMA responded that the MRCC will be constructed pursuant to the applicable regulations including the Water Resources Regulations, 2021. He however noted that the proposed project requires utilisation of the riparian area and KMA will seek the appropriate permits consistent with the Regulations.

Ms. Petrolina Bore from the State Department of Blue Economy and Fisheries noted that the final designs of the proposed project should incorporate the anticipated rise in lake levels to ensure sustainability. Eng. Tenai responded that bathymetric surveys have been conducted and climate change risks factored in the designs to ensure that such impacts are addressed. However, he mentioned that the lake level rise is influenced by a different phenomenon in comparison to the recent cases of flooding experienced in different regions in the country. In addition, he noted that expertise knowledge from other agencies like the meteorological department could be sought to provide long-term predictions about the rise of lake water levels. Mr. Michael Mbaru from KMA also added that the concern has already been forwarded to the project architect and as a result, the final designs would incorporate the probability of a rise in the lake levels. Moreover, Ms. Diana Awuor from Kenya Shipyards Limited noted that the construction would incorporate the standard hydrological survey that is always paramount before beginning construction.

Mr. Suku Sherwin from Katangi Developers Limited noted that considering that there is a projected increase in ship activities at the port, there is a risk of traffic snarling up in the water that would affect the MRCC's water ambulance. In response, Eng. Tenai from KPA noted that there is a plan to construct a tower within the port which would help in controlling traffic within the lake waters, particularly at the port to address such risks.

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5. Way Forward and AOB

Miss Fridah Khamalishi from Envasses Environmental Consultants Limited informed the participants that the next phase of the ESIA study would involve incorporating their comments into the final draft report, which would be validated on June 25, 2024, at the same venue. There being no other business, the meeting was adjourned at 1:12pm with a word of prayer from Mr. Maurice Omondi of Kichinjio BMU.

Signed:

Date: 21st June 2024

Mr. Jack Otieno,
Envasses Environmental Consultants Limited,
Meeting Secretary.



Annexure 1: List of participants

Attendance list

NO.	NAME	AFFILIATION	TELEPHONE NO. /EMAIL	SIGNATURE
1.	Captain P. K. Gadiyi	Kenya Shipyard Limited	0755868215	
2.	David Andrew Atieno	Kenya Shipyard Limited	peter.gadiyi@kenyashipyard.co.ke 0741395794	
3.	William K. Tenay	Kenya Port Trust	0741395794	
4.	Odionko David Daul.	NEMA	0715566249	
5.	Jack Siper Ofino	NEMA	0704387348 odionko.david@gmail.com edam.juliet@gmail.com	

Environmental and Social Impact Assessment Study for the Proposed Construction of Maritime Rescue Coordination Centre within Kisumu Port, Kisumu County

Task: Stakeholder Meeting to review draft ESIA Study Report

Date: 21st June 2024

Venue: Selesia Resort, Kisumu



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NO.	NAME	AFFILIATION	TELEPHONE NO./EMAIL	SIGNATURE
6.	George Wandera	ENVASSES	0729632854	
7.	Michael Mwangi	UMLA	0720040801	
8.	Philip Otingo	Solan Centre Ltd	0727-510616	
9.	Retina Bore	STATE DEPARTMENT FOR THE BUREAU Economy Efficiency	0708600586	
10.	Callus Odhiambo	WLA	0723877748	
11.	Ann Big	KENYA POWER	0722237582	
12.	Maurice Mwangi Mwangi	Kichingiro BMT	0702865438	
13.	George Odera Awaso	Kenya Fisheries Service	0709 889 412	
14.	John Otieno	Kenya Asset Management Ltd.	0711365447	
15.	Rachael Kanjira	Kenya Railways	0790192215	
16.	Brian Kabongo	Komur Railways	0711262386	
17.	Mr Godfrey Ogenda	OSTENATA (Friends of Victoria)	0728777863	
18.	Alvin Chaki	Kichingiro BMT	0743334308	

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NO.	NAME	AFFILIATION	TELEPHONE NO. /EMAIL	SIGNATURE
19.	Moses Othman	Kichingiro Bypass	079009952	
20.	James John Mwa	KMA	0721008612	
21.	Peter Oduku	KWS IMPATA	0721332005	
22.	SUN Shauri	Katangi Dev. Ltd	0723728741	
23.	Fidoh Kiamalichi	Envasses Ltd	070168064	
24.				
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15. Proceedings of the stakeholder meeting to validate ESIA Report held on 25th June 2024**Environmental and Social Impact Assessment Study for the Proposed Maritime Rescue Coordination Centre in Kisumu Port**

Proceedings of Stakeholder Meeting to Validate the Final Draft ESIA Study Report held at Selella resort, Kisumu on 25th June 2024

Proponent	Firm of Experts
Kenya Maritime Authority, P.O Box 95076-80104, Mombasa, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya.

Meeting Agenda

The stakeholder meeting to validate the KMA Maritime Rescue Coordination Centre ESIA Study Report was held at Selella Hotel, Kisumu on 25th June 2024 and the agenda was as follows;

1. Prayer and introductions
2. Opening remarks and project overview presentation
3. Presentation on the draft ESIA Study Report
4. Plenary discussions
5. Way forward and AOB
6. Vote of thanks and prayer

1. Prayer and introductions

The meeting started at 10:00am with a word of prayer from Mr. Maurice Omondi a member of the Kichinjio BMU and thereafter introductions. A total of 20 participants drawn from KMA, KRC, Kichinjio BMU, Kenya Shipyards Limited (KSL), KPA, KPLC, Mega Properties Ltd/Katangi Developers Ltd, Swan Centre, and the local community, among others, participated in the meeting (Figure 1, Annexure 1).



Figure 1: A section of the participants during the stakeholder meeting to validate the final draft ESIA Study Report.

2. Opening Remarks

Mr. Michael Mbaru, the Ag. Assistant Director-Marine Environment Protection-KMA thanked the participants for attending the meeting to validate the Final draft ESIA Study Report. He noted that although KMA is planning to construct more MRCCs at different locations within L. Victoria, the proposed Kisumu MRCC will serve as the first and will be a central coordination center for rescue operations conducted by KMA. Regarding the ESIA study, he reiterated that the view and concerns raised during the previous meetings were noted and incorporated in the ESIA report. He also noted

that although the meeting primarily aimed to validate the ESIA study report, further feedback and comments were still encouraged.

3. Review of comments on the draft ESIA Study Report

Ms. Fridah Khamalishi from Envasses Environmental Consultants Limited reviewed the proceedings of the draft ESIA study report review meeting with a focus on the comments provided by stakeholders (Table 1).

Table 1. Issues raised by stakeholders during the meeting to review the draft ESIA Study Report

Issue No.	Issues raised by stakeholders	Response provided
1.	Restriction of access road to Kichinjio BMU Landing Site	– KMA will work with County Government of Kisumu and stakeholders to provide an alternative access road to Kichinjio BMU landing site
2.	The wayleave distance to the railway line	– KMA will work closely with KRC to ensure compliance of provisions of KRC Act Cap 397 of Laws of Kenya
3.	Reclamation of riparian area	– The project will be implemented in collaboration with KPA and other relevant agency during the reclamation process.
4.	Waste management	– Effective waste management plan and waste management system will be put in place
5.	Obstruction of lake view	– The building will be constructed in compliance with the Physical Planning Act and the Building Code

4. Presentation on final ESIA Study Report

Ms. Fridah projected the Final ESIA study report and showed the participants that all the comments obtained from the two stakeholder meetings had been incorporated in the final ESIA Study Report. She also stated that proceedings of the stakeholders' meetings were prepared and those of the validation meeting will be finalized to form part of annexures of the ESIA Study Report. The meeting participants were then requested to confirm if all the comments had been documented and addressed in the ESIA Study Report to which they responded affirmatively.

5. Plenary Discussions

Mr. Maurice Omondi, a member of the Kichinjio BMU, expressed gratitude to KMA for planning the proposed project near the Kichinjio landing site, highlighting the benefits it would bring to BMU members. He emphasized the importance of KMA collaborating with the Kichinjio BMU to strengthen relationships with its members. Mr. Omondi also suggested that initiating CSR activities to support BMU members would be greatly appreciated. Additionally, both he and another BMU member urged the contractor and proponent to create an alternative route for BMU members before construction begins. In response, Mr. Mbaru acknowledged the request, noting that several CSR activities are already planned and will be communicated to the BMU leadership and members once the proposed MRCC becomes operational. Regarding the alternative route, he mentioned that the project site is within a designated port area, leading to restricted entry. However, further discussions will be held to provide an alternative route for Kichinjio BMU members.

Mr. Michael Mbaru, the Ag. Assistant Director-Marine Environment Protection-KMA enquired from the consultant if the proponent can use their current Grievance Redress Mechanism (GRM) when implementing the operational phase of the project rather than develop a new one. In response, Ms. Fridah made a recommendation for the proponent to assess if their current GRM will be feasible. However, if not possible, they can integrate a new one with the current one provided the

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grievances are effectively addressed when the facility is operational. Consequently, he informed the participants that the project is urgently needed since the station will operate in liaison with similar stations established in Tanzania (under construction) and Uganda (yet to be constructed).

Mr. Collins Odhiambo from WRA inquired if there has been any progress in updating the proposed project designs in regards to the issues such as railway reserve distance and storm water management that were raised in previous meetings. In response, Ms. Fridah assured him that the concerns were noted and, at the moment, the project engineer and architect are finalizing the designs which will be included in the final ESIA study report before submission to NEMA offices for review.

Mr. Brian Kolongo, KRC representative enquired on the progress of resolving the Land ownership issue between KPA, KRC and KMA. In response, Mr. Mbaru noted that there is a planned meeting between the board chairs of KRC and KPA tasked with creating a resolution on the issue named above but the land upon which the MRCC will be constructed had the approval of KPA based on the Presidential Directive allocating the land to them.

Ms. Ann Biy from KPLC, urged the proponent to ensure that the application for power connection is made early to ensure timely connection. Besides, she noted that this will help in ensuring that the project is completed within on time. In response, Mr. Mbaru acknowledged the suggestion and noted that it will be forwarded to the relevant personnel to initiate the process.

Mr. Steve Otieno from NEMA highlighted the risk of inefficiency and pollution if a biodigester is established at the site. He urged the consultant and proponent to consider factors like rising lake water levels in the biodigester design. Mr. Odhiambo from WRA offered his expertise to determine the best biodigester model and emphasized that the biodigester must ensure effluent discharge meets NEMA and WRA Water Quality Standards. Mr. Mbaru acknowledged the importance of this issue and said it would be forwarded to the contractor and project engineer. Mr. Odhiambo also noted that some government agencies have been responsible for releasing unsafe effluents into Lake Victoria, leading to water pollution.

Mr. Suku Sherwin from Katangi Developers requested that the final ESIA Study Report be shared with stakeholders for their records and future reference. Ms. Fridah responded that the final report would be submitted to NEMA for review and would be accessible on the NEMA website.

6. Way Forward and AOB

Ms. Fridah expressed gratitude to the participants for their involvement in the meetings and informed them that their final comments would be incorporated into the ESIA Study. She also mentioned that the meeting proceedings would be included in the final ESIA Study Report, which will be submitted to NEMA for decision-making. Additionally, she informed the participants that the ESIA Study Report would be advertised in the Kenya Gazette, newspapers with nationwide circulation, and a local radio station, inviting the public and stakeholders to submit oral and written comments on the proposed MRCC.

There being no other business, the meeting was adjourned at 1:00 pm with a word of prayer from Mr. Maurice Omondi, Kichinjio BMU member.

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Signed:



Date: 25th June 2024

Mr. Jack Otieno,
Envasses Environmental Consultants Limited,
Meeting Secretary



Annexure 1: List of participants



Environmental and Social Impact Assessment Study for the Proposed Construction of Maritime Rescue Coordination Centre in Kisumu

Task: Stakeholder Meeting to Validate ESIA Study Report

Date: 25th June 2024

Venue: Selesia Resort, Kisumu

Attendance list				
NO.	NAME	AFFILIATION	TELEPHONE NO./EMAIL	SIGNATURE
1.	Suepbah Cherich	Kenya Shippers Limited	0720345752	
2.	Diana Aguko	Kenya Shippers Limited	0710335714	
3.	Jack Omer Ojino	NEMA	0704387248	
4.	Collins Ochieng'o	WEA	0723877748	
5.	Philip Otingo	Susan Centre	0727-510616	

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NO.	NAME	AFFILIATION	TELEPHONE NO./EMAIL	SIGNATURE
6.	George Oreno Agwera	KEFS - Kisumu	0799839 412	
7.	P. ETIGOLINA BORE	STATE DEPARTMENT FOR THE BLUE ECONOMY	0708620586	
8.	Dani Dora Ochieng	NEMA	0118566229	
9.	Godfrey Ogunda	DSLENATA (Friends of Lake Victoria)	0728777863	
10.	LIAISER Omondi	FSTER/ML L.V.	0719814889	
11.	MAURE AMONDI OROLO	Kichinga Bnu	0702865438	
12.	Alvin GARI	KUTHINGO Bnu	0748334308	
13.	Jack Ochieng	ENVOIES Ltd	0711385457	
14.	Michael Njau	KMA	0732176581	
15.	Ann Biny	Kenya Power	0722237582	
16.	Rehael Kinyia	KRC	0790792215	
17.	Moses Ochieng	Kierito Bnu	079099952	
18.	Enaw Kolongo	KR	0711262388	

NO.	NAME	AFFILIATION	TELEPHONE NO./EMAIL	SIGNATURE
19.	SILVO S. N. N. N.	Matangi Development Ltd	0722 728741	
20.	Feleph Khamaliki	Envases limited	0704063064	
21.				
22.				
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30.				
31.				

16. Copy of NEMA practicing license for the firm, Envasses Environmental Consultants Limited

  **EAE 23060347**

FORM 7 **nema** **(r.15(2))**
Mazingira Yetu | Uhai Wetu | Wajiji Yetu

**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/20222**
Application Reference No: **NEMA/EIA/EI/26823**

M/S Envasses Environmental Consultants Ltd
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P.O. Box 2013 - 80100 Mombasa

is licensed to practice in the
capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts**
registration number **6175**

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

Issued Date: **12/18/2023** Expiry Date: **12/31/2024**

Signature.....


(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified



17. Copy of NEMA practicing license for Lead Expert, Ms. Jane Gitau

  EAE 23060348

FORM 7  (r.15(2))

**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/20221
Application Reference No: NEMA/EIA/EL/26825

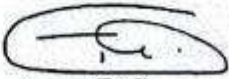
M/S Jane Mukami Gitau
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General
registration number 2015

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Signature.....


(Seal)
Director General
The National Environment Management Authority

P.T.O.

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18. Copy of NEMA e-citizen payment receipt