NITRO CHEMICALS LTD.

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Environmental Impact Assessment (EIA) Study Report for the Proposed Construction of Mining Explosives Storage Facility on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County.

Proponent	Firm of Experts
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Date: May 2023

CERTIFICATION

Certification by Lead Experts

We, Envasses Environmental Consultants Limited hereby confirm that this Environmental Impact Assessment Report has been prepared by ourselves pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

Signed for and on behalf of: **Envasses Environmental Consultants Limited**
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Signature: _____ **Date:** 24/05/2023

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED
24 MAY 2023
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Certification by Proponent

We, **Nitro Chemicals Limited,** hereby confirm that this Environmental Impact Assessment Study Report has been prepared and submitted to NEMA with our authority as the proponent.

Signed for and on behalf of: **Nitro Chemicals Limited**

Name and title of the signatory:

Signature: _____ **Date:** 30/05/2023

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ACKNOWLEDGEMENTS

The preparation of this EIA Study Report was made possible by a collaborative effort involving the proponent, consultant, neighbors and other project stakeholders. We thank the proponent, Nitro Chemicals Limited, for providing the requisite logistical, financial, human resources and documentation on the proposed project as well as facilitating the stakeholder engagement process.

Further, we acknowledge the support of the Rabai Sub-County Administration and particularly the Assistant County Commissioner (Ms. Fatuma Sarai) and the area Chief (Mr. Anthony Jao) for mobilizing the community and stakeholders for the meetings. We are also indebted to the community members, government agencies and local leaders for their participation in the meetings.

Sampling and analysis of baseline environmental media quality i.e., air, noise and soil were undertaken by Lahvens Limited. The consultants are grateful for their invaluable input in the preparation of the EIA Study Report.

EXECUTIVE SUMMARY

In 2022, Nitro Chemicals Limited conducted a Summary Environmental Impact Assessment Project Report (SPR) for the proposed project and an approval issued by National Environment Management Authority (NEMA (Annex 1). However, stakeholders contested the process and demanded a scoping and screening activity which demonstrated that the project was high risk and an ESIA study was required. Consequently, the proponent contracted Envasses Environmental Consultants Limited in early 2023 to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed Explosives Storage Facility on Plot L.R. No. Kawala "A'/405 in Kokotoni, Kilifi County. The ESIA is prepared pursuant to Section 58 of the Environmental Management and Coordination Act (EMCA) Cap 387 of the Laws of Kenya. Any other projects which pose high environmental risks is characterized as high-risk projects under the Second Schedule (15) of the EMCA and should therefore undergo an ESIA Study process.

The ESIA report was guided by the Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. Reconnaissance site survey was undertaken on March 2023 for the purposes of assessing baseline conditions and environmental risks associated with the proposed project. The Second Schedule of the EIA/EA Regulations, 2003 informed Environmental screening criteria and the issues considered by experts included ecological, socio-economic, landscape, land-use and water. The methodology used in collecting data included literature review of relevant documentation, photography, interviews and observations during site visits. In addition, baseline environmental data was collected on ambient air, noise and soil tests in collaboration with Lahvens Limited and public consultation strategy included three public engagement meetings with key stakeholders held at the project site.

The results of the assessment indicated that the proposed project will have both positive and negative environmental and social impacts. The positive impacts include; provision of safe storage of explosive material, optimal land use, generation of revenue to both national and county governments in form of taxes and licenses and will be source of income to the proponent. Despite the benefits, the proposed project is expected to result in a number of negative environmental and social impacts at the various stages of implementation.

During the construction phase, there are various environmental and social concerns that include; changes in land use, high demand of raw materials, water demand and effluent generation, solid waste generation and management, occupational safety and health risks, air and noise pollution. This report recommends the proponent to apply for change of user from the County Government of Kilifi, source construction raw materials from licensed sites as per EMCA, procure quantity based of the Bill of Quantities, sensitize workers on need to conserve available water resources, install bio-digester to manage domestic effluent and comply with the provision of the Environmental Management and Coordination (Water Quality) Regulations, 2006.

To mitigate the impact of solid wastes during construction phase, the proponent is advised to provide adequate waste collection bins with capacity for segregation, procure services of NEMA licensed waste handler for disposal, sensitize construction workers on the process of collection and disposal of waste and comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006. In addition, the inherent occupational safety and health risks can be mitigated by registering the site as workplace with the Directorate of Occupational Safety and Health Services (DOSHS), obtaining insurance cover for the workers at the site, providing adequate Personal Protective Equipment (PPE) and enforcing on their use, providing fully stocked first aid kit and trained personnel, regulating the entry of visitors to the construction site by deploying adequate security measures and complying with the provisions of the Occupational Safety and Health Act, 2007.

Air and noise pollution at the construction sites are inevitable and therefore, the proponent is advised to sprinkle water at unpaved access roads to suppress dust, install dust screens around the project site, monitor the fugitive emissions and ensure compliance with the limits set under the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014, ensure construction related works are limited to day time hours (8am to 5pm), sensitize truck drivers to switch off the engines when not in use and avoid unnecessary hooting and comply with the provisions of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

At the operation phase, the anticipated negative environmental and social impacts include; insecurity, safety and health risks, fire risks and emergencies, solid waste generation and management, increased water and energy demand. The main insecurity risks for the storage facility include break-ins, vandalism and theft that might arise due to weak security infrastructure and unlimited access to the facility. When the explosive materials are improperly used poses challenges to security of the community as well as the nation at large. However, the project design incorporates security guard house, three main entrances, adequate street lighting and use of steel blast doors. In addition, this report recommends the proponent to secure the facility by erecting a perimeter stone wall and installing chain links, ensure effective alarming systems for the facility, deploy adequate security marshals, train and sensitize security guards on insecurity emergency response and comply with the rules of physical security stocks.

Safety and health risks to workers and neighbors to the site will include explosions due to poor storage and handling, exposure to chemicals, musculoskeletal injuries during offloading and fire outbreaks. All these risks have the potential to cause permanent disability financial loss or even death and hence the management should be committed to ensuring safety and health of workers and neighbors by sensitizing drivers to ensure red flag of at least 45cm square is affixed to the front and rear of vehicle during loading and transit of the explosives, providing adequate PPEs and enforcing on their use, ensuring that barrels of explosives are securely fixed and wedged to prevent movement, conducting first aid training and providing well stocked first-aid kits, developing and implementing an emergency response plan, ensuring on arrival explosives are transferred without delay from the vehicle to the place of storage, complying with the provisions of the Occupational Safety and Health Act, 2007 and the Explosives (Blasting explosives) Rules Cap 115, 1962.

During the operation of the explosive magazines, fire hazards are real threat that must be accorded adequate attention. Potential sources include improper handling of the explosives, faults, external ignition and accidents during transportation of explosives. To mitigate the potential of fire outbreak, the proponent is advised to ensure the explosives are not stored directly against interior wall for ventilation reason, ensure access to the storage facility is controlled, provide adequate firefighting equipment and ensure servicing is regularly done by accredited service provider, clearly mark fire assembly point, clearly display and implement a fire and emergency evacuation procedure, conduct regular fire drills, clearly display warning signage at appropriate sections of the facility, sensitize drivers to observe the speed limits and comply with the provisions of Occupational Safety and Health Act, 2007.

During operations, solid waste generated will include paper, plastics, cartons, wrapping and organic wastes among others. Some of these wastes if poorly disposed might cause nuisance to the environment and general public as they may harbor disease causing pathogens. The management is recommended to procure adequate color coded waste collection bins, contract NEMA licensed waste handler to dispose of the waste and comply with the provisions of the Environmental Management

and Coordination (Waste Management) Regulations, 2006 and the Sustainable Waste Management Act, 2022.

Water will be required for the purposes of drinking, sanitation and general cleaning. The anticipated workforce will release effluent approximately 70% of the total water consumed. Further, energy will be required for lighting and transportation purposes and during operations it will be sourced from National Grid and fuel used during transportation of explosives to the site. Kenya is water stressed country with low capita annual freshwater endowment thus the proponent is recommended to install water saving systems, carry out regular inspection of water distribution network and sensitize workforce on need to conserve water. Further, the proponent should harness solar energy, use energy saving bulbs, keep records of power consumption to inform substantial practical guidelines to enhance energy efficiency and create awareness on energy conservation methods.

A decommissioning phase is possible in the event of end of project life, closure by government agencies due to non-compliance with environmental and health regulations, an order by a court of law due to non-compliance with existing regulations, natural calamities and change of user of land. The associated negative impacts during the possible decommissioning of the storage facility include safety and health risks, insecurity, waste generation, soil contamination and loss of employment. The proponent will prepare and submit a due diligence decommissioning audit report to NEMA for approval at least three (3) months in advance.

In conclusion, the proposed project is considered beneficial as it will enhance safety for transportation and storage of the explosive materials, optimize the use of land and generate revenue to the government through taxes and licenses and will be source of income to the proponent. However, despite the benefits there are environmental and social concerns that will arise during project implementation that will include, safety and health risks, physical insecurity, fire risks and emergencies, increased water and energy demand, air and noise pollution and waste management.

The ESIA study proposes a suite of Environmental Management Plan to mitigate the anticipated negative impacts and enhance the environmental performance during project implementation. 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 as per the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

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LIST OF ACRONYMNS

AAGR	Average Annual Growth Rate
ANFO	Ammonium Nitrate-Fuel Oil
CIDP	County Integrated Development Plan
DOSHS	Directorate Occupational Safety and Health Services
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Co-ordination Act
ESIA	Environmental and Social Impact Assessment
GDP	Gross Domestic Product
HCV	Heavy Commercial Vehicles
KNBS	Kenya National Bureau of Statistics
L.R	Land Registration
NEMA	National Environment Management Authority
OSHA	Occupational Safety and Health Act
TBD	To Be Determined
TOR	Terms of Reference

1 INTRODUCTION

1.1 Background information

In Kenya, the construction industry was valued at 16.6 billion as of 2021 and during 2023-2026, it's expected to achieve an AAGR of more than 5% according to the Kenya construction market research report. At the base of this growth is the quarry industry sector which increased the GDP by 91.8 Billion Kenyan Shillings in 2021 compared to 2018 according to Kenya National Bureau of Statistics. The growth has triggered an increase in demand for aggregates and expansion of quarrying operations. To satisfy the growing need, the quarry industry considers blasting as an essential component for the success of uncovering the mineral deposits and since these rocks are typically found deep below the earths' surface, explosives are commonly used to easily and sufficiently extract the minerals in large quantities. The most commonly explosives used in quarry industry include ammonium nitrate-fuel oil (ANFO), a mixture of ammonium nitrate and diesel fuel, gelignite, detonators, water-gel, emulsion and capped fuse explosive systems.

It is important to note that the explosives are generally manufactured by combing various chemicals that have the potential to react violently if proper safety precautions are not taken. The choice of explosives used depends on several factors that include site specific requirements, desired blast results and environmental regulation. The already manufactured explosives should therefore be typically stored in a secure and controlled environment to prevent accidental explosions.

Currently, in Kenya the explosive materials are typically transported to the blast site via a specially-designed vehicle. These poses high risks due to enormous amount of energy that can be rapidly converted into gases at high temperature and pressure during transportation of materials. Consequently, the proponent, Nitro Chemicals Limited proposes to construct two go-downs and three magazines for storage of explosive materials to ease the logistical costs and enhance safety and health risks. Furthermore, the establishment of the Explosives Act, 1962 (Rev. 2012), clearly outline measures on the safety and health risks associated with transport and storage of explosives that the proponent will adhere to.

In 2022, Nitro Chemicals Limited conducted a Summary Environmental Impact Assessment Project Report (SPR) for the proposed project and an approval issued by NEMA (Annexure 1). However, stakeholders contested the process and demanded a scoping and screening activity which demonstrated that the project was high risk and an ESIA study was required. Consequently, the proponent contracted Envasses Environmental Consultants Limited in early 2023 to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed Explosives Storage Facility on Plot L.R. No. Kawala "A'/405 in Kokotoni, Kilifi County consistent with the Second Schedule (15) of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya. To fulfill this legal requirement, minimize environmental impacts including hazards impact due to construction and operation of the go-downs and explosive magazines as well as ensure sustainability of the development activities, the proponent contracted Envasses Environmental Consultants Limited in March 2023 to carry out the ESIA Study.

1.2 Overview – Nitro Chemicals Limited

Nitro Chemical Limited is a private owned company established in Nairobi, Kenya to provide industry and chemical allied products merchandise. The proposed parcel of land is located in Kokotoni, Kilifi County under the ownership of Karsan Ramji and Sons Limited and currently, Nitro Chemicals Limited has leased the land for use for a period of 20 years.

1.3 Project location and neighbourhood

The proposed project will be located on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi county at GPS co-ordinates **Latitude 3°54'05" S,** and **Longitude 39°31'32" E** (Figure 1). The site is accessed via

an earth road off the Mombasa-Nairobi Highway at SS Mehta and Sons Company junction and approximately 2km from Kokotoni market.

The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation (Figure 2). The neighborhood depicts mixed land use but predominantly industrial which include quarries. The proposed site is bordered by Karsan Ramji & Sons-Kokotoni quarry to the South, Dhanjal Brothers Limited to the East and residential homes to the West and North

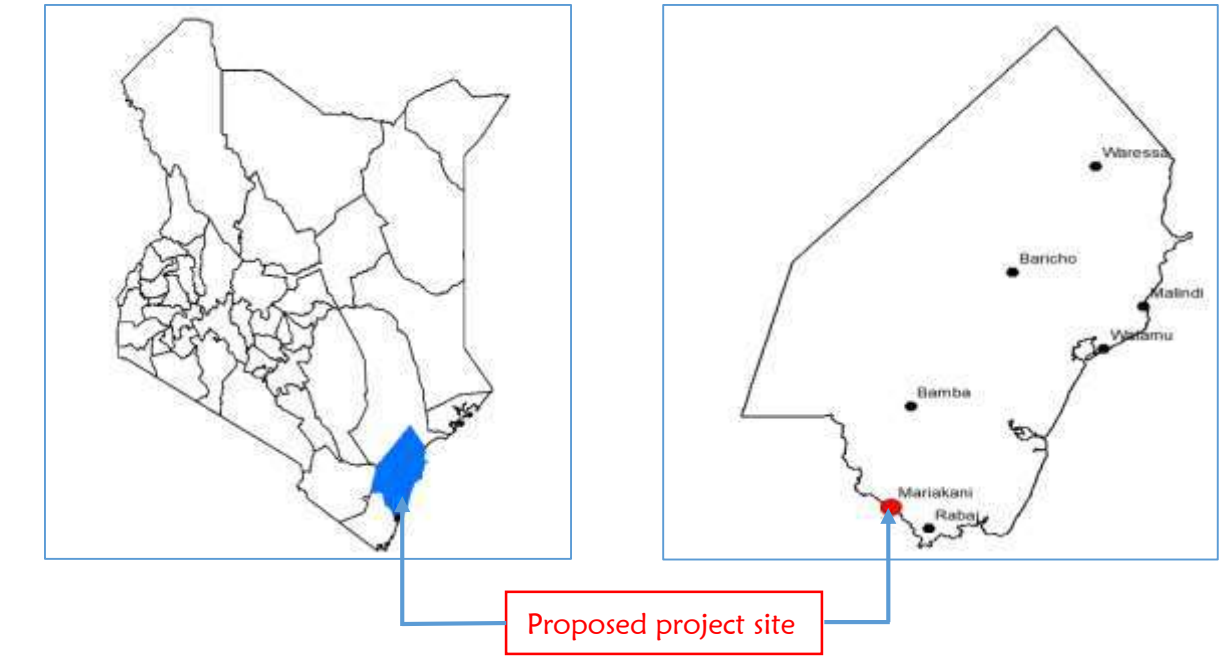

Figure 1: Location of the proposed project (Source: Google Earth, March 2023)

Figure 2: A section of the proposed project site (Source: Site visit; March 2023)

1.4 Project design and description

The proposed project will involve the construction, operation and possible decommissioning of two go-downs, three explosive magazines and other auxiliary facilities (office/store, truck parking area, guard house, water storage tank and fire assembly area).

The two go-downs will be built on ground level and mezzanine floor to house ammonium nitrate; and the three (3) magazines of holding weight capacity of 100 tons (where one (1) magazine will hold 20 tons and two (2) magazines will hold 40 tons each) explosive weight increasing its safety factor. The magazines will be designed in a special structure to store low or high explosive materials used in mining and demolition applications. One of the magazines will house detonators material while the other two magazines will house gelignite materials.

An explosive is a material that, under the influence of thermal or mechanical shock, decomposes rapidly and spontaneously with the evolution of large amounts of heat and gas. Low explosive includes black powder and cellulose which when set off undergo relatively slow auto combustion and evolve large volumes of gas in a definite and controllable manner. High explosives can further be categorized into primary, high explosives and secondary high explosives. The primary explosives are very sensitive and used generally in small quantities in detonators and percussion caps to set off larger quantities of secondary high explosives. Secondary high explosives, chiefly nitrates, nitro compounds, and nitramines, are much less sensitive to mechanical or thermal shock, but they explode with great violence when set off by an initiating explosive. The chief secondary high explosives manufactured for commercial and military use are ammonium nitrate blasting agents and 2,4,6,-trinitrotoluene (TNT).

Further, the storage facility would feature strict occupational safety and security issues to mitigate the potential adverse impacts where the magazines will be waterproofed, access limited and surrounded by a buffer zone of 200 to 500 feet including earth bunk and concrete line drain channels

and three entrances. Moreover, the design will feature adequate street lighting, steel blast doors, explosion alarms, special ventilation louvers and smoke detectors.

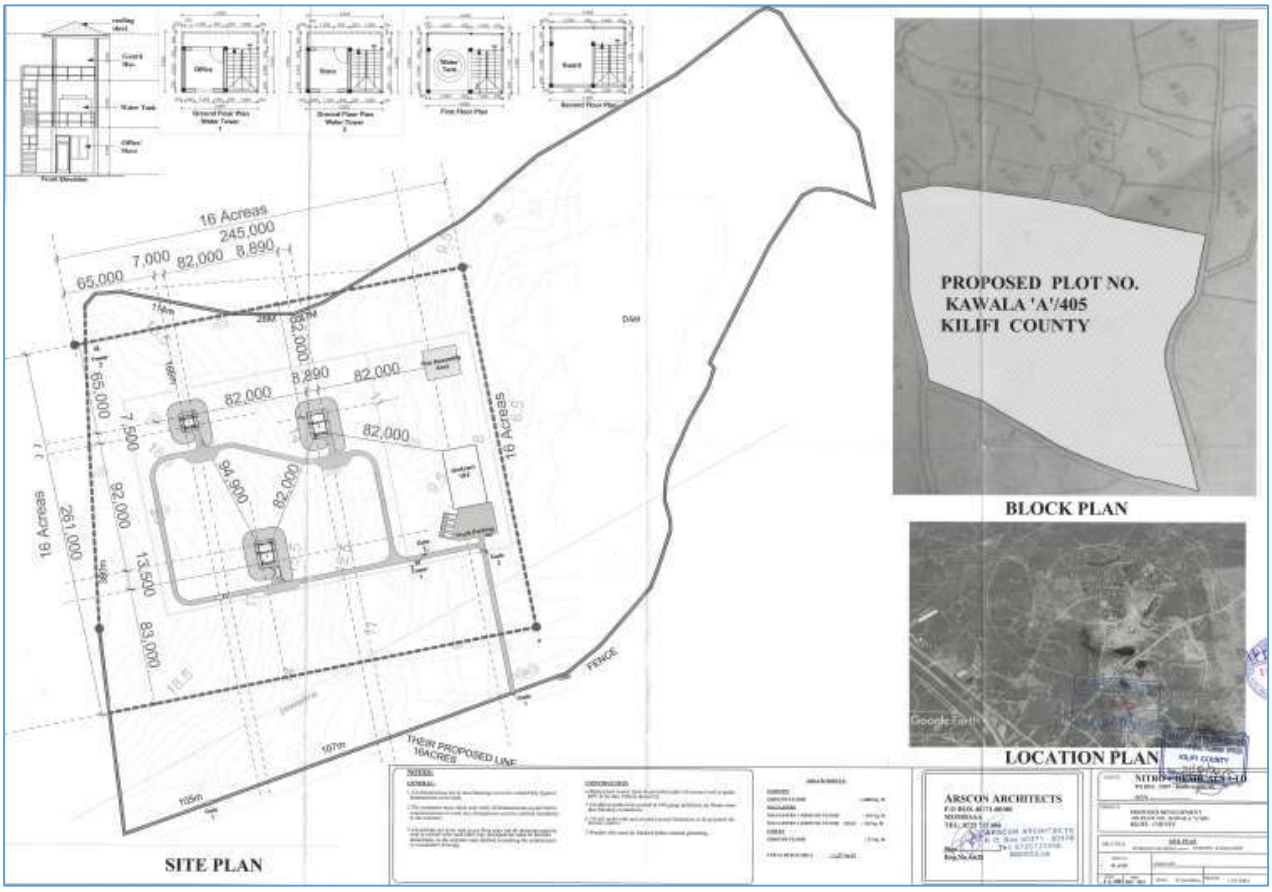

Figure 3: Site layout plan for the proposed project (Source: Arscon Architects, December, 2022)

1.5 Study approach and methodology

1.5.1 Introduction

The EIA was prepared based on the guidelines from the Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. 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 for approval. The scoping report and TORs were approved on 30th March 2023 and the consultants began the preparation of the ESIA study report.

1.5.2 Data collection

The consultant used various data collection method that included literature review of relevant documents, observations and photography during site visit. Baseline environmental data was collected on ambient air, noise levels and soil tests in collaboration with Lahvens Limited. Site visits were undertaken in March 2023 for purposes of reconnaissance, assessing the baseline and environmental risks associated with the proposed project as well as applicable environmental safeguards and standards. Environmental screening criteria was informed by the Second Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. As per this Schedule the issues considered by the experts were ecological and socio-economic issues, landscape changes, land use character and water.

Table 1: Summary of the results of screening

Criteria	Results
Ecological considerations	– Excavation will occur – No endangered species of trees and plants found at the site – No endemic species reported on site
Socio-economic considerations	– Provision of safe storage of mining explosive materials – Employment creation – Optimal use of land – Income to the proponent – Revenue to the government through taxes & licenses – No cultural or heritage issues at the site – No relocation of any inhabitant
Landscape impacts	– The proposed project will not impact significantly on the landscape of the area
Land use	– The proposed project land use is industrial
Water	– The construction and subsequent operations of the proposed project will increase water demand and impact on water resources

In addition, public participation was carried through three public meetings to inform the key stakeholders and communities about the proposed project. The objective of the meeting was to establish a participatory process for identifying potential impacts and benefits of the project. The information gathered was subsequently synthesized and incorporated into the ESIA Study Report.

1.6 Baseline monitoring of environmental media

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

1.6.1 Ambient air quality monitoring

Mobile, static and active monitoring was done by use of real time gas detector-pump suction equipment LB-MS4X which integrates the main ambient gases and meteorological parameters.

The gas sensitive semiconductor sensor uses proprietary sensing material, built in automatic Correction (ABC) and interference rejection. This combination results in ppb resolution and a highly linear response. The gas sensitive electrochemical sensors generate nano-amp currents proportional to the gas concentration. Aeroqual uses low noise electronics to capture these signals resulting in low detection levels. The non-dispersive infrared sensor uses infra-red light, a narrow band-pass filter and photodiode to measure the intensity of light at the gas absorption band. The light intensity is proportional to the gas concentration.

The laser particle counter for Particulate Matter measurements uses optimized signal processing using low noise electronics added algorithms to correct for interferences. An aerosol particle counter works on the principal of either light scattering or light blocking. An aerosol stream is drawn through a chamber with a light source (either Laser Based Light or White Light). When a particle is illuminated by this light beam, it is redirected or absorbed. Light scattered by a single particle in a specific direction in relation to the original direction has a unique signature which relates to the size of the particle. This allows for sizing and counting of individual particles

1.6.2 Baseline noise level measurements

Noise emission survey was achieved via initial examination of existing road traffic and other noise sources of significance. Noise levels was evaluated using a Sound Level Meter Model AWA 5636 IEC 61672 – 1:2013 class 2 with a built-in ῶoctave / octave band filters which does real time 1/1 and 1/3 octave analysis 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 over 10 minutes 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 its calibration period, at the time of monitoring. In addition, the equivalent noise level (LAeq), the maximum sound pressure level (Lmax) and the minimum sound pressure level (Lmin) during that measurement period were recorded. Factors to consider 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 that measurement period.

1.6.3 Soil sampling and analysis

Soil samples were obtained at the proposed project site and analyzed for PH and heavy metals including Cadmium, Chromium and Arsenic. The purpose of soil sampling and analysis was to give a general indication of the existing potential contaminants and for future monitoring of the impact of the proposed project.

1.7 Stakeholder mapping

Prior to commencement of the ESIA 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 in consultation with the proponent, the County Government and the Ministry of Interior and National Administrations. The consultants then prepared a comprehensive list of all the stakeholders in consultation with the proponent and categorized them based on the basis of interest and influence (Figure 4).

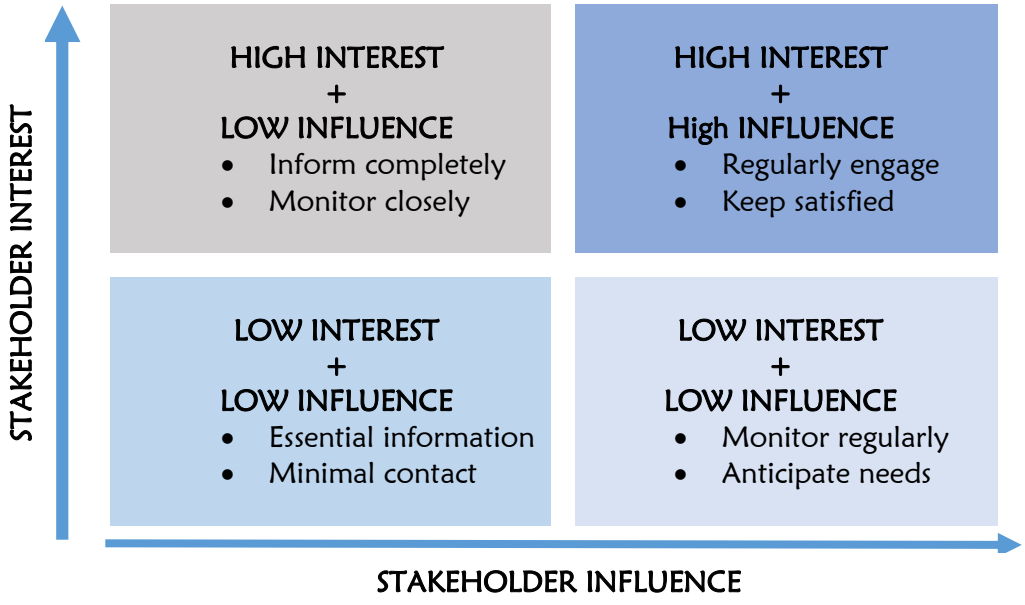

Figure 4: Stakeholder mapping considerations based on interest and influence in the proposed project

- Low interest, low influence – those to keep informed
- High interest, low influence – those to involve and consult with
- Low interest, high influence – powerful stakeholders to engage
- High interest, high influence – partners to collaborate with

Seven key stakeholder categories were identified. These are;

1. County and National Government Representation
2. Lead agencies (Department of Mines and Geology)
3. Civil Society
4. Local Community
5. Faith Based Institutions
6. Special Interest Groups
7. Media

The consultant then identified the key contact persons within the stakeholder categories who will be engaged throughout the ESIA study process. The identification of the key contact persons was done in consultation with the proponent, lead agencies, the County Government of Kilifi, Ministry of Interior and National Administration.

Further, the consultant identified other stakeholders who may not be apparent but needed to be consulted and analyzing the role of each stakeholder in the ESIA study process as well as project implementation. Finally, the consultant determined the tools for engaging with each stakeholder including language of communication and allocation of resources to ensure meaningful participation of the stakeholders in the ESIA process.

Following the stakeholder mapping and analysis, three public participation meetings was held to document the views and concerns with regards to the proposal.

1.8 Project budget

The project budget is Kenyan Shilling Fifty-four million five hundred and sixty-six thousand eight hundred and fifty-four only (KES 54,566,854). The statutory charge of 0.1% payable to NEMA is therefore KES 54,567. The payment is done on the e-citizen platform after receipt of an invoice from NEMA (Annex 17).

2 BASELING INFORMATION OF THE PROPOSED SITE

2.1 Introduction

This chapter presents the baseline conditions of the proposed project site assessed and documented to form a basis for impact monitoring plans and improvement of the environmental and social performance of the proposed project during implementation. The data was collected from both primary and secondary sources that included site visits, baseline media sampling and literature review. The information presented include bio-physical and socio-cultural environment.

2.2 Climatic conditions

Kilifi County receives bimodal rainfall pattern which is greatly influenced by the Migratory Inter Tropical Convergence Zone (ITCZ) characterized by monsoon winds. The coastal belt receives an average annual rainfall of about 900mm to 1,300mm while the hinterland receives average annual rainfall of about 300mm to 900mm. The short rain season is experienced in the months of October to December while the long rains are experienced in the months of March to May (KICDP: 2023-2027). During the dry season, the weather is generally hot and dry, with temperatures ranging between 25°C to 35°C (Figure 5) ad relative humidity ranging between 40% and 60% while during wet season, the weather is relatively cooler with temperatures ranging between 20°C to 30°C and relative humidity usually ranging between 60% and 80%. The county also experiences a very important wind field with relatively moderate wind speeds ranging from 4.8Km/h along the coastal strip to 12km/h in the hinterlands.

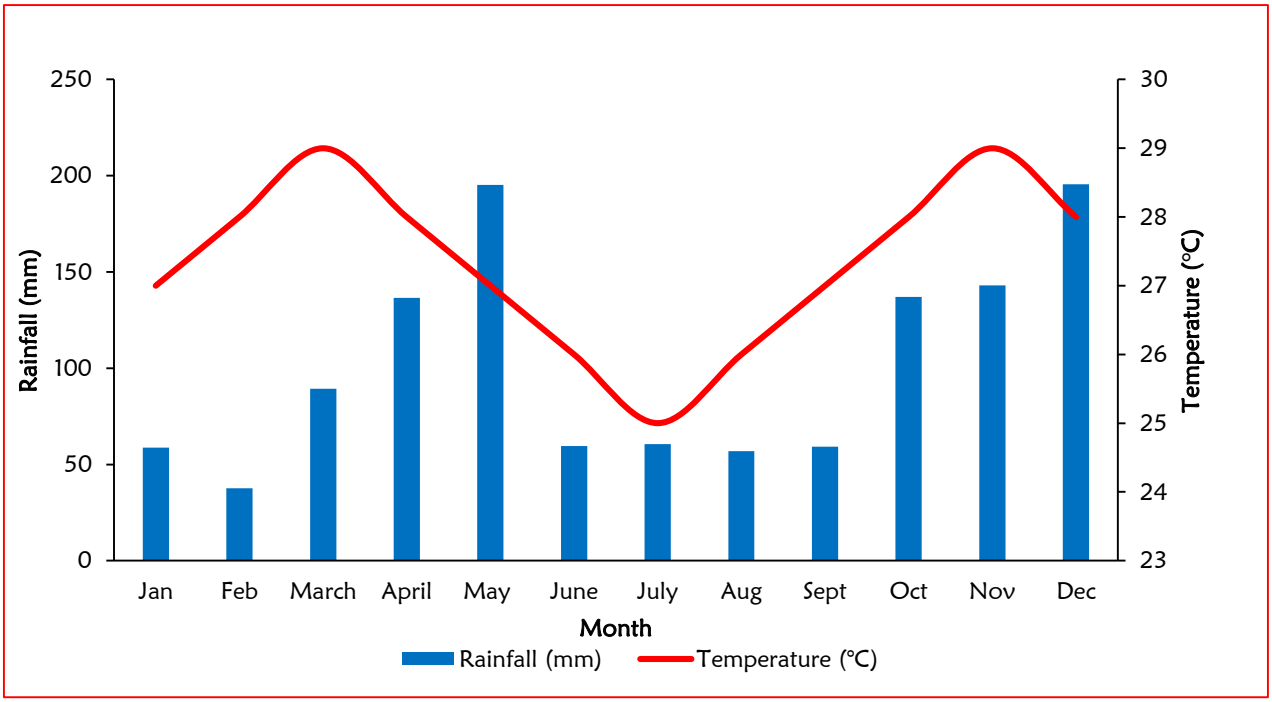

Figure 5: Average rainfall and temperature distribution for Kilifi County (Source: World Weather Online, 2022)

2.3 Topographic features

Kilifi County has four major topographic features where the first one is the narrow belt, which forms the coastal plain that lies below 30m above sea level with a few prominent peaks on the western boundary such as the Mwembetungu hills. The second is the foot plateau that lies to the east of the coastal plain and falls between 60m and 150m altitude. The third is the coastal range which falls beyond the foot plateau between 150m to 450m altitude and has distinct low-range sandstone hills which include Simba, Kiwava, Daka, Wacha, Gaabo, Jibana, Mazeras and Mwangea. The forth is the Nyika Plateau which rises from 100m to 340m above sea level covering about two-thirds of the

county area on its western side. This area constitutes the arid and semi-arid areas of the county, which are suitable for ranching. The drainage pattern of the county is formed by one permanent river, a number of ephemeral rivers and streams which drain into Indian Ocean (KICDP; 20233-2027).

2.4 Geology and Soils

Geologically, the county is described by a system of sedimentary and basement rocks lying in a north easterly to south easterly direction to the coastline. The type of rocks formed include basement rocks having metamorphosed from limestone and sandstones, sedimentary rocks mainly include Duruma sandstones, Jurassic rocks exist at altitude of 120m in Njora and 130m at Ndovuni, Jurassic shales are prone to erosion at 120m of altitude, carboniferous rocks that include sandstones and shales and quaternary sediments located on the immediate coastline areas.

The county has varied soil types in terms of texture, depth, physical and chemical properties though with poor fertility. The types of rocks formed determine the type of soils of which some have more of less similar chemical properties to the rocks. The rock types include (a) coastal plains-developed on coral limestone and Kilindini sands; (b) coastal Uplands composed of varied types due to the existing type of rock. They include Maharini sands, Jurassic shales, Kambe limestone, Mazeras sandstone and Mariakani sandstones. (c) Erosion Plains where most of the areas in Kilifi County are prone to erosion due to the high local relief in coastline areas.

2.5 Minerals

There are various minerals found within Kilifi county and they include coral rocks, limestone, gypsum, barites, manganese, rubies, iron ore, titanium, silica, salt and pozzolana. The titanium ore is highly found in Mambrui, Vipingo and Sokoke areas and its' deposits cover approximately 450.7km. However, the mining industry faces challenges that include conflict with local communities due to non-involvement, non-compliance to environmental regulations by the mining companies, issues of land use conflicts and ownership status and lack of inadequate policies and procedures at the County level.

2.6 Land use

The land use patterns and economic activities are shaped by its unique geography, climate, and natural resources. The main economic activities in Kilifi County include tourism, fishing, agriculture and mining. Tourism is a key sector in the County which plays a vital role in improving the economy. The county is endowed with sunny and sandy beaches, magnificent landscapes, tropical and marine forests and swamps that are home to endemic flora and fauna, rich cultural and historical heritage that includes Swahili/Arab and Mijikenda cultures, world heritage sites like the Kaya forests and archaeological monuments such as those in Gede, Malindi, Takaungu, Mnarani and Rabai, dating back to the slave trade period.

In addition, the county has several forest reserves, including Arabuko-Sokoke Forest Reserve, which is one of the largest coastal forests in East Africa. The forest is home to several rare and endemic species of flora and fauna and is an important tourist attraction. The forest also provides several ecosystem services such as carbon sequestration, water regulation, and soil conservation. Mining is a relatively new economic activity in Kilifi, with several mineral deposits, including titanium, manganese, and iron ore. However, mining activities are still in their early stages, and their impact on the local economy and environment is yet to be fully realized. The proponent will apply for change of use at the County Government of Kilifi.

2.7 Demographics

The proposed site is located in Kokokoni, Kilifi County and based on the 2019 Kenya Population and Housing Census report, the county has a total population of 1,453,787 of which 704,089 are males, 749,673 females and 25 intersex persons. Rabai Sub-county where the project site is located has a total population of 120,813 (58,571 females and 62,242 males) and population density of 581 persons/km^2. The coastal region is culturally heterogeneous and the largest ethnic group is Mijikenda which comprises of nine-sub-tribes namely: Giriama, Digo, Rabai, Duruma, Kauma, Chonyi, Kambe, Ribe, and Jibana. In addition, the urban centers' population of the region has been on rise due to the rural urban migration, tourism and influx of foreigners.

2.8 Vegetation cover

Vegetation cover at the project site mainly consists of a few assorted mature trees including mango trees among others (Figure 6).

Figure 6: Section of existing vegetation within the proposed site (Source: Site visit, March 2023)

2.9 Water resources

Kenya is a water stressed country with a low per capita annual freshwater endowment. Access to water and sanitation is low because of limited water resources development and ageing/dilapidated infrastructure. Access to water falls below the Sustainable Development Goal (SDG) targets of universal access. Despite increased investments and improvements in levels of access in the last 5 years, the rapid population increase, urbanization and economic growth strain the existing water resources and infrastructure and hinder efforts towards achieving the sector SDGs.

The main water service provider in Kilifi County include boreholes, wells, springs, rainwater, water bowsers and piped water which is supplied by the KIMAWASCO. KIMAWASCO sources its water from Baricho water works located about 50km North of Malindi and pumps about 2,000cubic meters per day to the area. The proposed project site is located within the surrounding of existing quarry facilities and water is sourced from boreholes, reticulated supply and exhausted mine pits (dams) for suppressing dust on unpaved access areas (Figure 7). However, the daily availability of water at the project site cannot be guaranteed and the proponent will drill a borehole to provide water during the construction period and supplemented by water bowsers.

Figure 7: A section of the pullover water in a decommissioned quarry within the proposed site surroundings (Source: Site visit, 2023)

2.10 Effluent generation and management

The water use in the county is needed for general cleaning and sanitation purposes among other uses and an estimate of 70% of the water usage is generated as effluent especially from the sanitary facilities. The access to basic sanitation facilities remains formidable challenge across the county thus hindering effective effluent management. The county has no sewerage treatment infrastructure and the toilets coverage within the county is estimated at 67% and 30% of households have hand washing facilities resulting to a significant proportion of population in the county with no access to basic sanitation facilities especially in the rural areas.

2.11 Solid waste management

The main sources of solid waste in Kilifi County are domestic, commercial ventures, hotels, markets, industries and institutions including health facilities. All types of waste are transported to designated transfer stations awaiting disposal in the main dumpsites including Mtondia, Casuarina and Katolani.

2.12 Infrastructure

2.12.1 Transport Network

Kilifi County is served by both classified and non-classified roads. The road networks are greatly influenced by existence of important industrial, tourism and commercial centers. Most rural areas in the county are served with a dilapidated and narrow road network. The proposed project site is accessed via an earthed road (Figure 8) approximately 1 kilometer off the Mombasa-Nairobi Road Highway.

Figure 8: Section of the access road to the proposed site (Source: Site visit, Marh 2023)

2.12.2 Energy Supply

The county has several power stations which include Kilifi 132/133kV and Rabai 220/132/133 kV. The other several transmission small substations are connected to the 132kV line from Juja Road to Rabai, however serve only industrial loads.

Kokotoni area is mainly supplied by electricity from the national grid supplemented with diesel power generators in times of power outage. A number of facilities have also ventured into harnessing solar energy by use of solar panels and accumulators. In the rural areas, main energy sources are fuel wood, charcoal and paraffin. For the proposed project, energy will be fuel for vehicle and solar for lighting.

2.12.3 Telecommunication

The proposed project area is well served with communication network including the main mobile phone services such as Safaricom, Airtel and Telkom.

2.13 Baseline environmental data

2.13.1 Ambient air quality measurements

There were detectable levels of particulate matter (PM10 & PM2.5) within the project site. Nitrogen dioxide (NO_2), Sulfur dioxide (SO_2) and Carbon monoxide (CO) concentrations remained below detection limits (<0.05ppm&mg/m^3 respectively). The particulate matter recorded at the four selected survey points resulted from fugitive dust from the surrounding quarry activities. The weather conditions at the time of assessment were characterized by little showers and these conditions could have contributed to the concentration recorded at the study location. However, the gaseous and particulate parameters measured were all within the stipulated standards under the First Schedule of Environmental Management and Coordination (Air Quality) Regulations, 2014 (Table 2).

Table 2: Baseline air quality measurements for the proposed project site (Source: Lahvens Limited, 2023)

Project site	CO (mg/m^3)	NO_X (ppm)	SO_2 ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
PB1	0.28	0.028	0.018	39	48
PB2	0.35	0.031	0.022	42	52
PB3	0.27	0.037	0.020	33	40
PB4	0.30	0.026	0.019	37	45
EMCA (Air Quality) Regulations, 2014	**4.0**	**0.5**	**0.191**	**75**	**100**

2.13.2 Noise level measurements

The quantity of noise measured and recorded from the four survey locations complied with the EMC noise and vibration regulations 2009 maximum Noise Level Permitted (Leq) during the day. Baseline results obtained at the monitoring locations showed that all the locations are noise insignificant areas hence there is no threat to the sensitive receptors before implementation of proposed construction of the mining explosives storage facility. Ambient conditions existed at the time of the survey during the day. The existing identifiable sources of noise emissions included environmental noise (wind breeze), traffic noise from heavy trucks accessing Karsan Ramji & Sons-Kokotoni and Dhanjal Brothers Limited quarries. Quarry activities / operations including drilling, blasting, and loading processes were audible during the survey therefore contributing to the noise levels recorded.

2.13.3 Soil sampling and analysis

Soil sampling and analysis were carried out in May 2023 and the results are as indicated in table 3 below. Kenya has not developed a specific environmental legislation on soil standards but relies on existing legislation on pollution such as the Environmental Management and Coordination (Water Quality) Regulations, 2006 and the Kenya Constitution 2010 to prosecute environmental crimes on soil contamination.

Table 3: Baseline soil tests for the proposed project site (Source: Bureau Veritas, 2023).

Test	Method	Results (mg/kg)	Soil Remediation Guideline value
pH @ 25 ^{0}C	EPA 3050B	6.10	Min 6-Max 8.5
Total Organic Carbon	ISO 19822	5.34	No guideline
Calcium	EPA 3050B	1.28	No guideline
Magnesium	EPA 3050B	43.48	No guideline
Phosphorus	EPA 3050B	32.14	No guideline
Potassium	EPA 3050B	0.03	No guideline
Nitrogen	ISO 13878	2.19	No guideline
Cadmium	EPA 3050B	1.46	No guideline

Test	Method	Results (mg/kg)	Soil Remediation Guideline value
Chromium as Cr	EPA 3050B	2.80	No guideline
Lead as Pb	EPA 3050B	1.40	No guideline
Nickel	EPA 3050B	2.66	No guideline
Mercury	ISO 16772	<0.01	No guideline

3 IDENTIFICATION OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

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

3.1 Positive impacts of the proposed explosives storage facility

The proposed project will have the following benefits;

1. **Provision of safe storage of explosives materials used in quarrying**
   The proposed project will provide safe storage of explosives material used in mining and construction industry within Kilifi County and other regions. The construction of storage facility will reduce logistical and transportation costs for the users. In addition, the design structure of the facility allows for increased safety factor thus minimizing the adverse environmental, social and health risks associated with use and storage of the mining explosives.

2. **Provision of employment opportunities**
   The proposed project will provide employment opportunities to both skilled and non-skilled personnel throughout its life cycle. Already the proponent has employed various consultants to develop the plans and preparation of the ESIA study report.

3. **Optimal land use**
   Development of the proposed project will make optimal use of land considering that the land currently is undeveloped.

4. **Income to the proponent**
   The facility through its operations will accrue income to the proponent thus enabling expansion of business and creating more employment opportunities to the locals.

5. **Revenue to the government**
   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 country.

3.2 Anticipated negative environmental and social impacts

Alongside the positive impacts, the proposed project is expected to result in a number of negative environmental and social impacts at the various stages of implementation as discussed below.

3.2.1 Negative impacts at the construction phase of the proposed project

3.2.1.1 Changes in land use

The proposed site is currently undeveloped and land use within the surrounding area is predominantly industrial. However, the proponent proposes to set up a storage facility which is inconsistent with the current land use. To ensure compliance, the proponent has already applied to the County Government of Kilifi as per the Physical and Land-use Planning Act, 2019 and the Ministry of Mining, Blue Economy and Maritime Affairs as per the Explosives Act Cap 115 for approvals (Annexure 7).

Recommended mitigation measures

1. Apply for and obtain a change of user from the County Government of Kilifi

2. Comply with the provisions of pertinent approvals

3.2.1.2 High demand of raw materials

The establishment of the two go downs and three magazines will require construction materials such as sand, ballast, murram and steel. These materials will be sourced from the environment and might have a negative impact at their points of origin.

Recommended mitigation measures

1. Source raw materials from sites that are licensed as per the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya
2. Have a procurement plan based on the Bill of Quantities prepared by a Quantity Surveyor to avoid potential oversupply of materials and wastage
3. Re-use construction materials such as wood and metal cuttings which can be salvaged

3.2.1.3 Loss of vegetation cover

The project site is currently undeveloped and the vegetation cover is largely made of shrubs and some few indigenous trees. In order to pave way for construction works, clearing of vegetation will be carried out. Although grass and very few trees mainly cover the project site, the proponent will take proper measures to ensure minimal disturbance of the flora.

Recommended mitigation measures

1. Landscaping where necessary after completion of the project

3.2.1.4 Water demand and effluent generation

During construction, water will be required for concrete mixing, casting and curing works, drinking and sanitation purposes. Based on the projected workforce at the construction, water demand at the site will be at most 20m^3 per day. Out of these, approximately 10% (2m^3) will be used for domestic purposes and will generate 1.4m^3 of effluent which will need to be disposed of. The rest of the water soaks into ground areas within the project site. Poor disposal of the wastewater generated has potential to pollute underground water resources.

Recommended mitigation measures

1. Sensitize the workers on the need to conserve available water resources
2. Install a bio-digester to manage the domestic effluent
3. Record and monitor the amount of water being abstracted from the borehole
4. Procure and deliver to the site mobile toilets from a NEMA licensed waste contractor
5. Comply with the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006

3.2.1.5 Solid waste generation and management

Construction activities will generate significant quantities of solid waste in form of biomass, overburden, construction materials such as wood, metal cuttings and domestic waste such as plastic containers and wrappings among others. These will need to be disposed off appropriately as poor solid waste management can create breeding grounds for disease causing pathogens.

Recommended mitigation measures

1. Procure and provide adequate solid waste collection bins with capacity for segregation within the construction site
2. Provide a sizeable central solid waste collection with chambers to accommodate separated waste
3. Sensitize construction workers on the Integrated Solid Waste Management System

4. Procure the services of a NEMA licensed waste handler to dispose off the solid waste
5. Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006

3.2.1.6 Occupational safety and health risks

Construction related works are likely to expose the workforce visitors and the neighbors to safety and health risks such as trips and falls, musculoskeletal injuries, air and noise pollution among others. It is also expected that there will be accumulation of various streams of waste especially construction debris that might be detrimental to the general public if poorly managed.

Recommended mitigation measures

1. Register the site as a workplace with the Directorate of Occupational Safety and Health Services (DOSHS)
2. Obtain insurance cover for the workers at the site
3. Provide adequate and appropriate Personal Protective Equipment (PPE) to workers and visitors to the site and enforce on their use
4. Provide employees with correct tools and equipment for the jobs assigned and train on their use
5. Ensure moving parts of machines and sharp surfaces are securely protected with guards to avoid unnecessary contacts and injuries
6. Provide first aid services and trained first aid personnel
7. Regulate the entry of visitors to the construction site by deploying adequate security measures
8. Comply with the provisions of the Occupational Safety and Health Act, 2007

3.2.1.7 Air pollution

Air pollution during the construction phase will be in form of dust generated during excavations and from unpaved access road during delivery of construction materials to the site. The most relevant pollutant considered is particulate matter because of its potentially significant increase during the construction phase. 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 in excess of 100 $\mu g/Nm^3$ as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014.

Recommended mitigation measures

1. Sprinkle water at unpaved access areas to suppress dust
2. Install dust screens around the project site during construction
3. Provide and enforce the use of appropriate PPEs to workers and visitors to the project site
4. Ensure machinery/equipment and trucks are maintained and serviced regularly
5. Monitor fugitive emissions to ensure compliance with the limits set under the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014
6. Comply with Environmental Management and Coordination (Air Quality) Regulations, 2014

3.2.1.8 Noise pollution

The construction works, delivery of raw materials by heavy commercial vehicles (HCVs) and the use of machinery may lead to high levels of noise and vibration within the construction site and the surrounding area. It should be noted that the noise produced during construction will be in keeping with the background noise emanating from the quarrying activities.

Recommended mitigation measures

1. Delivery of raw materials, excavation and construction work should be limited to day time hours only between 8am to 5pm
2. Locate machinery that are likely to produce noise as far as practical from neighboring properties
3. Sensitize truck drivers to avoid unnecessary hooting and running of vehicle engines
4. Comply with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

3.2.1.9 Storm water management

Storm water from the site is likely to affect the construction works especially from heavy rainfall. There will be increased surface runoff due to the impervious areas created during the construction. The impervious areas are more likely to have runoff coefficients as compared to natural areas and this might lead to groundwater contamination.

Recommended mitigation measures

1. Provide adequate drainage systems to minimize and control run-off
2. Limit access road gradients to reduce run-off induced erosion
3. Providing effective short-term measures for slope stabilization, sediment control and subsidence control until long term measures for the operational phase can be implemented.
4. Restrict vehicle access to particular section of the project site to avoid soil compaction

3.2.1.10 Soil and Water Pollution

The proposed construction activities' impact on water and soil quality may arise from spills and poor management of oil, fuel and lubricants at the contractor's vehicle maintenance, garages and fueling areas, which may lead to contamination of soil, underground water through leaching and ground water if it joins the storm drains. During this phase, excavation works will also loosen the soil and expose it to erosive elements of air and water.

3.2.2 Negative impacts during operation phase of the proposed project

3.2.2.1 Security risks

During the operational phase of the storage facility, the main risks include break-ins, vandalism and theft. The physical insecurities might arise due to the unlimited access to the facilities and weak security infrastructure. The improper usage of the explosive materials poses challenge to the security of the community and thus to enhance the security measures, the project design incorporates use of steel blast doors, security guards house, three main entrances and adequate street lighting.

Recommended mitigation measures

1. Secure the facility by erecting a perimeter stone wall and installing chain links
2. Deploy adequate security marshals at the proposed site
3. Train and sensitize security guards on insecurity emergency responses
4. Develop and implement the alarm systems for the facility
5. Comply with the rules of physical security of stocks

3.2.2.2 Safety and health risks

At the operation phase of the warehouses, safety and health risks to workers, visitors and neighbors to the project site will include explosion due to poor storage, exposure to chemicals, musculoskeletal injuries during offloading and fire outbreaks. All these risks have potential to cause permanent disability, financial loss or even death and hence the management should be committed to ensuring safety and health of workers and visitors.

Recommended mitigation measures

1. Provide adequate and appropriate Personal Protective Equipment (PPEs) to workers and enforce on their use.
2. Sensitize drivers to ensure red flag of at least 45cm square is affixed to the front and rear of vehicle during loading and transit of the explosives
3. Ensure that barrels of explosives are securely fixed and wedged to prevent movement
4. Provide and keep an accident/ incident register
5. Conduct first aid training among the workers and provide well-stocked first aid kits
6. Develop and implement an effective emergency response plan
7. Ensure on arrival, explosives are transferred without delay from the vehicle to the place of storage
8. Comply with the provisions of the Occupational Safety and Health Act, 2007
9. Comply with the provisions of the Explosives (Blasting explosives) rules Cap 115, 1962.

3.2.2.3 Fire risks and emergencies

Fire hazards are real threats to the mining explosive storage facility and must be accorded adequate attention and swift action in case of an outbreak. Potential sources include improper handling of the explosives, faults, external ignition and accidents during transportation of explosives. Fire occurrence may lead to death, financial losses and loss of livelihoods for the workers and neighbors.

Recommended mitigation measures

1. Ensure the explosives are not stored directly against interior wall for ventilation reason
2. Develop, clearly display and implement a fire and emergency evacuation procedure
3. Ensure access to the facility is effectively controlled to limit exposure to hazards
4. Procure and provide adequate firefighting equipment such as fire extinguishers, fire hose reels, smoke detectors, fire alarms and fire hydrants and place them strategically within the facility
5. Ensure firefighting equipment are serviced regularly by accredited service providers
6. Clearly mark fire assembly points and display emergency exits
7. Conduct regular fire drills
8. Conduct annual fire safety audit
9. Display warning signage at appropriate sections of the facility
10. Comply with the provisions of Occupational Safety and Health Act, 2007

3.2.2.4 Water demand

Water will be required for the purposes of drinking, general cleaning and sanitation. The anticipated workforce during the operation may release approximately 70% of the water used as effluent from the sanitation facilities. Kenya is a water stressed country with a low per capita annual freshwater endowment thus there is need to conserve the available water resources.

Recommended mitigation measures

1. Install water saving systems such as self-closing taps and low flush water toilets
2. Carry out regular inspection and maintenance of the water distribution network to ensure zero leaks and damages
3. Create awareness on water conservation
4. Undertake domestic water quality analysis of samples from the borehole to ensure conformity with natural potable water standards pursuant to the Environmental Management and Coordination (Water Quality) Regulations, 2006
5. Comply with the Environmental Management and Coordination (Water Quality) Regulations, 2006.

3.2.2.5 Solid waste generation and management

During operations, solid waste generated will include paper, plastics, cartons, wrapping and organic wastes among others from the offices. Some of these wastes if poorly disposed might cause nuisance to the environment and public as they may harbor disease causing pathogens. In addition, the organic wastes can cause effect to the environment because as they decompose they produce methane gas and carbon-dioxide, powerful greenhouse gases known to contribute to global warming.

Recommended mitigation measures

1. Procure and provide adequate color coded solid waste collection bins with a capacity for segregation
2. Adopt and sensitize workers on the Integrated Solid Waste Management System
3. Contract a NEMA licensed waste handler for disposal of solid waste
4. Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006
5. Comply with provisions of the Sustainable Waste Management Act, 2022

3.2.2.6 Energy demand

Energy will be required for lighting and transportation purposes. Energy during operations will be sourced from solar and fuel for transportation of explosives to the site.

Recommended mitigation measures

1. Use compact fluorescent lights in high use areas within the facility– they last longer and use 75% less energy than normal light bulbs
2. Keep records of power consumption to inform substantial practical guidelines for continuous improvement of consumption efficiency and identifying cost saving opportunities in energy efficiency
3. Create awareness among employees and visitors on energy conservation such as switching off lights when not in use.

3.2.3 Impacts at possible decommissioning phase

A decommissioning phase is possible in the event of end of project life, closure by government agencies due to non-compliance with environmental and health regulations, an order by a court of law due to non-compliance with existing regulations, natural calamities and change of user of land. The proponent will prepare and submit a due diligence decommissioning audit report to NEMA for approval at least three (3) months in advance. The following environmental and social concerns will manifest at this phase;

1. Safety and health risks
2. Insecurity
3. Waste generation
4. Soil contamination
5. Loss of employment

3.2.3.1 Safety and health risks

Decommissioning activities for explosives magazines can be hazardous if fully and developed safety management systems are not implemented. The risks likely to emanate during this phase are noise and air pollution, fire ignition, cuts bruises, trips and falls and musculoskeletal injuries.

Recommended mitigation measures

1. Carry site safety risk assessment prior to decommissioning
2. Decontaminate any equipment in contact with the explosive material
3. Contract a licensed construction company to carry out demolitions

4. Install signage to forewarn people on ongoing demolition activities
5. Provide adequate and enforce the use of PPE throughout the demolition works
6. Avail first aid kits on site throughout the entire period
7. Ensure the process of demolition is supervised by competent personnel
8. Comply with the provisions of Environmental and Management Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.Noise and excessive vibration (
9. Comply with the provisions of the Occupational Safety and Health Act, 2007

3.2.3.2 Insecurity

Insecurity will result from the site when it's abandoned after decommissioning. Unoccupied structures within the site will act as criminal dens and the security boost that had been provided by the storage facility to the local community would be lost.

Recommended mitigation measure

1. The proponent should extend the tenure of contracted security firm during the decommissioning phase of the facility.

3.2.3.3 Waste generation

Demolition activities will result in generation of solid waste that if not properly managed poses health and safety hazards to the environment and general public. The waste generated will include construction debris, steel cuttings, building rubbles, packaging and roofing wastes. In addition, the explosive materials contain substances that are complex organic chemicals which do not readily degrade in the environment and may therefore present explosive risk if not disposed well.

Recommended mitigation measures

1. Obtain demolition permits from the County Government of Kilifi and NEMA
2. Contract NEMA licensed waste handler to dispose demolition wastes
3. All recyclable materials should be collected and sent to NEMA licensed recyclers
4. Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006
5. Comply with the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006

3.2.3.4 Soil contamination

Explosive materials are generally manufactured by combining various chemicals that need safety precautions when handling. Upon decommissioning of the magazines there is likelihood of leakage thus contaminating the soil of the surrounding

Recommended mitigation measures

1. Conduct soil screening
2. Ensure contaminated soil is treated and properly disposed

3.2.3.5 Loss of employment opportunities

In the event of decommissioning of the storage facility, the employees will lose their livelihoods. In addition, the government will lose revenue earned from the operations of the facility.

Recommended mitigation measures

1. Train employees on alternative livelihoods prior to decommissioning
2. Prepare and issue recommendation letters to employees to seek alternative employment opportunities
3. Comply with labor laws by paying the employees their terminal dues

3.3 Impact analysis

Potential project impacts are predicted and quantified to the extent possible. The magnitude of the environmental and social impacts such as safety and health risks, insecurities, fire risks and emergencies, air and noise pollution is defined based on the following characteristics of the impact.

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)

In addition, magnitude takes into account 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. The report has used a scale of 0-3 to define the magnitude of the anticipated impacts where 0-means very low impact, 1-low impact, 2-moderate impact and 3-high impact;

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.

3.4 Public consultations and findings

3.4.1 Introduction

This sub-section provides details of public participation undertaken during the ESIA process pursuant to 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 participation was to obtain and document comments, views, and concerns that the neighbors and stakeholders have regarding the proposed project. A total of three consultative meetings were held in consultation with the Ministry of Interior and National Administration (Annexure 10, 11 and 12). The stakeholders were drawn from government agencies, political leaders and the local community.

3.4.2 Public participation meetings

First and Second public participation meetings were held on 24th January 2023 and 15th February 2023 respectively in collaboration with the Ministry of Interior and National Administration- Rabai. The objective of the first meeting was to sensitize the local community on the proposed project, document their views and opinions. The second meeting was to communicate to the community on mitigations for the raised issues and concerns.


Figure 9: Section of participants during the 1st public participation meeting held on 24th January, 2023 (left) and 2nd public participation meeting held on 15th February 20023 at the project site

Key environmental, social and safety concerns noted down during the 1st and 2nd meetings are summarized below;

Table 4: Issues raised by the local community and their recommended mitigation measures.

Issues raised by the local community	Recommended mitigation measures proposed by the community
Air pollution	- Carrying out air quality assessment to ascertain levels of air pollutants - Implementing measures to suppress dust emission
Displacement of football pitch used by youths	- Proponent to allow youth to use part of the land for playing football
Employment opportunities to the locals	- Prioritizing employment opportunities to the locals
Corporate Social Responsibility (CSR)	- Initiating CSR projects.
Community health and safety risks	- Complying with the provisions of Mining Act, 2016 for the construction of explosive magazines

The third public meeting was held on 19th May 2023 to validate the draft ESIA report for the proposal (Figure 11).

Figure 10: Participants during the draft EIA Study Report validation meeting (Source: Validation meeting, 2023)

Concerns raised by the local community	Response
Air pollution	- The proponent is advised to comply with the recommended measures to suppress dust
Storm water drainage	- Recommendations will be incorporated in the report
Football pitch used by youths Employment opportunities to the locals	- Will inform the proponent to allow youth to use part of the land for playing football as well as prioritize locals for employment
Corporate Social Responsibility (CSR) by providing water, supporting youth sports activities and constructing a health clinic	- Recommendations will be forwarded to the proponent for considerations.
Availability of the EIA report to the community	- Final Report will be available at NEMA website as well as its offices (Nairobi & Kilifi)
Water shortage	- The report recommends supplement from water bowsers
Community health and safety risks	- Proponent advised to comply with the provisions of Mining Act, 2016 during implementation of the project

3.4.3 Grievances Redress Mechanism

3.4.3.1 Introduction

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.

3.4.4 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 communities. 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.

3.4.5 Grievances Redress Mechanism Tool

The storage facility will have an efficient resolution on individual and collective grievances and provide feedback on dissatisfaction for stakeholders during operation. There's a mechanism considered based on World Bank guideline that provides an accessible channel for submission of complaints and feedback from stakeholders as provided in the flow chart below;

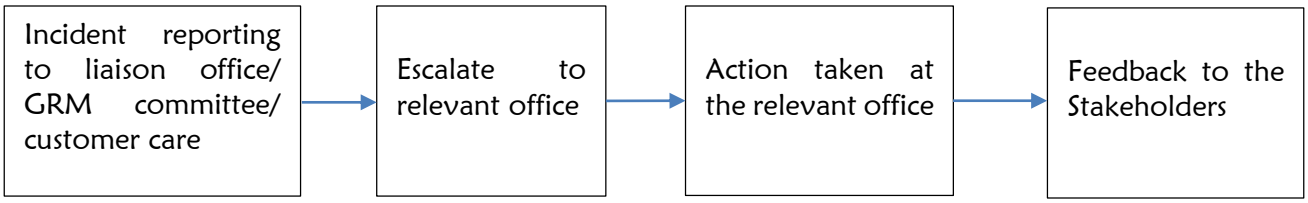

Figure 11: Grievances Redress Mechanism Tool flow chart (Source: World-Bank, 2020).

3.5 Analysis of project alternatives

An Environmental Impact Assessment is designed to ensure project implementation is carried out in an environmentally and socially sound way and enhance sustainability. The analysis of project alternatives in the assessment process is key as it allows the proponent to evaluate the project options including project site, technology, materials used, design and implementation to reach and adopt a convenient and feasible option. The alternatives for the proposed project is discussed below;

3.5.1 The 'No Project' alternative

The 'No Project' alternative in respect to the proposed project means the status quo is retained. This option means that the predicted environmental impact will not occur and is ideally the best case scenario for mitigation. From the environmental perspective, this option is the most suitable as there's no interference with the existing conditions. However, from the socio-economic perspective is not viable owing to the fact that retaining the status quo denies the proponent a viable investment opportunity and thereby income generation translating into profits, denies the local community employment opportunities and also denies both the County and National Government revenue.
Therefore, the 'No project' alternative is not considered viable in the light of the benefits and deprivations of the project.

3.5.2 The "Yes Project" alternative

This option envisages that the proposal will be implemented. It was considered as the most viable because of the following reasons;

- Provision of safe storage of explosive agent
- Employment creation
- Optimal use of land
- Revenue to the government both national and county through taxes and licenses.

3.5.3 Alternative project site

An alternative site could be considered for the proposed project if the proposed project would present serious environmental challenges that cannot be effectively managed. However, the proposed mitigation measures are considered adequate to minimize the impacts to levels that do not warrant significant environmental damage. In addition, there is availability of adequate piece of land for the development. This alternative is therefore not viable.

3.5.4 Alternative to the project design

An alternative to the project design could be construction of the facility using above ground, prefabricated metal structures permanently installed on concrete pads. Less cost will be required during the construction but the facility could not store many explosives nor could the unburned structures afford the safety and protection that the proposed concrete structures. This alternative would require maintaining approximately twice the amount of buffer zone to achieve the same level of safety as the proposed design thus not viable.

4 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

4.1 Introduction

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 construction, operational and possible decommissioning phases. Each of the ESMP is organized into five sections comprising of the environmental concerns, recommended mitigation measures, implementing party, timeframe and a budget. The strategies for mitigation include preventing the impact from occurring in the first place, minimizing the impact, taking corrective action where impact occurs among others. The overall focus is to ensure that the project complies with the substantive EIA Principle of ensuring the right to a clean and healthy environment during the entire project cycle.

4.2 Environmental and Social Management Plan for the construction phase

For the construction phase ESMP (Table 5), the main environmental issues include environmental risks of obtaining raw materials, destruction of the physical environment, increased water and energy demand and effluent generation, solid waste generation and management, occupational safety and health risks, air and noise pollution.

Table 5: Environmental and Social Management Plan for the construction phase of the proposed project.

Environmental concerns	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
Change in land use	Comply with the provisions of the County Government of Kilifi and State Department of Mining approvals	Proponent	Prior to construction	Nil
High demand of raw materials	Source raw materials from licensed sites as per the EMCA Cap 387 of Laws of Kenya	Proponent/ contractor	Throughout construction	Nil
	Procure materials based on Bill of Quantities provided by licensed surveyor	Proponent/ contractor	Throughout construction	Nil
	Re-use construction materials such as wood and metal cuttings which can be salvaged	Proponent/ contractor	Throughout construction	Nil
Water demand and effluent generation	Sensitize the workers on the need to conserve available water resources	Proponent/ contractor	Throughout construction	Nil
	Install a bio-digester to manage the domestic effluent	Proponent/ contractor	Throughout construction	Tender
	Comply with the provisions of Environmental Management and Coordination (Water Quality) Regulations, 2006	Proponent/ contractor	Throughout construction	Nil
Solid waste generation and management	Provide adequate solid waste collection bins with capacity for segregation within the construction site	Proponent/ contractor	Throughout construction	50,000
	Provide a sizeable central solid waste collection with chambers to accommodate separated waste	Proponent/ contractor	Throughout construction	50,000
	Sensitize construction workers on the Integrated Solid Waste Management System	Proponent/ contractor	Throughout construction	Nil
	Procure the services of a NEMA licensed waste handler to dispose off the solid waste	Proponent/ contractor	Throughout construction	Tender
	Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006	Proponent/ contractor	Throughout construction	Nil
Occupational safety and health risks	Register the site as a workplace with DOSHS	Proponent/ contractor	Throughout construction	5,000
	Obtain insurance cover for the workers at the site	Proponent/ contractor	Throughout construction	TBD
	Provide adequate and appropriate PPEs to workers and visitors to the site and enforce on their use	Proponent/ contractor	Throughout construction	TBD
	Provide employees with correct tools and equipment for the jobs assigned and train on their use	Proponent/ contractor	Throughout construction	Nil

Environmental concerns	Recommended mitigation measures	Implementing party	Timeframe	Estimated Cost (KES)
	Ensure sharp surfaces are securely protected with guards to avoid unnecessary contacts and injuries	Proponent/ contractor	Throughout construction	Nil
	Provide first aid services and trained first aid personnel	Proponent/ contractor	Throughout construction	20,000
	Regulate the entry of visitors to the construction site by deploying adequate security measures	Proponent/ contractor	Throughout construction	Nil
	Comply with the provisions of the Occupational Safety and Health Act, 2007	Proponent/ contractor	Throughout construction	Nil
Air pollution	Sprinkle water at unpaved access areas to suppress dust	Proponent/ contractor	Daily	25,000
	Install dust screens around the project site during construction	Proponent/ contractor	Throughout construction	500,000
	Provide and enforce the use of appropriate PPEs to workers and visitors to the project site	Proponent/ contractor	Throughout construction	50,000
	Ensure machinery/equipment and trucks are maintained and serviced regularly	Proponent/ contractor	Throughout construction	Nil
	Monitor fugitive emissions to ensure compliance with the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014	Proponent/ contractor	Quarterly	30,000
	Comply with Environmental Management and Coordination (Air Quality) Regulations, 2014	Proponent/ contractor	Throughout construction	Nil
Noise pollution	Limit delivery of raw materials, excavation and construction work to day time only between 8am to 5pm	Proponent/ contractor	Throughout construction	Nil
	Locate machinery that are likely to produce noise as far as practical from neighboring properties	Proponent/ contractor	Throughout construction	Nil
	Sensitize truck drivers to avoid unnecessary hooting and running of vehicle engines	Proponent/ contractor	Throughout construction	Nil
	Comply with the EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.	Proponent/ contractor	Throughout construction	Nil

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4.3 Environmental and Social Management Plan for the operational phase

The main environmental concerns at this phase include Security risks, Safety and Health risks, Fire risks and emergencies, Solid waste generation and management, increased water and energy demand (Table 6).

Table 6: Environmental and Social Management Plan for the operational phase of the proposed project.

Environmental concerns	Recommended mitigation measures	Implementing party	Timeframe	Cost (KES)
Security risks	Secure the facility by erecting a perimeter stone wall and installing chain links	Proponent	Throughout operations	In project costs
	Deploy adequate security marshals at the proposed site	Proponent	Throughout operations	TBD
	Train and sensitize security guards on insecurity emergency responses	Proponent	Throughout operations	Nil
	Develop and implement the alarm systems for the facility	Proponent	Throughout operations	In project costs
	Comply with the rules of physical security of stocks	Proponent	Throughout operations	Nil
Safety and Health risks	Provide adequate and appropriate Personal Protective Equipment to workers and enforce on their use	Proponent	Throughout operations	TBD
	Sensitize drivers to ensure red flag of at least 45cm square is affixed to the front and rear of vehicle during loading and transit of the explosives	Proponent	Throughout operations	Nil
	Ensure that barrels of explosives are securely fixed and wedged to prevent movement	Proponent	Throughout operations	Nil
	Provide and keep an accident/ incident register	Proponent	Throughout operations	Nil
	Conduct first aid training among the workers and provide well-stocked first aid kits	Proponent	Throughout operations	15,000
	Develop and implement an effective emergency response plan	Proponent	Throughout operations	10,000
	Ensure on arrival, explosives are transferred without delay from the vehicle to the place of storage	Proponent	Throughout operations	Nil
	Comply with the Occupational Safety and Health Act, 2007	Proponent	Throughout operations	Nil
	Comply with the provisions of the Explosives (Blasting explosives) rules Cap 115, 1962.	Proponent	Throughout operations	Nil

Environmental concerns	Recommended mitigation measures	Implementing party	Timeframe	Cost (KES)
Fire risks and emergencies	Ensure the explosives are not stored directly against interior wall for ventilation reason	Proponent	Throughout operations	Nil
	Develop, clearly display and implement a fire and emergency evacuation procedure	Proponent	Throughout operations	10,000
	Ensure access to the facility is effectively controlled to limit exposure to hazards	Proponent	Throughout operations	Nil
	Procure and provide adequate firefighting equipment	Proponent	Throughout operations	70,000
	Ensure firefighting equipment are serviced regularly by accredited service providers	Proponent	Throughout operations	Nil
	Clearly mark fire assembly point and display emergency exits	Proponent	Throughout operations	Nil
	Conduct regular fire drills	Proponent	Quarterly	Nil
	Conduct annual fire safety audit	Proponent	Annually	50,000
	Display warning signage at appropriate sections of the facility	Proponent	Throughout operations	Nil
	Comply with the provisions of Occupational Safety and Health Act, 2007	Proponent	Throughout operations	Nil
Solid waste generation and management	Procure and provide adequate color coded solid waste collection bins with a capacity for segregation	Proponent	Throughout operations	50,000
	Adopt and sensitize workers on the Integrated Solid Waste Management System	Proponent	Throughout operations	Nil
	Contract a NEMA licensed waste handler for disposal of solid waste	Proponent	Throughout operations	Tender
	Comply with the Environmental Management and Coordination (Waste Management) Regulations, 2006	Proponent	Throughout operations	Nil
	Comply with provisions of the Sustainable Waste Management Act, 2022	Proponent	Throughout operations	Nil
Increased water demand	Install automatic water saving faucets	Proponent	Throughout operations	Nil

Environmental concerns	Recommended mitigation measures	Implementing party	Timeframe	Cost (KES)
	Carry out regular inspection and maintenance of the water distribution network to ensure zero leaks and damages	Proponent	Throughout operations	Nil
	Create awareness on need to conserve available water	Proponent	Throughout operations	Nil
	Comply with the Environmental Management and Coordination (Water Quality) Regulations, 2006	Proponent	Throughout operations	Nil
Increased energy demand	Use compact fluorescent lights in high use areas within the facility	Proponent	Throughout operations	Nil
	Keep records of power consumption to inform substantial practical guidelines for continuous improvement	Proponent	Throughout operations	Nil
	Create awareness among employees and visitors on energy conservation	Proponent	Throughout operations	Nil

4.4 Environmental and Social Management Plan for the decommissioning phase

The 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 the Safety and health risks, insecurity, Waste generation, Soil contamination, Loss of employment (Table 7)

Table 7: Environmental and Social Management Plan for the decommissioning phase of the proposed project.

Environmental concerns	Recommended mitigation measures	Implementing party	Timeframe	Cost (KES)
Safety and health risks	Carry site safety risk assessment	Proponent	Prior to decommissioning	50,000
	Decontaminate any equipment in contact with the explosive material	Proponent	Throughout decommissioning	TBD
	Contract a licensed construction company to carry out demolitions	Proponent	Throughout decommissioning	TBD
	Install signage to forewarn people on ongoing demolition activities	Proponent	Throughout decommissioning	Nil
	Provide adequate and enforce the use of PPE throughout the demolition works	Proponent	Throughout decommissioning	Nil
	Avail first aid kits on site throughout the entire period	Proponent	Throughout decommissioning	Nil
	Ensure the process of demolition is supervised by competent personnel	Proponent	Throughout decommissioning	Nil
	Comply with the Environmental Management and Coordination Air Quality Regulations, 2014	Proponent	Throughout decommissioning	Nil
	Comply with Noise and Excessive Vibration Pollution (Control) Regulations, 2009	Proponent	Throughout decommissioning	Nil
	Comply with the provisions of the Occupational Safety and Health Act, 2007	Proponent	Throughout decommissioning	Nil
Insecurity	The proponent should extend the tenure of contracted security firm	Proponent	Throughout decommissioning	As per contract
Waste generation	Contract NEMA licensed waste handler to dispose demolition wastes	Proponent	Throughout decommissioning	Tender
	All recyclable materials should be collected and sent to NEMA licensed recyclers	Proponent	Throughout decommissioning	Nil

Environmental concerns	Recommended mitigation measures	Implementing party	Timeframe	Cost (KES)
	Comply with the Environmental Management and Coordination (Waste Management) Regulations, 2006	Proponent	Throughout decommissioning	Nil
	Comply with the Environmental Management and Coordination (Water Quality) Regulations, 2006	Proponent	Throughout decommissioning	Nil
Loss of employment opportunities	Train employees on alternative livelihoods prior to decommissioning	Proponent	Prior to decommissioning	Nil
	Prepare and issue recommendation letters to employees to seek alternative employment opportunities	Proponent	Prior to decommissioning	Nil
	Comply with labor laws by paying the employees their terminal dues	Proponent	Throughout decommissioning	Nil

5 ENVIRONMENTAL MONITORING PLANS

5.1 Introduction

A suite of Environmental Monitoring Plans is required to ensure full and systematic implementation of the Environmental Management Plan. It entails assessment of environmental performance of the proposed project by documenting, tracking and reporting any changes in environmental parameters in space and time. The objective of the monitoring plans is to enhance the environmental performance of the project by providing data and information on compliance with legislative standards and determining the levels of deviation from the values obtained during the baseline monitoring. This in turn informs the corrective measures if any that need to be implemented to comply with the legislative standards. For the proposed project, seven monitoring plans are proposed. These are;

1. Safety and Health monitoring plan
2. Air monitoring plan
3. Water quality monitoring plan
4. Noise monitoring plan
5. Solid waste monitoring plan
6. Soil monitoring plan

5.1.1 Safety and health monitoring plan

5.1.1.1 Introduction

During construction and subsequent operation of the storage facility, the inherent occupational safety and health risks will emanate from explosion due to poor storage, fire outbreak from external ignition, musculoskeletal injuries during offloading, noise and air pollution. All these risks have potential to cause death, permanent disability and even financial losses. The purpose of the safety and health monitoring plan is to assess existing controls alongside the potential health and safety risks in order to develop an effective action plan and ensure compliance with the provisions of OSHA, 2007.

5.1.1.2 Monitoring strategy

The proponent should be committed to ensuring, as far as is reasonably practicable, the health and safety 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;

- Conducting occupational safety and health reviews and reports.
- Administration of safety awareness and motivation scheme.
- Routine inspections of the facility and equipment.
- Visual inspection as well as interviewing key personnel to identify areas of improvement.
- 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 and overall the management.

5.1.1.3 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.

5.1.2 Air quality monitoring plan

5.1.2.1 Introduction

At construction phase, air pollution will emanate from dust during excavations, concrete mixing activities and exhaust fumes from machinery and Heavy Commercial Vehicles. The access road to the site is unpaved thus likelihood of excessive dust emitted during delivery of construction materials by trucks will occur. Air pollution above acceptable limits are toxic to human health and environment. The purpose of the air quality monitoring plan is to ensure the concentrations air emissions from the construction are within the stipulated standards set under the Environmental Management and Coordination (Air Quality) Regulations, 2014. In addition, the results will be used to evaluate if the adopted air pollution controls and management are effective.

5.1.2.2 Monitoring parameters

Construction sites are listed as sources of fugitive emissions under the Fifth Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014. Therefore, the proponent should monitor fugitive emissions as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014 (Table 8).

Table 8: Ambient air quality tolerance limits as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014.

Pollutant	Time weighted average	Residential area, Rural & other areas
Sulphur Oxides (SO_X)	Annual Average*	60 $\mu g/m^3$
	24 hours**	80 $\mu g/m^3$
Oxides of Nitrogen (NO_x)	Annual Average*	60 $\mu g/m^3$
	24 hours**	80 $\mu g/m^3$
Nitrogen Dioxide	Annual Average	0.05 ppm
	24 hours	0.1 ppm
Suspended Particulate Matter (SPM)	Annual Average*	140 $\mu g/m^3$
	24 hours**	200 $\mu g/m^3$
Respirable particulate matter (< 10μm) (RPM)	Annual Average*	50 $\mu g/m^3$
	24 hours**	100 $\mu g/Nm^3$
Carbon monoxide/ Carbon dioxide	Annual Average*	2.0 mg/m^3
	24 hours**	4.0 mg/m^3
Non methane hydrocarbons	Instant Peak	700ppb
Ozone	One hour	0.12 ppm
	8 hour (instant peak)	1.25pm

5.1.2.3 Monitoring location

Air quality monitoring should be carried out within the project site during construction.

5.1.2.4 Monitoring frequency

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

5.1.3 Water quality monitoring plan

5.1.3.1 Introduction

The proponent should put in place a consistent water quality monitoring plan targeting the quality of effluent discharged from the proposed bio-digester and the quantity of water abstracted from the borehole. The objective of the water quality monitoring plan is to provide data and information to manage the effluent in order to comply with the standards prescribed under the Third Schedule of the Environmental Management and Coordination (Water Quality) Regulations, 2006.

5.1.3.2 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 (Table 9).

Table 9: 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. *Coli* Colonies; count/100ml	Nil
Total coliform; count/100ml	1000/100ml

5.1.3.3 Monitoring location

Effluent sampling will target the last discharge point of the proposed bio-digester.

5.1.3.4 Monitoring frequency

Effluent sampling and analysis will be undertaken quarterly in collaboration with a NEMA designated laboratory.

5.1.4 Noise monitoring plan

5.1.4.1 Introduction

Potential sources of noise pollution will emanate during construction activities. Noise may nuisance to the neighbours, visitors and workmanship at the site. The purpose of noise monitoring plan is to therefore ascertain the extent of the impact due to the construction activities in compliance with the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibrations pollution) (Control) Regulations, 2009. Permissible levels for construction sites are tabulated below (Table 10 & 11)).

Table 10: Maximum permissible levels for construction sites as stipulated under the Second Schedule of 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 11: The Occupational Health and Safety Exposure Limits for Noise Emissions

Sound Level dB(A)	Maximum Permitted Duration (hours/day)
80	16
85	8
90	2
100	1
105	0.5
110	0.25
115	1/8
>115	0
Hearing Protectors (Ear Mufflers)	
Sound Level dB(A)	Maximum Class of Hearing Protectors
85-95	C
96-105	B
106 and over	A

5.1.4.2 Monitoring location

Noise monitoring should be carried out within the project site during construction works.

5.1.4.3 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).

5.1.5 Solid waste monitoring plan

5.1.5.1 Introduction

During construction and operation phases of the proposed project, bulk of solid waste will be generated. Poor disposal of solid waste might pose health risks to the general public and environment. The purpose of this monitoring plan is to therefore ensure solid waste is managed in such a way that it protects both the public health and the environment.

5.1.5.2 Monitoring frequency

The frequency of solid waste monitoring will differ from the collection to the disposal stage in order to ensure reduced odours and accumulation of heaps of waste. Table 12 describes the outline for which the activity will be monitored but can be adjusted depending on the amount generated.

Table 12: Sample outline for solid waste monitoring plan.

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

5.1.5.3 Monitoring strategy

The solid waste monitoring plan will document the collection, storage and disposal of solid waste from the proposed resort. 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.

5.1.5.4 Indicator of success

Indicators of success will include timely collection and disposal of waste by the licensed waste handlers.

5.1.6 Soil monitoring plan

5.1.6.1 Introduction

Sampling and analyzing soil can provide useful information about the physical, chemical and biological condition of soil in a particular location. This information plays important role in solving soil-related problem or determine the extent of soil contamination for a remediation plan.

5.1.6.2 Monitoring parameter

The soil parameters to be monitored include moisture content, PH value, available nutrients such as Nitrogen and Phosphorus and heavy/trace metals. Although Kenya has not developed a specific environmental legislation on soil standards, it relies on existing legislation on pollution such as the Environmental Management and Coordination (Water Quality) Regulations, 2006 and the Kenya Constitution 2010 to prosecute environmental crimes on soil contamination.

5.1.6.3 Monitoring frequency

The soil monitoring frequency should be conducted at-least once every three years by an expert in collaboration with NEMA designated laboratory.

6 GOVERNANCE FRAMEWORKS

6.1 Introduction

There is a growing concern in Kenya and at a global level that many forms of development activities cause damage to the environment and the community. The Third Schedule of EIA/EA Regulations requires that environmental guidelines and standards which include Kenya government policies and strategies, national legislation and the institutional arrangements to render them should be incorporated in an ESIA report. This section therefore provides review of the applicable sets of laws, and institutions in reference to the proposed project.

6.2 Policy frameworks and National strategies

6.2.1 National Environment Policy, 2014

This Policy aims to provide a framework for an integrated approach to sustainable management of Kenya's environment and natural resources. Its objectives include;

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

To achieve this, it is a policy direction that appropriate reviews and evaluations of the proposed project and operations are checked to ensure compliance with the environmental policy.

6.2.2 National Mining and Minerals Policy, 2016

The overall goal of the policy is to set out frameworks and strategies for exploration and exploitation of mineral resources for socio-economic development. The policy is guided by principles of sustainable development and its' key objectives include;

i). Provide long-term policy direction and legal framework that conform to current industry needs, trends and international best practices.
ii). Provide a strategy for clear, simple, predictable, transparent and accountable licensing procedures including access to land
iii). Provide a framework for harmonizing mining, health and occupational safety and environmental legislations
iv). Provide a framework for local participation in the mining investment ventures.

6.2.3 National Disaster Risk Management Policy, 2017

The overall objective of the policy is to develop sustained, committed and concerted efforts with regard to disaster management. Various principles were used to guide the establishment of the policy and these include the Constitution of Kenya, 2010, humanitarian rights and gender mainstreaming. The key objectives of the policy are to establish and strengthen institutional capacities for Disaster Risk Management, reduce disaster risks and vulnerabilities, mainstream disaster risk management into sustainable development strategies and enhance effective and coordinated disaster preparedness prevention, response, mitigation and recovery.

6.2.4 National Health Policy 2014-2030

The goal of the Policy is to attain the highest possible standard of health in a responsive manner. The health sector aims to achieve this goal by supporting equitable, affordable, and high-quality health and related services at the highest attainable standards for all Kenyans. This Policy has six objectives which include; to eliminate communicable conditions, to halt and reverse the rising burden of non-

communicable conditions and mental disorders, to reduce the burden of violence and injuries, to provide essential healthcare, to minimize exposure to health risk factors and to strengthen collaboration with private and other sectors that have an impact on health. This policy takes into account the functional responsibilities between the two levels of government (county and national) with their respective accountability, reporting and management lines. It proposes a comprehensive and innovative approach to harness and synergise health services delivery at all levels.

6.2.5 National Land Policy, 2009

The National Land Policy guides the country towards efficient, sustainable and equitable use of land for prosperity and posterity. The Mission of the Policy aims at: promoting positive land reforms for the improvement of the livelihoods of Kenyans through the establishment of accountable and transparent laws, institutions and systems dealing with land. The overall objective of the Policy is to secure rights over land and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives. Specifically the policy offers a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that will provide: a) All citizens with the opportunity to access and beneficially occupy and use land; b) Economically viable, socially equitable and environmentally sustainable allocation and use of land; c) Efficient, effective and economical operation of land markets; d) Efficient and effective utilization of land and land-based resources; and e) Efficient and transparent land dispute resolution mechanisms. Sustainable land use practices are key to the provision of food security and attainment of food self-sufficiency.

6.2.6 The National Water Services Strategy, 2004

This strategy was prepared so as to ensure sustainable access to adequate and affordable water and sewage services to all Kenyans through rehabilitated and expanded water supply and sewage systems and through efficient, responsive institutions. It aims to increase the urban and rural water supply, reduce the unaccounted for water due to both technical and social losses and to increase the urban and rural wastewater collection, treatment and disposal coverage.

6.2.7 The National Industrialization Policy, 2012

Under Kenya vision 2030, the manufacturing sector has been identified as the key driver for economic growth and development due to its immense potential in job and wealth creation, and its high potential to the realization of the Sustainable Development Goals (SDG). This policy framework focuses on value addition for both primary and high valued goods; and linkages between industrial sub-sectors and other productive sectors to drive the industrialization process and aims at providing strategic direction for the sector growth and development.

6.2.8 The Kenya National Climate Change Response Strategy of 2010

The Government of Kenya has strategies it's taking to address issues related to the impact of climate change on various sectors of the economy. The proposed project will take into consideration the effects of climate change in the country and integrate climate change mitigation and adaptation measures in its operations.

6.2.9 Kilifi County Integrated Development Plan

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.

6.3 Legal framework

6.3.1 The Constitution of Kenya, 2010

The Constitution is the supreme law of the land as it lays foundation on which the well-being of Kenya is founded. Its' provisions are specific to ensuring sustainable and productive management of land resources. Under Chapter IV, Article 42 '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; establish systems of environmental impact assessment, environmental audit and monitoring of the environment; eliminate processes and activities that are likely to endanger the environment.

Further, Chapter V deals with Land and Environment and specifically Part elaborates on the obligations of the proponent in respect to protection of the environment and enforcement of environmental rights.

Relevance to the proposed project

- The proponent must ensure that the development is carried out in an ecologically, economically and socially sustainable manner.
- The proponent should ensure that construction and operations of the facility do not infringe on the right to a clean and healthy environment for all.

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

EMCA Cap 387 is the principle law that governs the use, management and regulation of environmental resources in Kenya. The act aims to improve the legal and administrative co-ordination of the diverse sectoral initiatives in the field of environment so as to enhance the national capacity for its effective management.

Relevance to the proposed project

- Section 58 of the Act requires proponents of a development likely to adverse effects on the environment to prepare and submit an EIA report to NEMA for consideration for decision making. This ESIA report is prepared in compliance with the provisions of this section.

Regulations under the EMCA Cap. 387 of the Laws of Kenya

To operationalize EMCA, several Regulations have been gazetted since its enactment in 1999 and its amendment in 2015. They include;

1. **Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003**

   These Regulations guide the preparation of EIA including how experts should conduct the EIA process and guidelines and standards to be met by the reports. The Regulations were reviewed in 2016 to align them to the Kenya Constitution 2010. They were also recently amended (2019) to address challenges that have been reported since they were gazetted. This report complies with the provisions of these Regulations.

2. **Environmental Management and Coordination (Air Quality) Regulations, 2014**

   These regulations were aimed at controlling, preventing and abating air pollution to ensure clean and healthy ambient air. The activities of the proposed project will have a potential to pollute the air from construction works and vehicular movement.

   Relevance to the proposed project

   - The proponent should ensure that ambient air quality is maintained throughout the project cycle.

3. **Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009**
   These Regulations were gazetted to manage noise levels to levels that do not cause a disturbance to the public. Machinery and equipment used during the construction phase are likely to generate noise above the acceptable limits.

   Relevance to the proposed project
   – The proponent shall be required to adhere to the provisions of maximum permissible noise levels for construction sites.

4. **Environmental Management and Coordination (Water Quality) Regulations, 2006**
   These Regulations address the challenges of pollution of water resources and conservation. It consists of VI parts and eleven schedules dealing with protection of sources of water for domestic use to miscellaneous provisions.

   Relevance to the proposed project
   – The proponent should monitor the quality of the effluent before discharge into the environment to ensure conformity and compliance with these regulations.

5. **Environmental Management and Coordination (Waste Management) Regulations, 2006**
   The Regulations focus on the management of solid waste, industrial waste, hazardous waste, pesticides, toxic substances and radioactive substances. The regulations also stipulate the conditions for licensing any person dealing with the transport or waste disposal.

   Relevance to the proposed project
   – The proponent should ensure proper solid waste disposal throughout the project cycle and procure the services of a NEMA licensed contractor for solid waste management.

6.3.3 Explosives Act Cap 115

It's the Act of Parliament to consolidate and amend law relating to manufacture, storage, sale, transport, importation, exportation and use of explosive. Part III make provisions for restriction of storage and possession of authorized and unauthorized explosives. Section 7 (1) states that "no person shall keep, store or be in possession of any authorized explosive in or on any premises (a) except in an explosive factory or explosives magazine, or (b) unless the explosive is kept for private use, and not for sale or other disposal, and in accordance with rules;". Part VII Section 22 (1) states that "any person desiring to erect or carry on a magazine for the storage of explosives shall make application for a license for the same to an inspector, who may grant such license, subject to the observance of the rules and after consultation with the local authority, if any, and upon such other conditions as he may think fit to attach to the license."

Relevance to the proposed project
– The proponent should apply for requisite approvals and licenses as per the provisions of this Act.

Subsidiary regulations
The Explosives (Blasting Explosives) Rules 1962 provides for guidelines for safe handling, storage and management of the explosives i.e., every explosives magazine shall be in charge of an explosive manager acquainted with these Rule, no one magazine building shall contain more than 45,000kg of explosives among other guidelines. The proponent should comply with the provisions of these rules during construction and operation phase of the storage facility.

6.3.4 The Mining Act, 2016

This Act of Parliament was established to set out frameworks, strategies and principles for exploration and exploitation of mineral resources for socio-economic development. Further, the Act gives effect of the Constitution of Kenya as they apply to minerals to provide for processing, treatment and transport and related mining purposes.

Relevance to the proposed project

- The proponent should comply with the provisions o this Act throughout the project cycle.

6.3.5 Occupational Safety and Health Act, 2007

The purpose of the Act is to ensure safety, health and wellbeing of persons at workplace and protect any visitor against risks arising out of activities at work. 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.

Relevance to the proposed project

- The proponent should ensure that safety protocols as per this Act are adhered to throughout the project phases.

6.3.6 Work Injury Compensation Benefit Act (WIBA) 2007

This Act provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes. 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 project

- The proponent should ensure that all the employees who will be engaged during the execution are covered as provided for in the Act

6.3.7 The Public Health Act, 2012

The Act aims at prohibiting 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 project

- The proponent should ensure compliance with the Act by providing clean, healthy and safe environment during project implementation.

6.3.8 The Sustainable Waste Management Act, 2022

This Act establishes the legal and institutional framework for the sustainable management of waste and ensure the realization of the constitutional provision of the right to clean and health environment. The Act further make provisions to enable the recovery and re-use of products where possible, separate hazardous and non-hazardous waste and ensure disposal at the facility provided by county government.

Relevance to the proposed project

- Proponent should ensure compliance with this Act by;

i). Providing waste segregation receptacles at the premise,

ii). Procuring services of licensed waste personnel to transport and dispose off the wastes
iii). Sensitize staff on integrated solid waste management system

6.3.9 Water Act, 2016

The purpose of this act was to align the water sector with the Constitution's primary objective of devolution for assigning the responsibility for water supply and sanitation. Section 25 (10 of this Act provides for need of a permit for purposes of:

- any use of water from a water resource, except as provided by Section 26;
- the drainage of any swamp or other land;
- the discharge of a pollutant into any water resource; and,
- Any purpose, to be carried out in or in relation to a water resource, which is prescribed by rules made under this Act to be a purpose for which a permit is required.

Section 18 (30) allows Water Resource Authority to demand from any person or institution, documents, samples or materials on water resources.

Relevance of the proposed project

- The proponent should comply with the provisions of this Act.

6.3.10 Energy Act, 2012

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.

Relevance to the audit facility and compliance

- The proponent will incorporate the requirements of the Energy Act in its operations.

6.3.11 The Land Act, 2012

This Act provides for the sustainable administration and management of land and land based resources, and for connected purposes. Part VIII of this Act provides procedures for compulsory acquisition of interests in land. Further, it provides settlement program and any dispute arising out of any matter provided under the Act may be referred to the Environment and Land Court for determination.

Relevance to the proposed project

- The proponent should adhere to the provisions of this Act when solving any land disputes that may arise during project implementation.

6.3.12 The Environment and Land Court Act, 2011

This Act was established to give effect to Article 162 (2) (b) of the Constitution; to establish a superior court (Environment and Land court) to hear and determine disputes relating to environment and the use and occupation of, and title to land, and to make provisions for its jurisdiction functions and power and connected purposes.

6.3.13 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 project

- The proponent has obtained pertinent approvals and requisite operational licenses from the County Government of Kilifi.

6.3.14 The Occupiers Liability Act Cap. 34

The Act regulates the duty that an occupier of premises owes to his visitors in respect of dangers due to the state of the premises or to things done or omitted to be done on them.

Relevance to the proposed project

- The act requires that the occupier warn the visitors of the likelihood of dangers within his premises to enable the visitor to be reasonably safe.

6.3.15 The County Government Act, 2012

This Act of parliament give effect to Chapter Eleven of the Kenyan Constitution; that provide for the County government's powers, functions and responsibilities to deliver services and for connected purposes. The Act lays emphasis on the need for a consultative and participatory approach where the principles of planning and development facilitation in a county serve as a basis for engagement between the county government and the citizens and other stakeholders.

Relevance to the proposed project

- The proponent has engaged the County Government of Kilifi in its planning to ensure various licenses and permits are acquired.

6.4 Institutional framework

To implement the above legal framework, the government has established a number of institutions with varying mandates of implementation. These include;

1. The Ministry of Mining, Blue Economy and Maritime affairs to implement Explosives Act ad subsidiary legislation.
2. The Directorate of Occupational Safety and Health Services to implement the Occupational Safety and Health Act alongside the subsidiary legislation.
3. The Water Resources Authority to implement the Water Act.
4. The County Government of Kilifi to implement the County Government Act, its by-laws, the Public Health Act, the Physical and Land Use Planning Act and the Occupiers Liability Act.

5. Institutions under EMCA Cap 387

There are other institutional arrangements provided for within the EMCA Cap 387 and relevant to the development. The roles are reviewed and discussed into details below:

i). National Environmental Management Authority (NEMA)

NEMA is established under EMCA to exercise general supervision and co- ordinate over all matters relating to the environment. It's the principal instrument of the government under Ministry of Environment, Forestry and Climate Change in the implementation of all policies relating to the environment. The Director General appointed by the president heads NEMA. Any project that falls under the second schedule of EMCA, Cap 387 shall seek an Integrated Environmental Impact Assessment License from NEMA.

ii). National Environmental Tribunal

The National Environment Tribunal (NET) created under Section 125 of EMCA Cap 387 has the following functions:

- To hear and determine appeals from NEMA's decisions and other actions relating to issuance, revocation or denial of (EIA) licences or amount of money to be paid under the Act and imposition of restoration orders;
- To give direction to NEMA on any matter of complex nature referred to it by the Director General; and

If the proponent disagrees with NEMA decisions in exercising the above-mentioned functions, then they may lodge a case at the NET to seek to overturn the decision. Should this avenue not lead to a favorable ruling from the NET, an appeal may be lodged in the Environment and Land Court.

iii). National Environmental Complaints Committee

The National Environmental Complaints Committee executes the following functions:

- Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the Cabinet Secretary.
- Prepare and submit to the Cabinet Secretary periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3) and
- To undertake public interest litigation on behalf of the citizens in environmental matters.

This committee will act as a safeguard for members of the public who feel aggrieved by actions taken under the proposed project and can exercise their constitutional rights to launch a complaint should they have exhausted all other grievance redress mechanisms available to them.

7 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The proposed project is considered beneficial in supporting the mining sector in Kenya and reducing the cost of doing business for the quarries in the coast region and beyond. It will further enhance safety measures of transportation and storage of mining explosives, optimize the use of land and generate revenue to the government through taxes and licenses. However, despite the benefits there are environmental and social concerns that will arise during project implementation that will include, safety and health risks, physical insecurity, fire risks and emergencies, increased water and energy demand, air and noise pollution and waste management. The ESIA study proposes a suite of Environmental Management Plans to mitigate the anticipated negative impacts and enhance the environmental performance and social benefits during project implementation.

7.2 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. Comply with the provisions of the requisite approval and permits
2. Sprinkle water adequately on unpaved areas to suppress dust
3. Install a bio-digester to manage the domestic effluent
4. Secure the facility by erecting a perimeter stone wall and installing chain links
5. Deploy adequate security marshals at the proposed site
6. Train and sensitize security guards on insecurity emergency responses
7. Provide adequate PPEs and enforce on their use
8. Ensure barrels of explosives are securely fixed and wedged to prevent movement
9. Sensitize drivers to ensure red flag of at least 45 cm^2 is affixed to the front and rear of vehicle during loading and transit of the explosives
10. Ensure on arrival, explosives are transferred without delay from vehicle to storage
11. Comply with the provisions of The Explosives (Blasting Explosives) Rules, 1962
12. Develop and implement an effective emergency response plan
13. Provide adequate firefighting equipment within the facility
14. Designate fire assembly point and clearly display emergency exits
15. Provide first aid services and trained first aid personnel
16. Display warning signage at appropriate sections of the facility
17. Comply with provisions of the Mining Act, 2016
18. Comply with provisions of Occupational Safety and Health Act, 2007
19. Contract NEMA licensed personnel to handle and dispose wastes
20. Comply with provisions of the Sustainable Waste Management Act, 2022
21. Comply with Environmental Management and Coordination (Air Quality) Regulations, 2014
22. Comply with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

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

8 REFERENCES

1. Constitution of Kenya, 2010. Government Printers, Nairobi, Kenya.
2. County Government of Kilifi (2022), County Spatial Plan, Kilifi
3. Environmental Impact Assessment and Audit Regulations, 2003. Government Printers, Nairobi, Kenya.
4. Environmental Management and Coordination (Air Quality) Regulations. 2014. Government Printers, Nairobi, Kenya.
5. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. Government printer, Nairobi, Kenya.
6. Environmental Management and Coordination (Waste management) Regulations, 2006. Government Printers, Nairobi, Kenya.
7. Environmental Management and Coordination (Water Quality) Regulations, 2006 Government Printers, Nairobi
8. Environmental Management and Coordination Act (EMCA) Number 8 of 1999 (Amended 2015) Government Printers, Nairobi, Kenya.
9. Kenya National Bureau of Statistics, 2019
10. Kilifi County Integrated Development Plan, 2023-2027
11. Mining Act, 2016 Government Printers, Nairobi, Kenya
12. National Disaster Risk Management Policy, 2017. Government Printers, Nairobi, Kenya
13. Public Health Act (Cap. 242), 2012. Government printer, Nairobi, Kenya.
14. Sustainable Waste Management Act, 2022 Government Printers, Nairobi, Kenya.
15. The Explosives (Blasting Explosives) Rules, 1962. Government Printers, Nairobi, Kenya
16. The Occupational Safety and Health Act, 2007. Government Printers, Nairobi, Kenya
17. Water Act, 2016. Government Printers, Nairobi, Kenya.

9 LIST OF APPENDICES

1. Summary Environmental Impact Assessment Project Report(SPR) NEMA approval license
2. Copy of Certificate of Incorporation for Nitro Chemicals Limited
3. Copy of Pin Certificate for Nitro Chemicals Limited
4. Copy of the site layout plan and architectural drawing for the proposed project
5. Copy of the Bill of quantities
6. Copy of Land ownership documents
7. Copy of approval of plans by State Department of Mining and County Government of Kilifi
8. Copy of approval of the scoping report and Terms of Reference for the ESIA study
9. Copies of the baseline monitoring reports for ambient air, acoustic levels and soil tests
10. Proceedings of the first public participation meeting
11. Proceedings of the second public participation meeting
12. Proceedings of the third public participation meeting
13. Copy of the public consultation attendance lists
14. Copy of the draft EIA Study report validation meeting programme
15. Copy of NEMA practicing license for the firm, Envasses Environmental Consultants Limited
16. Copy of NEMA practicing license for Lead Expert, Mr. Simon Nzuki
17. Copy of NEMA e-citizen payment receipt

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
OFFICE OF THE COUNTY DIRECTOR OF ENVIRONMENT-KILIFI

NEMA GREEN POINT OFFICE KIMAWASCO COMPOUND
P.O BOX 247-80108 KILIFI, Email: Kilifi@nema.go.ke

APPROVAL NO: NEMA/SPA/10909
APPLICATION ID: NEMA/SPR/5/2/17587

12/28/2022

NEMA/SPR/KLF/5/2/723

NITRO CHEMICALS LTD

P.O. BOX 17897-00500 NAIROBI

RE: SUMMARY PROJECT REPORT APPROVAL FOR THE PROPOSED THE PROPOSED CONSTRUCTION OF A GODOWN PLOT L.R NO.: KAWALA "A'/405, KILIFI NORTH, KILIFI COUNTY

Reference is made to your Summary Project Report submitted to the Authority on 2022-12-23 on the above subject.

The National Environment Management Authority (NEMA) has reviewed the Summary Project Report of the above mentioned proposed project and in light of the provisions of the Environmental Management and Coordination Act, EMCA 1999 and pursuant to Section 3(b) of the Environmental (Impact Assessment and Audit) (Ammendment) Regulations, 2019 the Authority has approved the proposed project with the following mandatory conditions.

.....

28 DEC 2022

OYOO GEORGE PETER

FOR: DIRECTOR GENERAL

1.0 General Conditions

1.1. The license is issued for the proposed **construction of a godown.**

1.2. The license shall be valid for 24 months (time within which the project shall commence) from the date hereof.

1.3. The proponent shall provide the final project accounts (final project cost) on completion of construction phase. This should be done prior to project commissioning/operation/occupation.

1.4. Without prejudice to the other conditions of this license, the proponent shall implement and maintain an environmental management system, organizational structure and allocate resources that are sufficient to achieve compliance with the requirements and conditions of this license.

1.5. The Authority shall take appropriate action against the proponent in the event of breach of any of the conditions stated herein or any contravention to the Environmental Management and Co-ordination Act, Cap 387 and regulations thereunder.

1.6. This license shall not be taken as statutory defense against charges of pollution in respect of any manner of pollution not specified herein.

1.7. The proponent shall ensure that records on conditions of licenses/approval and project monitoring and evaluation shall be kept on the project site for inspection by NEMA's Environmental Inspectors.

1.8. The proponent shall submit an Environmental Audit Report in the first year of occupation/operation/commissioning to confirm the efficacy and adequacy of the Environmental Management Plan.

1.9. The proponent shall comply with NEMA's improvement orders throughout the project cycle.

2.0 Construction Conditions

2.1. The proponent shall put up a project signboard as per the Ministry of Public Works Standards showing the NEMA license number among other details.

2.2. In the event that the project site borders a river or a stream or ocean front, the proponent, pursuant to Regulation 6(c) of the Water Quality Regulations of 2006, shall protect the riparian reserve by ensuring that no development activity is undertaken within the full width of the river or stream to a minimum of six (6) meters and a maximum of 30 meters on either side, based on the highest recorded flood level.

2.3. The proponent shall construct an effective waste water treatment system.

2.4. The proponent shall ensure that adequate and appropriate sanitary facilities are provided for the workers during construction phase and that proper decommissioning of the facilities is carried out once construction is complete.

2.5. The proponent shall ensure strict adherence to the provisions of Environmental Management and Coordination (Noise and Excessive Vibrations Pollution Control) Regulation of 2009. The back-up generator should be operated to within permissible noise level limits.

2.6. The proponent shall ensure strict adherence to the Occupational Safety and Health Act (OSHA), 2007.

2.7. The proponent shall ensure that construction workers are provided with adequate personal protection equipment (PPE), as well as adequate training.

2.8. The proponent shall ensure that construction activities are undertaken during the day (and not at night) between 0800 hours and 1700 hours; and that transportation of construction material to site are undertaken during weekdays at off peak hours.

2.9. The proponent shall ensure strict adherence to the Environmental Management Plan developed throughout the project cycle.

2.10. The proponent shall ensure that the development adheres to zoning specifications issued for development of such a project within the jurisdiction of the **County Government of Kilifi**, National Construction Authority, and Ministry of lands with emphasis on approved land use for the area.

2.11. Obtain relevant approvals from mining and geology department before constructing the magazine within the warehouse.

28 DEC 2022

3.0 Operational Conditions

3.1. The proponent shall conduct a fresh EIA for any other activity/operation not specified in this license within the same plot and obtain EIA License.

3.2. The proponent shall obtain all requisite planning and development approvals before commencing operation.

3.3. The proponent shall ensure that there is fire-fighting preparedness, emergency response plan and easy access to effective fire-fighting equipment

3.4. The proponent shall ensure proper measures are documented to manage risks and incidences that may arise during operation

3.5. The proponent shall apply for effluent discharge license in accordance with Water Quality Regulations 2006.

3.6. The proponent shall apply for a provisional emission license within the first year of operation in accordance with Environmental Management and Coordination (Air Quality) regulations, 2014.

3.7. The proponent shall ensure that all waste water is disposed as per the standards set out in the Environmental Management and Coordination (Water Quality) Regulations of 2006.

3.8. The proponent shall ensure that all drainage facilities are maintained and where appropriate fitted with adequate functional oil/water interceptors.

3.9. The proponent shall ensure that all equipment used are well maintained in accordance with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations of 2009.

3.10. The proponent shall ensure that all solid waste is handled in accordance with the Environmental Management and Coordination (Waste Management) Regulations of 2006.

3.11. The proponent shall ensure that all workers are well protected and trained as per the Occupational Safety and Health Act (OSHA) of 2007.

3.12. The proponent shall comply with the relevant principal laws, by-laws and guidelines issued for development of such a project within the jurisdiction of the **County Government of Kilifi**, state department of lands, state department of housing, Architectural Association of Kenya, National Construction Authority (NCA) and other relevant Authority.

3.13. The proponent shall ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as **Effective Waste Water treatment plant/systems, solid waste segregation mechanism and respective well labelled reception bins** are designed, constructed and employed simultaneously with the proposed project.

3.14. Obtain relevant approvals from mining and geology department before operating the magazine within the warehouse.

4.0 Notification Conditions

4.1 The proponent shall ensure that the proposed mitigation measures are implemented during both construction and operation of the project.

4.2 The proponent shall seek written approval from the Authority for any operational changes under this license.

4.3 The proponent shall ensure that the Authority is notified of any malfunction of any system within 12 hours on the NEMA hotline No. **020 6006041/0786101100** and mitigation measures put in place.

4.4 The proponent shall keep records of all pollution incidences and notify the Authority within 24 hours.

4.5 The proponent shall notify the Authority in writing of its intent to decommission the **facility three (3)** months in advance

5.0 Decommissioning Conditions

5.1. The proponent shall ensure that a decommissioning plan is submitted to the Authority for approval at least three (3) months prior to decommissioning.

5.2. The proponent shall ensure that all pollutants and polluted material is contained and adequate mitigation measures provided during the phase.

28 DEC 2022.

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
OFFICE OF THE COUNTY DIRECTOR OF ENVIRONMENT-KILIFI

NEMA GREEN POINT OFFICE KIMAWASCO COMPOUND
P.O BOX 247-80108 KILIFI, Email: Kilifi@nema.go.ke

APPROVAL NO: NEMA/SPA/11036
APPLICATION ID: NEMA/SPR/5/2/17765

1/12/2023

NEMA/SPR/KLF/5/2/731

NITRO CHEMICALS LTD

P.O. BOX 17897-00500 NAIROBI

RE: SUMMARY PROJECT REPORT APPROVAL FOR THE PROPOSED THE PROPOSED CONSTRUCTION OF THREE (3) MAGAZINES WITH A HOLDING CAPACITY (1-20 TONS AND 2-MAGAZINES 40TONS EACH)-SPECIAL DESIGNED STRUCTURE TO STORE LOW OR HIGH EXPLOSIVE MATERIAL USED IN MINING AND DEMOLITION APPLICATION PLOT L.R NO.: KAWALA "A'/405', KILIFI SOUTH, KILIFI COUNTY

Reference is made to your Summary Project Report submitted to the Authority on 2023-01-09 on the above subject.

The National Environment Management Authority (NEMA) has reviewed the Summary Project Report of the above mentioned proposed project and in light of the provisions of the Environmental Management and Coordination Act, EMCA 1999 and pursuant to Section 3(b) of the Environmental (Impact Assessment and Audit) (Ammendment) Regulations, 2019 the Authority has approved the proposed project with the following mandatory conditions.

COUNTY DIRECTOR OF ENVIRONMENT
NEMA - KILIFI COUNTY
12 JAN 2023
P.O. Box 247 KILIFI

.....

OYOO GEORGE PETER

FOR: DIRECTOR GENERAL

1.0 General Conditions

1.1 This approval is for the construction of **three (3) Magazines with a holding capacity (1 – 20 tonnes and 2 – 40 tonnes each).**

1.2 The Director General shall be notified of any transfer, variation or surrender of this approval.

1.3 Without prejudice to the other conditions of this approval, the proponent shall implement and maintain an environmental management system, organizational structure and allocate resources that are sufficient to achieve compliance with the requirements and conditions of this approval.

1.4 The Authority shall take appropriate action against the proponent in the event of breach of any of the conditions stated herein or any contravention to the Environmental Management and Coordination Act, Cap 387 and regulations therein.

1.5 This approval shall not be taken as statutory defence against charges of environmental degradation or pollution in respect of any manner of degradation/pollution not specified herein.

1.6 The proponent shall ensure that records on conditions of approval and project monitoring and evaluation shall be kept on the project site for inspection by NEMA's Environmental Inspectors.

1.7 The proponent shall submit an Environmental Audit report in the first year of occupation/operations/commissioning to confirm the efficacy and adequacy of the Environmental Management Plan.

1.8 The proponent shall comply with NEMA's improvement orders throughout the project cycle.

2.0 Construction Conditions

2.1 The proponent shall obtain the requisite approvals from the County Government of Kilifi and all other relevant Authorities prior to commencement of works.

2.2 The proponent shall put up a project signboard as per the Ministry of Transport and Infrastructure standards indicating the NEMA EIA license number among other information.

2.3 In the event that the project site borders a river or a stream the proponent, pursuant to Regulation 6 (c) of the Water Quality Regulation 2006, shall protect the riparian reserve by ensuring that no development activity is undertaken within the full width of the river or stream to a minimum of six (6) meters and a maximum of 30 meters on either side based on the highest recorded flood level.

2.4 The proponent shall ensure that adequate and appropriate sanitary facilities are provided for the workers during construction phase and that proper decommissioning of the facilities is carried out once construction is complete.

2.5 The proponent shall ensure strict adherence to the building code of Kenya of 1968.

2.6 The proponent shall design and implement a concise traffic management plan duly approved by the Town Engineer and the Kenya Urban Roads Authority before commencement of works.

2.7 The proponent shall ensure strict adherence to the provisions of the Environmental Management and Coordination (Air Quality) Regulations of 2014.

2.8 The proponent shall ensure air pollution control measures are put in place to mitigate against any dust during the construction phase.

2.9 The proponent shall ensure that all excavated material and debris is collected, re-used and where need be, disposed off as per the Environmental Management and Coordination (Waste Management) Regulations of 2006.

COUNTY DIRECTOR ENVIRONMENT
NEMA - KILIFI COUNTY
12 JAN 2022
P.O. BOX 247 - 80108, KILIFI

3.10 The proponent shall ensure that all solid waste is handled in accordance with the Environmental Management and Coordination (Waste Management) Regulations of 2006.

3.11 The proponent shall ensure strict adherence to the Occupational Safety and Health Act (OSHA), 2007.

3.12 The proponent shall comply with the relevant principal laws, by-laws and guidelines issued for development of such a project within the jurisdiction of the County Government of Kilifi , Ministry of Lands, Housing & Urban Development, Ministry of Health, the Directorate of Occupational Health and Safety Services, Water Resources Authority, the Ministry of Industrialization and Enterprise Development, National Construction Authority, Kenya Bureau of Standards and other relevant Authorities.

3.13 The proponent shall obtain approval from department of Mines and Geology before operating the magazine.

3.14 The proponent shall ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as a functional soil erosion control scheme, installation of water and energy-saving fixtures, functional storm drainage system, emergency response fixtures/ plan, traffic management plan, effluent treatment plant, solid waste management plans, functional landscaping and tree planting, water quality testing and catchment protection mechanisms are constructed and employed simultaneously with the proposed project.

4.0 Notification Conditions

4.1 The proponent shall ensure that mitigation measures identified are implemented during both construction and operation.

4.2 The proponent shall seek written approval from the Authority for any operational changes under this license.

4.3 The proponent shall ensure that the Authority is notified of any malfunction of any system within 12 hours on the NEMA hotline No.**0786101100** and mitigation measures put in place.

4.4 The proponent shall keep records of all pollution incidences and notify the Authority within 24 hours.

4.5 The proponent shall notify the Authority in writing of its intent to decommission the facility **three (3) months** in advance.

5.0 Decommissioning Conditions

5.1 The proponent shall ensure that a decommissioning plan is submitted to the Authority for approval at least three (3) months prior to decommissioning.

5.2 The proponent shall ensure that all pollutants and polluted material is contained and adequate mitigation measures provided during the phase.

The above conditions will ensure environmentally sustainable development and must be complied with.

COUNTY DIRECTOR OF ENVIRONMENT
NEMA - KILIFI COUNTY
12 JAN 2023
P.O. Box 247-80108, KILIFI

No. C. 73165

CERTIFICATE OF INCORPORATION

I hereby Certify, that—

NITRO CHEMICALS LIMITED.....

is this day Incorporated under the Companies Act (Cap. 486) and that the Company is LIMITED.

Given under my hand at Nairobi this FOURTEENTH day

of OCTOBER One Thousand Nine Hundred and NINETY SIX

Snr. Dy. Registrar of Companies

NITRO CHEMICALS LIMITED
P. O. BOX 17897 - 00500
NAIROBI, KENYA

GPK 6788—10m—9/95

Kenya Revenue Authority

INCOME TAX DEPARTMENT

PERSONAL IDENTIFICATION NUMBER CERTIFICATE

PIN : P051151500Y

NAME : NITRO CHEMICALS LIMITED

DATE OF BIRTH :

PLACE OF BIRTH :

Date : 11/2/20[illegible]

Signature

FORM PIN 1

NITRO CHEMICALS LIMITED
P. O. BOX 17897 - 00500
NAIROBI, KENYA

PROPOSED DEVELOPMENT ON PLOT NO. KAWALA 'A'/405 KILIFI -COUNTY

CLIENT

NITRO CHEMICALS LTD

P.O. BOX 18897-00500

NAIROBI

BILLS OF QUANTITIES

DEMMBER 2022

ITEM NO	PRELIMINARIES	UNIT	AMOUNT KSHs
1	Site Office and Store	item	150,000.00
2	Sanitation	item	50,000.00
3	Insurance for Works	item	200,000.00
4	Performance Bond	item	200,000.00
5	Temporary Lighting and Power	item	100,000.00
6	Water	item	120,000.00
7	Safety	item	75,000.00
8	Sign Board	item	60,000.00
9	Security of Works	item	200,000.00
10	Removal of Rubbish and Cleaning	item	50,000.00
11	Setting out and levelling	item	200,000.00
	TOTAL PRELIMINARIES	**PR 1/1**	**1,405,000.00**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	BILL NO 02 **GO-DOWN** **ELEMENT NO 01** **SUBSTRUCTURE** **(ALL PROVISIONAL)** ***Excavation including maintaining and supporting sides and keeping free from water, mud and fallen materials***				
	Mass Excavation				
A	Excavate 0.00 - 1.50m deep starting from ground level, minimum depth 600mm deep	CM	621	449.00	278,710.46
	Excavate 0.00 - 1.50 deep starting from reduced level to receive :-				
B	Foundation trench	CM	158	449.00	70,942.00
C	Ditto to Column Bases	CM	118	449.00	52,982.00
D	Extra over excavations for excavating in rock Class I	CM	55	1,914.00	105,652.80
	Disposal of excavated materials				
E	Cart away surplus excavated material.	CM	621	794.00	492,864.38
F	Return, fill in and ram well selected excavated materials to make up levels around wall foundations.	CM	154	362.00	55,748.00
	Planking and strutting				
G	Allow for keeping foundations free from water, mud, fallen materials by pumping, bailing or other approved means, etc.	item			30,000.00
P	Ditto for planking and strutting.	item			30,000.00
	Backfilling				
M	Approved Murram filling; well rolled and compacted in layers not exceeding 300mm deep to 96% compaction at optimum moisture content	CM	1,448	522.00	756,056.45
	Concrete work				
	Plain concrete class 15 (mix 1:3:6)				
N	Blinding under strip footing	SM	105	430.00	45,150.00
P	Ditto to Column Bases	SM	79		
	Vibrated Reinforced Concrete: Class 25: in				
Q	Strip footing	CM	21	12,610.00	264,810.00
R	Column Bases	CM	28	12,610.00	353,080.00
S	Foundation Columns	CM	4	12,610.00	50,440.00
T	200mm Thick floor bed Treated with Sika Floor cure hard 24 or Equivalent	SM	1,035	2,100.00	2,173,500.00
V	Plinth Beam	CM	20	12,610.00	252,200.00
	Total carried to collection	**SB**	**2/-1-**		**5,012,136.10**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	Reinforcements				
	Deformed mild steel reinforcement to B.S 4449 in structural concrete work, grade 460B high strength type 2 Ribbed bars with proof stress of 460 N/mm2, including cutting, bending, hoisting, fixing, tying wire and spacer block				
	Strip Footing				
A	T 10mm bar	KG	381	169.00	64,389.00
B	T 8mm bar	KG	209	169.00	35,321.00
					-
	Column Bases				-
C	T 16mm bar	KG	1,295	169.00	218,855.00
					-
	Columns				-
D	T 8mm Bars	KG	99	169.00	16,731.00
E	T 12mm Bars	KG	373	169.00	63,037.00
F	T 16mm Bars	KG		169.00	-
					-
	Mesh fabric reinforcement to BS 4483: reference A252 weighing 3.95kg per square metre: 200mm laps: in Double Layer in:				-
G	Floor bed: (measured nett; allow for laps)	SM	2,070	945.00	1,956,150.00
	Formwork: to				
H	Column Bases	SM	74	655.00	48,470.00
J	Foundation Columns	SM	63	655.00	41,265.00
K	Sides Of Strip Footing	SM	44	655.00	28,820.00
L	Sides of PlinthBeam	Sm		655.00	-
M	Edges of Slab	LM	133	98.25	13,067.25
	Water proofing				
N	1000g Polythene damp proof membrane laid under floor bed with 300mm side and end laps (measured nett allow for laps)	SM	1,035	133.00	137,655.00
	Filling				
	Imported filling to excavations				
P	300mm thick Approved imported hardcore filling; well rolled and compacted in layers not exceeding 150mm deep to 96% compaction at optimum moisture content	SM	1,035	1,020.00	1,055,700.00
Q	50mm Thick stone dust blinding to hardcore surfaces (M.S)	SM	1,035	126.00	130,410.00
R	Supply and fix 600x600x25mm thick paving slab around the Go-down	SM	160	2,230.00	356,443.20
	Total carried to collection	**SB**	**2/-2-**		**4,166,313.45**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	Soil Poisoning				
	Antitermite treatment				
A	Chemical anti-termite treatment to subsoil or filling: RENTOKIL. or equal approved: provide a ten year guarantee	SM	1,035	348.00	360,180.00
	Walling				
	Quarry dressed natural stone wall: load bearing 7.0N/mm^2 ; bedded and jointed in cement and sand (1:3) mortar:				
B	200mm Thick walling: 1.50m high (average)	SM	263	1,992.00	523,896.00
	Plinths				
C	12mm cement/sand (1:3) render on masonry and concrete work	SM	60	382.00	22,920.00
D	Prepare and apply three coats bituminous paint on rendered surfaces	SM	60	390.00	23,400.00
	Total carried to collection below				930,396.00
	Collection				
	From Page SB -2/-1-				5,012,136.10
	From page SB -2/-2-				4,166,313.45
	From page SB -2/-3- Above				930,396.00
	Total Carried to Summary.	**SB -2/-3-**			**10,108,845.55**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 02				
	V.R.C SUPERSTRUCTURES				
	Vibrated Reinforced Concrete: Class 20: in				
A	Beams and gutter	CM	54	11,550.00	623,700.00
B	Columns	CM	21	11,550.00	242,550.00
C	225mm thick Suspended slab	SM	37	2,598.75	96,491.59
D	Staircase Starter and Steps	CM	2	11,550.00	23,100.00
E	Staircase Waist	SM	13	2,598.75	34,017.64
F	Staircase Landing	SM	3	2,598.75	7,432.43
	Reinforcements				
	Deformed mild steel reinforcement to B.S 4449 in structural concrete work, grade 460B high strength type 2 Ribbed bars with proof stress of 460 N/mm2, including cutting, bending, hoisting, fixing, tying wire and spacer block				
	Columns				
G	T 8mm bar	kg	539	169.00	91,091.00
H	T 12mm bar	kg	1,989	169.00	336,141.00
					-
	BEAMS/GUTTER				-
I	T 8mm Bars	KG	1,461	169.00	246,909.00
J	T 12mm Bars	KG	825	169.00	139,342.53
J	T 16mm Bars	KG	2,219	169.00	375,012.35
					-
	Staircase				-
K	T 10mm bar	kg	75	169.00	12,675.00
L	T 12mm bar	kg	413	169.00	69,797.00
					-
	Suspended Slab				-
M	T 8mm Bars	KG	134	169.00	22,646.00
N	T 10mm bar	kg	364	169.00	61,516.00
					-
	Formwork: to				-
R	Soffits of suspended slab	SM	37	655.00	24,320.15
S	Vertical sides of columns	Sm	273	655.00	178,815.00
T	Sides and soffits of Beam/gutter	Sm	721	655.00	472,255.00
V	Sloping soffites of staircase	Sm	7	655.00	4,323.00
W	Soffits of Landing	Sm	3	655.00	2,043.60
X	Edges of suspended floor slab: over 150 but not exceeding 225mm high.	Lm	26	147.38	3,831.75
Y	Edges of risers: over 150 but not exceeding 225mm high.	Lm	21	147.38	3,080.14
Z	Open string of staircase: to profile of steps: 300mm wide extreme	Lm	13	196.50	2,633.10
	Carried to summary		**-2/4-**		**3,073,723.27**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 03 **ROOFING** **STEEL CONSTUCTION** **(ALL PROVISIONAL)** All structural steelworks shall be in accordance with ASTM A500 KS02-104 Grade 250, all welding in accordance with BS5135 and bolts and nuts, grade 4.6 to BS4360. All steelwork shall be primed with red oxide before delivery to site. The rates shall allow for all cleats, gusset plates, stiffer plates etc. **Truss Type 01 (10No)**				
A	75X50X3mm SHS Rafters	KG	2,549	306.00	779,994.00
B	50X50x3mm SHS Struts and ties	KG	2,212	306.00	676,872.00
C	150X50X20X2mm zed Purlins	KG	3,918	306.00	1,198,908.00
D	12mm Anti sag bars	KG	384	169.00	64,904.11
E	75X75X6mm Bracings	KG	1,338	306.00	409,428.00
F	75x75x6mm M.S Plate	KG	420	306.00	128,520.00
G	6mm M.S plate	KG	1,400	306.00	428,400.00
	Painting and decoration				-
					-
					-
H	Prepare surfaces, apply primer, one undercoat and two finishing coats of 'Crown' or other equal and approved gloss oil paint on all steel work after erection (measured net overall	SM	1,062	409.00	434,256.57
					-
I	Allow for canopy to the entrance of Godown 9000mm x 2000mm wide	SM	18	17,400.00	313,200.00
					-
	Total for roof Construction carried to collection		**-2/5-**		**4,434,482.68**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ROOF FINISHES				
	28 Gauge galvanised IT5 Long Trough Steel Sheets Pre-painted with a "Resincot" Finish laid with 150mm end laps and single corrugation side lap fixed to steelwork with hook-bolts, nuts and washers as described:-				
A	Supply and fix 28 gauge resincoat pre-painted IT5 sheets as "Mabati Rolling Mills" or other equal and approved with and including necessary fixing materials	SM	1,062	1,972.00	2,093,774.94
B	Jumbolene insulation	SM	1,062	638.00	677,397.78
	Cyclone				
C	Cyclone with its accesssories ventelation	NO	8	22,968.00	183,744.00
D	Matching Ridge	M	85	1,149.00	97,665.00
	RAIN WATER GOODS				
	UPVC Rain water goods				
E	Extra over for 100 x 100 mm outlet.	No	4	1,021.00	4,084.00
F	Ditto for stopped ends.	No	4	1,021.00	4,084.00
G	100 x 100 mm down pipe fixed to walls with mild steel brackets at 1.50 m centres.	M	48	1,532.00	73,536.00
H	Extra over ditto for swan neck offset.	No	4	1,021.00	4,084.00
J	Ditto for splash shoe.	No	4	1,021.00	4,084.00
	COLLECTION				3,142,453.72
	From Page sup -2/5-				4,434,482.68
	From Page Sup -2/6- Above				3,142,453.72
	ELEMENT NO. 2-ROOFING				
	CARRIED TO SUMMARY OF BUILDERS WORKS		**-2/6-**		**7,576,936.40**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 04				
	WALLING				
	Masonry wall; load bearing 7.0 N/mm^2 ; bedded and jointed in cement and sand (1:3) mortar reinforced with 25mm x 20mm gauge hoop iron at every alternate course as described in;				
	External walling				
A	200mm Thick walling	SM	794	1,992.00	1,581,648.00
	Internal walling				
B	200mm Thick walling	SM	376	1,992.00	748,992.00
	Bituminous felt damp proof courses laid on and including leveling screed of cement mortar (mix 1:3)				
C	200mm Wide bituminous felt damp proof course	LM	176	248.00	43,648.00
	Total Carried to Summary		**-2/7-**		**2,374,288.00**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 05				
	STEEL CASEMENT WINDOWS				
	Woonden frame cypress with louvers and grill including glazing				
	Window size				
A	1500X1500mm High	NO	3	16,965.00	50,895.00
B	2000X1500mm High	NO	2	22,620.00	45,240.00
C	600X1500mm High	NO	1	6,786.00	6,786.00
D	600X600mm High	NO	1	2,715.00	2,715.00
	Concrete cement louvers				
E	3000 x 700 mm	NO	17	9,768.00	166,056.00
	Precast Concrete Window Cills				
F	***"First Quality" Clay flooring tiles and fittings as manufactured by "Kenya Clay Products Ltd" bedded and jointed in cement and sand 1:1 and pointed in tinted cement***				
G	Window cill, size 150x15mm	LM	10	955.00	9,263.50
	Total Carried to Summary		**-2/8-**		**280,955.50**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	Finishing to reveals				
	12 mm cement and sand (1:3) render,finished with woodfloat to:-				
A	Window and Door Reveals externally	SM	39	382.00	14,745.20
B	Plaster to External beams and columns	SM	474	382.00	181,068.00
	Painting and decorating				
	Exterior Paint to;				
C	Plastered Beams, Columns and reveals externally	SM	513	409.00	209,653.40
	Painting and Decorating				
D	Prepare surfaces and apply three coats gloss oil paint as 'Crown' or equal and approved manufacturer(s) on surfaces of steel casements and burglar proofing grills: measured overall on both sides over glass.	Sm	39	409.00	15,951.00
	COLLECTION				**421,417.60**
	From Page sup -2/8-				280,955.50
	From Page sup -2/9- Above				421,417.60
	Total For Windows Carried to Summary		**-2/9-**		**702,373.10**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 06				
	DOORS ***External Steel door***				
	Purpose made steel casement door manufactured from heavy duty frames and sections complete with steel hinges and pins fixed to masonry jambs and concrete heads and cill, with mastic pointing all round.				
A	Door overall size 4000 x 4000mm High	No	2	167,040.00	334,080.00
B	Door overall size 900 x 2400mm High	No	2	20,045.00	40,090.00
	Flush Doors				
E	50 mm thick solid cored flush doors to B.S. 459 part 2: mahogany veneered both sides: hardwood lipped edges: with and including birch laminate or wall nut finish to Architect's approval Door size 900 x 2400 mm including door fanlight internally.	No.	2	8,120.00	16,240.00
	Cypress Frames and Finishings				
F	200 x 50 mm rebated door frame	LM	13	1,392.00	18,374.40
G	40 x 20 mm splayed and rounded architrave	LM	11	464.00	5,289.60
H	20 mm quadrant	LM	16	348.00	5,637.60
	Total Carried to Collection		**-2/10-**		**419,711.60**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	Ironmongery				
	Supply and fix the following ironmongery to timber complete with matching screws and keys as per 'UNION' manufacturers (reference to a particular catalogue are given as a guide to type and quality only, other equal and approved alternatives may be used)				
A	150 mm Heavy duty aluminium tapered hinges: with aluminium pin and screws; stainless steel double ball bearing	PRS	3	1,392.00	4,176.00
B	Two lever mortice lock; with lever handles	No.	2	4,060.00	8,120.00
C	38mm Rubber floor mounted door stopper as UNION 8400 ; rawl bolted to concrete Painting	No.	4	348.00	1,392.00
	Prepare and apply one coat aluminium wood primer to back of frame before fixing to :-				-
D	Surfaces not exceeding 200 - 300 mm	LM	13	122.70	1,619.64
E	Prepare and apply three coats clear polyurethane varnish on general timber surfaces: measured overall on both sides	SM	9	409.00	3,533.76
	COLLECTION				**18,841.40**
	From Page sup -2/10-				419,711.60
	From Page sup -2/11- Above				18,841.40
	Total Doors Carried to Summary		**-2/11-**		**438,553.00**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 07 **METAL WORKS & BALUSTRADES** **STAIRCASE BALUSTRADING** **Mild steel** Supply & fix in mild steel 950mm Balustrade consisting of 50mm diameter x 3mm thick handrail welded to 40mm diameter x 3mm thick baluaters at 150mm centers, with 2No. 25mm diameter x 2mm thick intermidiate handrails, welded and arranged in approved pattern all to architects detail and approval. Rate to include griding all welds smooth after fixation				
A	Staircase	M2	7	5,220.00	36,540.00
	Total Carried to Summary		**-2/12-**		**36,540.00**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 07				
	INTERNAL FINISHES				
	FLOOR SCREEDING				
	Cement Sand (1:3) backings; With Wood Float Finish to Receive :				
A	28mm thick to Receive Ceramic Tiles (m.s)	SM	37	551.00	20,458.63
B	28mm thick to Receive Powerfloat finish (m.s)	SM	1,035	551.00	570,285.00
	Wall Backing				
	Cement Sand (1:3) backings; With Wood Float Finish to Receive Ceramic Tiles				
C	Masonry walling	SM	11	382.00	4,125.60
	Powerfloating to Ground Floor Slab				
D	Extra-over floor surface bed for 'Sikafloor - Quartztop ZA or equal and approved anti-dust concrete hardening additive; applied strictly in accordance with manufacturer's printed instructions. Including all necessary surface preparation. Apply smooth and polished machine power float finish to surface beds.	SM	1,035	770.00	796,950.00
	CERAMIC TILES				
	Coloured non-slip ceramic tiles as selected by the architect/Client.				
E	Floor Tiles	SM	68	1,949.00	131,557.50
F	Wall Tiles	SM	11	1,949.00	21,049.20
G	Landings	SM	3	1,949.00	5,613.12
H	Treads, 300 mm wide	LM	23	584.70	13,331.16
J	Risers, 150 mm high	LM	23	292.35	6,665.58
					-
	SKIRTING				-
K	Ceramic Skirting, size 20x100mm	LM	48	194.90	9,355.20
	CEILING				
L	Supply and fix 9mm softboard ceilng including skimming and painting,brandering	SM	34	2,330.00	79,220.00
	Total Carried to Collection		**-2/13-**		**1,658,610.99**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	MORTAR WORK- SUPPLY AND MIX PLASTER AS DETAILED IN :-				
	PLASTER WORK				
	12mm (minimum) Two coat cement sand plaster, with steel trowelled finish , as described to:-				
A	Soffits of suspended Slab	SM	37	382.00	14,183.66
B	Soffits of suspended Landings	SM	3	382.00	1,100.16
C	Slopping soffits of Stairs	SM	11	382.00	4,253.95
D	Masonry Walling Internally	SM	1,778	382.00	679,157.80
					-
	Prepare and apply three coats plastic emulsion paint				-
E	Plastered walls	SM	1,778	409.00	727,161.10
F	Plastered Soffits	SM	37	409.00	15,186.17
G	Soffits of suspended Landings	SM	3	409.00	1,177.92
H	Slopping soffits of Stairs	SM	11	409.00	4,554.62
	COLLECTION				**1,446,775.39**
	From Page sup -2/13-				1,658,610.99
	From Page sup -2/14- Above				1,446,775.39
	Total Internal Finishes Carried to Summary		**-2/14-**		**3,105,386.38**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 09 **EXTERNAL FINISHES** **Wall** ***Horizontal keys and flush perp ends with neat cement and sand (1:2) mortar***				
A	External Walls	SM	794	382.00	303,308.00
	Carried to Summary		**-2/15-**		**303,308.00**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 10 **Builder's Works in connection with services**				
A	Provide the Provisional Sum of Kenya Shillings Fifty Thousand Only for builder's works in connection with Mechanical and Electrical services comprising chasing, making holes, cutting, making good on masonry/ concrete surfaces	SUM			50,000.00
	Total carried to Summary		**-2/16-**		**50,000.00**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT No. 11				
	P.C. & PROVISIONAL SUMS				
	The following sums are to be expended in whole or in part thereof at the discretion of the Architect:-				
	Electrical Installations				
A	Allow a Provisional sum for **Electrical Installations**	Sum			**750,000.00**
	Mechanical Installations				
B	Allow a Provisional sum for **Mechanical Installations**	Sum			**375,000.00**
	TOTAL FOR P.C. & PROVISIONAL SUMS CARRIED TO SUMMARY		**-2/17-**		**1,125,000.00**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	SUMMARY				
1	Sub-Structures	SB -2/-3-			10,108,845.55
2	Concrete Superstructures	Sup	-2/4-		3,073,723.27
3	Roofing	Sup	-2/6-		7,576,936.40
4	Walling	Sup	-2/7-		2,374,288.00
5	Windows	Sup	-2/8-		702,373.10
6	Doors	Sup	-2/11-		438,553.00
7	Metal Works and balustrades	Sup	-2/12-		36,540.00
8	Internal Finishes	Sup	-2/14-		3,105,386.38
9	External Finishes	Sup	-2/15-		303,308.00
10	Builders work in connection with services	Sup	-2/16-		50,000.00
11	P.C. & Provisional Sums	Sup	-2/17-		1,125,000.00
	TOTAL CARRIED TO GRAND SUMMARY		**M-Store -2/18-**		**28,894,953.70**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	BILL NO 03 **MAGAZINE TYPE 01** **ELEMENT NO 01** **SUBSTRUCTURE** **(ALL PROVISIONAL)** ***Excavation including maintaining and supporting sides and keeping free from water, mud and fallen materials***				
	Mass Excavation				
A	Excavate 0.00 - 1.50m deep starting from ground level, minimum depth 600mm deep	CM	102	449.00	45,833.02
					-
	Excavate 0.00 - 1.50 deep starting from reduced level to receive :-				-
B	Foundation base	CM	153	449.00	68,697.00
					-
					-
	Disposal of excavated materials				-
C	Excavate to create soil buffer corne shaped as per drawing 8600 x 2400mm high	CM	255	449.00	114,530.02
					-
D	Return, fill in and ram well selected excavated materials to make up levels around wall foundations.	CM	47	362.00	17,014.00
					-
	Planking and strutting				-
E	Allow for keeping foundations free from water, mud, fallen materials by pumping, bailing or other approved means, etc.	item			5,000.00
					-
F	Ditto for planking and strutting.	item			5,000.00
					-
	Backfilling				-
G	Approved imported Murram filling; well rolled and compacted in layers not exceeding 300mm deep to 96% compaction at optimum moisture content	CM	102	522.00	53,284.72
					-
	Concrete work				-
	Plain concrete class 15 (mix 1:3:6)				-
H	Blinding under base	SM	170	430.00	73,155.90
					-
	Vibrated Reinforced Concrete: Class 25: in				-
I	Base	CM	42	12,610.00	529,620.00
J	Magazine Wall	CM	44	12,610.00	554,840.00
					-
					-
	Total carried to collection	**SB**	**3/-1-**		**1,466,974.66**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	Reinforcements **Deformed mild steel reinforcement to B.S 4449 in structural concrete work, grade 460B high strength type 2 Ribbed bars with proof stress of 460 N/mm2, including cutting, bending, hoisting, fixing, tying wire and spacer block**				
	Base Footing				
A	T 10mm bar	KG	1,779	169.00	300,651.00
B	T 16mm bar	KG	2,664	169.00	450,216.00
					-
	Magazine wall 1				-
C	T 10mm bar	KG	1,681	169.00	284,089.00
D	T 12mm Bars	KG	2,748	169.00	464,412.00
					-
	Magazine wall 2				-
E	T 10mm Bars	KG	1,736	169.00	293,384.00
F	T 12mm Bars	KG	2,210	169.00	373,490.00
					-
	Beam				-
G	T 8mm Bars	KG	139	169.00	23,491.00
H	T 20mm Bars	KG	598	169.00	101,062.00
I	T 25mm Bars	KG	1,173	169.00	198,237.00
					-
	Cover slab				-
J	T 8mm Bars	KG	806	169.00	136,214.00
K	T 10mm Bars	KG	671	169.00	113,399.00
L	T 16mm Bars	KG	2,557	169.00	432,133.00
					-
	Formwork: to				-
H	Bases	SM	13	655.00	8,515.00
J	Magazine wall	SM	349	655.00	228,333.00
K	Sides and soffits of Beam	SM	43	655.00	28,335.30
L	Soffits of suspended slab	Sm	141	655.00	92,125.75
M	Edges of Slab	LM	50	98.25	4,912.50
					-
	Filling				-
	Imported filling to excavations				-
					-
P	300mm thick Approved imported hardcore filling; well rolled and compacted in layers not exceeding 150mm deep to 96% compaction at	SM	168	1,020.00	171,349.80
					-
Q	50mm Thick stone dust blinding to hardcore surfaces (M.S)	SM	168	126.00	21,166.74
					-
R	Supply and fix 600x600x25mm thick paving slab around the Go-down	SM	58	2,230.00	129,518.40
					-
	Total carried to collection	**SB**	**3/-2-**		**3,855,034.49**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	Soil Poisoning				
	Antitermite treatment				
A	Chemical anti-termite treatment to subsoil or filling: RENTOKIL. or equal approved: provide a ten year guarantee	SM	168	348.00	58,460.52
					-
	Plinths				-
C	12mm cement/sand (1:3) render on masonry and concrete work	SM	36	382.00	13,752.00
D	Prepare and apply three coats bituminous paint on rendered surfaces	SM	36	390.00	14,040.00
	Total carried to collection below				86,252.52
	Collection				
	From Page SB -3/-1-				1,466,974.66
	From page SB -3/-2-				3,855,034.49
	From page SB -3/-3- Above				86,252.52
	Total Carried to Summary.	**SB**	**-3/3-**		**5,408,261.67**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 02				
	DOORS				
	External Steel door				
	Purpose made steel casement door manufactured from heavy duty frames and 3mm ms plate sections complete with steel hinges and pins fixed to concrete jambs and concrete heads and cill, complete with lockable mechanism mecha				
A	Door overall size 1000 x 2500mm High	No	2	92,800.00	185,600.00
					-
	painting				-
B	Prepare and apply three coats gloss oil paint on general metal surfaces	SM	10	409.00	4,090.00
					-
C	Allow for 75dia. Pvc vent with wire gauge	NO	20	580.00	11,600.00
	Total Carried to Summary	**SP**	**-3/4-**		**201,290.00**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 03				
	INTERNAL FINISHES				
	FLOOR SCREEDING				
	Cement Sand (1:3) backings;				
A	28mm thick to screed	SM	134	551.00	74,010.32
					-
	WALL BACKING				-
	Cement Sand (1:3) backings; With Wood Float Finish				-
B	Concrete walling	SM	195	382.00	74,604.60
					-
	PLASTER WORK				-
	12mm (minimum) Two coat cement sand plaster, with steel trowelled finish , as described to:-				-
C	Soffits of suspended Slab	SM	130	382.00	49,728.76
					-
	Wood linning				-
					-
D	50 x 50mm thick brandering to wall	LM	784	464.00	363,776.00
E	25mm thick pine wood linning on wall	SM	112	2,320.00	259,840.00
					-
	EXTERNAL FINISHES				-
	Wall				-
	12mm (minimum) Two coat cement sand plaster, with wood float finish , as described to:-				-
F	External Walls	SM	146	382.00	55,772.00
					-
	ROOF TOP				-
					-
	WATERPROOFING FLAT ROOF SLAB				-
	FLOOR SCREEDING				-
	Cement Sand (1:3) backings; With Wood Float Finish to Receive Waterproofing compound				-
G	28mm thick to Receive waterproofing	SM	141	551.00	77,498.15
					-
	Prepare and spray waterproofing compound applied by a specialist and with a 10 year guarantee				-
H	To Flat Terrace slab	SM	141	833.00	117,161.45
					-
	Rainwater Disposal				-
	uPVC pipe or other equal and approved rainwater pipes, with and including matching clips at 500mm centres screwed to the walls to detail				-
I	110 mm diameter rainwater downpipes	LM	12	1,532.00	18,384.00
J	Extra for shoe.	NO.	8	1,021.00	8,168.00
K	100mm diameter approved domed fulbora	NO	8	5,800.00	46,400.00
					-
	Carried to Summary	**SP**	**-3/5-**		**1,145,343.28**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 04				
	Lightenning Conductor(L.C)				
A	Black round tube 75dia.x3mm thick including L.C and painting	LM	18	2,590.00	46,620.00
	Carried to Summary	**SP**	**-3/6-**		**46,620.00**

ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	SUMMARY				
1	Sub-Structures/Frames	SB	-3/3-		5,408,261.67
2	Doors	SP	-3/4-		201,290.00
3	Finishes	SP	-3/5-		1,145,343.28
4	L.C	SP	-3/6-		46,620.00
	TOTAL FOR MAGAZINE TYPE 1 CARRIED TO GRAND SUMMARY				**6,801,514.95**
			2NO.		13,603,029.90
	TOTAL FOR MAGAZINE TYPE 1 40TN (2NO.) CARRIED TO GRAND SUMMARY	**SP '-3/7-**			**13,603,029.90**

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	BILL NO 03 **MAGAZINE TYPE 02** **ELEMENT NO 01** **SUBSTRUCTURE** **(ALL PROVISIONAL)** ***Excavation including maintaining and supporting sides and keeping free from water, mud and fallen materials***				
	Mass Excavation				
A	Excavate 0.00 - 1.50m deep starting from ground level, minimum depth 600mm deep	CM	55	449	24,537
					0
	Excavate 0.00 - 1.50 deep starting from reduced level to receive :-				0
B	Foundation base	CM	82	449	36,818
					0
					0
	Disposal of excavated materials				0
C	Excavate to create soil buffer corne shaped as per drawing 8600 x 2400mm high	CM	137	449	61,355
					0
D	Return, fill in and ram well selected excavated materials to make up levels around wall foundations.	CM	34	362	12,308
					0
	Planking and strutting				0
E	Allow for keeping foundations free from water, mud, fallen materials by pumping, bailing or other approved means, etc.	item			5,000
					0
F	Ditto for planking and strutting.	item			5,000
					0
	Backfilling				0
G	Approved imported Murram filling; well rolled and compacted in layers not exceeding 300mm deep to 96% compaction at optimum moisture content	CM	55	522	28,526
					0
	Concrete work				0
	Plain concrete class 15 (mix 1:3:6)				0
H	Blinding under base	SM	91	430	39,164
					0
	Vibrated Reinforced Concrete: Class 25: in				0
I	Base	CM	24	12,610	302,640
J	Magazine Wall	CM	33	12,610	416,130
					0
	Total carried to collection	**SB**	**4/-1-**		**931,479**

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	Reinforcements				
	Deformed mild steel reinforcement to B.S 4449 in structural concrete work, grade 460B high strength type 2 Ribbed bars with proof stress of 460 N/mm2, including cutting, bending, hoisting, fixing, tying wire and spacer block				
	Base Footing				
A	T 10mm bar	KG	1,142	169	192,998
B	T 16mm bar	KG	1,728	169	292,032
					0
	Magazine wall 1				0
C	T 10mm bar	KG	1,552	169	262,288
D	T 12mm Bars	KG	2,396	169	404,924
					0
	Magazine wall 2				0
E	T 10mm Bars	KG	886	169	149,734
F	T 12mm Bars	KG	1,371	169	231,699
					0
	Beam				0
G	T 8mm Bars	KG	139	169	23,491
H	T 20mm Bars	KG	598	169	101,062
I	T 25mm Bars	KG	1,173	169	198,237
					0
	Cover slab				0
K	T 10mm Bars	KG	1,035	169	174,915
L	T 16mm Bars	KG	1,618	169	273,442
					0
	Formwork: to				0
H	Bases	SM	11	655	7,205
J	Magazine wall	SM	349	655	228,333
K	Sides and soffits of Beam	SM	43	655	28,335
L	Soffits of suspended slab	Sm	73	655	47,769
M	Edges of Slab	LM	34	98	3,370
					0
	Filling				0
	Imported filling to excavations				0
					0
P	300mm thick Approved imported hardcore filling; well rolled and compacted in layers not exceeding 150mm deep to 96% compaction at optimum moisture content	SM	91	1,020	92,902
					0
Q	50mm Thick stone dust blinding to hardcore surfaces (M.S)	SM	91	126	11,476
					0
R	Supply and fix 600x600x25mm thick paving slab around the Go-down	SM	41	2,230	91,519
					0
	Total carried to collection	**SB**	**4/-2-**		**2,815,731**

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	Soil Poisoning				
	Antitermite treatment				
A	Chemical anti-termite treatment to subsoil or filling: RENTOKIL. or equal approved: provide a ten year guarantee	SM	91	348	31,696
					0
	Plinths				0
C	12mm cement/sand (1:3) render on masonry and concrete work	SM	27	382	10,314
D	Prepare and apply three coats bituminous paint on rendered surfaces	SM	27	390	10,530
	Total carried to collection below				52,540
	Collection				
	From Page SB -4/-1-				931,479
	From page SB -4/-2-				2,815,731
	From page SB -4/-3- Above				52,540
	Total Carried to Summary.	**SB**	**-4/3-**		**3,799,750**

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 02				
	DOORS				
	External Steel door				
	Purpose made steel casement door manufactured from heavy duty frames and 3mm ms plate sections complete with steel hinges and pins fixed to concrete jambs and concrete heads and cill, complete with lockable mechanism mecha				
A	Door overall size 1000 x 2500mm High	No	2	92,800	185,600
					0
	painting				0
B	Prepare and apply three coats gloss oil paint on general metal surfaces	SM	10	409	4,090
					0
C	Allow for 75dia. Pvc vent with wire gauge	NO	20	580	11,600
	Total Carried to Summary	**SP**	**-4/4-**		**201,290**

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 03				
	INTERNAL FINISHES				
	FLOOR SCREEDING				
	Cement Sand (1:3) backings;				
A	28mm thick to screed	SM	73	551	40,184
					0
	WALL BACKING				0
	Cement Sand (1:3) backings; With Wood Float Finish				0
B	Concrete walling	SM	131	382	50,023
					0
	PLASTER WORK				0
	12mm (minimum) Two coat cement sand plaster, with steel trowelled finish , as described to:-				0
C	Soffits of suspended Slab	SM	61	382	23,264
					0
	Wood linning				0
					0
D	50 x 50mm thick brandering to wall	LM	784	464	363,776
E	25mm thick pine wood linning	SM	86	2,320	199,520
					0
	EXTERNAL FINISHES				0
	Wall				0
	12mm (minimum) Two coat cement sand plaster, with wood float finish , as described to:-				0
H	External Walls	SM	103	382	39,346
					0
	ROOF TOP				0
					0
	WATERPROOFING FLAT ROOF SLAB				0
	FLOOR SCREEDING				0
	Cement Sand (1:3) backings; With Wood Float Finish to Receive Waterproofing compound				0
I	28mm thick to Receive waterproofing	SM	73	551	40,184
					0
	Prepare and spray waterproofing compound applied by a specialist and with a 10 year guarantee				0
J	To Flat Terrace slab	SM	73	833	60,751
					0
	Rainwater Disposal				0
	uPVC pipe or other equal and approved rainwater pipes, with and including matching clips at 500mm centres screwed to the walls to detail				0
K	110 mm diameter rainwater downpipes	LM	12	1,532	18,384
L	Extra for shoe.	NO.	8	1,021	8,168
M	100mm diameter approved domed fulbora	NO	8	5,800	46,400
					0
	Carried to Summary	**SP**	**-4/5-**		**890,000**

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	ELEMENT NO 04				
	Lightenning Conductor(L.C)				
A	Black round tube 75dia.x3mm thick including L.C and painting	LM	12	2,590	31,080
	Carried to Summary	**SP**	**-4/6-**		**31,080**

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	SUMMARY				
1	Sub-Structures/Frames	SB	-4/3-		3,799,750
2	Doors	SP	-4/4-		201,290
3	Finishes	SP	-4/5-		890,000
4	L.C	SP	-4/6-		31,080
	TOTAL FOR MAGAZINE TYPE 2 (20.TN) CARRIED TO GRAND SUMMARY	**SP '-4/7-**			**4,922,120**

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT KSHs
	BILL NO 5 **PROVISIONAL SUMS - NOMINATED SUB-CONTRACT SERVICES** **GENERAL CONTINGENCY ALLOWANCE**				
A	Provide a Provisional for General contingency to be spent in whole or in part at the discretion of the Architect with client approval	P.S			2,200,000
B	Power connection to GO.Down	P.S			150,000
C	Allow for pit latrine	P.S			150,000
D	Allow for chainlink 2400mm high with concrete post to magazine and warehouse compound (950lm long)	P.S			2,375,000
D	Allow for gate house	P.S			218,750
E	Allow for 3no. Gate(6mx2.4m high0	P.S			648,000
	Total carried to collection	**PC -5/1-**			**5,741,750**

GRAND SUMMARY

BILL NO	DESCRIPTION	PAGE NO	AMOUNT KSHS
1	PRELIMINARIES	PR 1/1	1,405,000
2	MAIN STORES -(2NO.)	M-Store -2/18-	28,894,954
3	MAGAZINE (40TN.) TYPE 1(2NO.)	SP '-3/7-	13,603,030
4	MAGAZINE (20TN.) TYPE 2	SP '-4/7-	4,922,120
5	PROVISIONAL SUMS	PC -5/1-	5,741,750
	TOTAL CONSTRUCTION COST INLUSIVE VAT		54,566,854

CLIENT

NAME : NITRO CHEMICAL LTD

Signature of Client.....

Address.....

Date.....

CONTRACTOR

NAME:..... Kaylee Construction Company Limited

Signature of Contractor.....

Address ..... Mikindani Mombasa

Date..... 06/01/2023

KAYLEE CONSTRUCTION CO. LTD
BUILDING & CIVIL
ENGINEERING CONTRACTORS
BOX 81141 CODE 80100
MOMBASA

REPUBLIC OF KENYA

CT

SALE No.

ORIGINAL

DEPARTMENT OF LANDS

1783310

FEE RECEIPT

Station Kilifi 18-2- 20 11

ed

Received from Karsan Ramji & Sons Ltd	Nature of Fee	Sh.	cts.
of	Certificate of Title	500	
	Registration		
	Search Certificate		
	Opening New Register		
	Attestation		
	Inspection		
	Copying		
	Conveying/Preparation		
Cash / Cheque			
By the sum of Shillings Five thousand five hundred only	Survey Fees		
	Rent		
	Stand Premium		
	Stamp Duty		
cents	Land Adjudication Fees	5000	
As per marginal statement nature of transaction Title Deed & Adj fees	Deposits		
Title Number Kilifi/Kawala 'A'/405			
for COMMISSIONER OF LANDS	TOTAL KSh.	5500	

REPUBLIC OF KENYA

THE REGISTERED LAND ACT

(Chapter 300)

Title Deed

Title Number KAWALA 'A' KILIFI/405

Approximate Area 9.34 Ha.

Registry Map Sheet No. 48

This is to certify that KARSAN RAMJI & SONS LTD

is (are) now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the KILIFI District Land Registry this 9TH day of NOVEMBER 2010

Land Registrar

(To be completed only when the applicant has paid the fee of Sh. 125)

At the date stated on the front hereof, the following entries appeared in the register relating to the land:

EDITION: 1

OPENED: 9.11.2010

PART A—PROPERTY SECTION

REGISTRATION SECTION	EASEMENTS, ETC.	NATURE OF TITLE
KAWATA 'A' KADZONZO		
PARCEL NUMBER: 405		ABSOLUTE
APPROXIMATE AREA: 9.34 Ha.		
REGISTRY MAP SHEET No.: 48		

PART B—PROPRIETORSHIP SECTION

ENTRY NO.	DATE	NAME OF REGISTERED PROPRIETOR	ADDRESS AND DESCRIPTION OF REGISTERED PROPRIETOR	CONSIDERATION AND REMARKS	SIGNATURE OF REGISTRAR
1	9.11.2010	KARSAN RAMJI & SONS LTD	P.O. BOX 82914 MOMBASA		A. T. Karani
2	9.11.2010	TITLE DEED	ISSUED		

PART C—ENCUMBRANCES SECTION

ENTRY NO.	DATE	NATURE OF ENCUMBRANCE	FURTHER PARTICULARS	SIGNATURE
			-NIL- A. T. Karani 251	

A. T. Karani 251

REPUBLIC OF KENYA

MINISTRY OF MINING, BLUE ECONOMY & MARITIME AFFAIRS

STATE DEPARTMENT FOR MINING

When replying please quote
Ref. No. CP/XM/68/(128)
Please address all replies to:

The Regional Mining Officer

MOMBASA REGIONAL OFFICE
MVITA HOUSE
P.O. Box 85420-80100
MOMBASA

Date: 16th January, 2023

The Director,
Nitro Chemicals Ltd,
P.O. Box 17897-00500,
NAIROBI.

Dear Sir,

RE: CONSTRUCTION OF EXPLOSIVES MAGAZINES ON PLOT LR No.: KAWALA 'A' KADZONZO/405, KILIFI NORTH, KILIFI COUNTY

The above subject refers.

This is to inform you that your application to construct explosives magazines on the above location has been approved after meeting all the requirements including submission of magazines designs and site plan drawings in addition to other approvals.

You may therefore commence the construction of the magazines which must be done as per the approved designs/plans and in accordance with the provisions of the Explosives Act, Explosives Rule 39(1).

During the different stages of construction, you are expected to liaise with this office for inspection and guidance and upon completion, notify this office so as to conduct final inspection prior to licensing.

Yours faithfully,

Francis W. Kamau
PRINCIPAL SUPT. INSPECTOR OF EXPLOSIVES
COAST REGION

Copy to: Director of Mines,
Madini House, Nairobi.

COUNTY GOVERNMENT OF KILIFI

DEPARTMENT OF LANDS, ENERGY, HOUSING, PHYSICAL PLANNING & URBAN DEVELOPMENT

Dept Email: ...
When Replying please quote:

DEVELOPMENT CONTROL UNIT
P.O. BOX 519
KILIFI, KENYA

Date: 22nd Decenber. 2022

FORM PLUPA 2
THE PHYSICAL AND LAND USE PLANNING ACT OF 2019

Application Reg: CGK/P/MRK/452/2022

1. Sub-division
2. Consolidation
3. Change of use
4. Extension of use
5. Extension of lease
6. **Development plan**

NITRO CHEMICALS LTD
P.O. BOX 17897-00500
NAIROBI

RE: NOTIFICATION OF APPROVAL OF PROPOSED GODOWNS AND MAGAZINES ON PLOT No. KAWALA 'A'/405-KILIFI COUNTY

Your application number as above submitted on **20th December, 2022** in seeking for permission as indicated above is approved by the County Government on **22nd December, 2022** subject to the following conditions.

1. Notifying the County Government of Kilifi in writing 48 hours prior to commencement of ANY construction works.
2. To execute the proposal in **strict** conformity with the development proposals approved by the County Government of Kilifi.
3. To ensure that there is continuous inspection during construction by our officers in conjunction with your site Engineer and the Architect.
4. An **E.I.A** project report must be prepared, submitted and approved before the construction commences as provided under EMCA of 1999.
5. Property is **free** from **encumbrances** and that it is not the subject of litigation.
6. Filling in the indemnity form to indemnify the officer approving the application against any structural or civil short comings.
7. Subject to the proponent's personal liability on the structural shortcoming during and after construction. (Physical Planning Regulations of 1998)
8. Subject to the provisions of the **National Construction Authority Act. of 2011.**
9. Not constituting part of disputed **public/private** land or **public utility land.**
10. Satisfying all other legal requirements of your application.

COUNTY GOVERNMENT OF KILIFI
COUNTY DEVELOPMENT CONTROL OFFICER
22 DEC 2022
APPLICATION APPROVED

County Development Control Officer
Housing, Physical Planning & Urban Development
For: County Executive Committee Member
Lands, Energy, Housing, Physical Planning & Urban Development

TOR 554

NCL NITRO CHEMICALS LTD.

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Environmental Impact Assessment (EIA) Study Report for the Proposed Explosives Storage Facility on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County.

Terms of Reference

Proponent	Firm of Experts
Nitro Chemicals Limited P.O Box 17897-00500 Nairobi, Kenya.	Envasses Environmental Consultants Limited P.O. Box 2013-80100, Nairobi, Kenya. Tel: +254722347155 Email: info@envasses.org

Date: 27th March 2023

RECEIVED
30 MAR 2023

Approved
30/3/2023

ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING.

PROJECT: THE PROPOSED EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY.

PROPONENT: NITRO CHEMICALS LIMITED,
P.O BOX 17897-00500.
NAIROBI, KENYA.

REPORT REFERENCE NUMBER: 50123-024 A

LAHVENS LIMITED

ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED CONSTRUCTION OF MINING EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY

FOR:

NITRO CHEMICALS LIMITED
P.O BOX 17897-00500
NAIROBI, KENYA.

CLIENT ADDRESS:

LAHVENS LIMITED
P.O BOX 34153, 80118
TEL. NO. +254110093237
EMAIL: LAHVENS@LAHVENS.COM

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED
P. O BOX 2013 - 80100
RALLI HOUSE BUILDING, 1ST FLOOR,
MOMBASA, KENYA

ENVIRONMENTAL CONSULTANTS:

This Technical report titled ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED CONSTRUCTION OF MINING EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY was authored by Lahvens Limited in accordance to the EMC (Air Quality) Regulation 2014.

REVISION HISTORY

03	23-05-2023	Issuance of Final Report
02	22-05-2023	Re-submission to close the given comments and approvals
01	17-05-2023	1st draft issue of the soft copy submitted for review
REV	**DATE**	DESCRIPTION

Accepted by			
Reviewed & Approved by	LOVANS ROBERT SPOO (ENVIRONMENTAL MANAGER) N.E.R. NO.: 7165		23-05-2023
Prepared by	VINCENT AGIN - FIELD ATTENDANT		23-05-2023
	VALENTINE AGUTU - FIELD ATTENDANT		23-05-2023
PROJECT	Name	Signature	Date
DOCUMENT No.:	50123-024 A		REVISION: 00 FINAL

REPORT NO. 50123-024 A	CONTRACT NO. AS PER EL / EECL TOR.	CLASSIFICATION: A – Unclassified (open report)
TEST FIRM CONTACT PERSON: LOVANS SPOO: (254 – 728716948)	PROJECT: PROPOSED CONSTRUCTION OF MINING EXPLOSIVES STORAGE FACILITY.	NUMBER OF PAGES: 33
TITLE: ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED CONSTRUCTION OF MINING EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY.		
AUTHOR(S): LOVANS ROBERT SPOO, VINCENT OKUMU, VALENTINE AGUTU		QUALITY CONTROLLER: SAMSON OBIYA
REPORT PREPARED FOR: NITRO CHEMICALS LIMITED		DOCUMENT REF. NO. **50123-024A-FED**
ABSTRACT: LAHVENS Ltd was commissioned by Envasses Environmental Consultants Limited to form the Project's Environmental Team (ET) in providing consulting services of environmental baseline air quality concentrations prior to commencement / execution of the PROPOSED CONSTRUCTION OF MINING EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY.		
ENGLISH TITTLE		
KEYWORDS		
EBS Ambient Air Quality monitoring and Consultant Reporting		
ABSTRACT (in ENGLISH)		
PUBLICATION TYPE: Digital document (pdf)		LAHVENS LIMITED P.O. BOX 34153-80118 MOMBASA KENYA TUDOR, TOM MBOYA STREET, H03

EXECUTIVE SUMMARY

The proposed project will involve the construction, operation and possible decommissioning of two go-downs and three magazines. The proposed project will be located on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County at GPS co-ordinates Latitude 3^{0}54'05" S, and Longitude 39^{0}31'32" E. The site is accessed via an earth road off the Mombasa-Nairobi Highway at SS Mehta and Sons Company junction and approximately 2km from Kokotoni market.

The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines. The proposed site is bordered by Karsan Ramji & Sons-Kokotoni quarry to the South, Dhanjal Brothers Limited to the East and residential homes to the West and North.

The proposed project will involve the construction, operation and possible decommissioning of two go-downs and three magazines (Figure 2). The two go-downs will be built on ground level and mezzanine floor to house ammonium nitrate; and the three (3) magazines of holding weight capacity of 100 tons (where one (1) magazine will hold 20 tons and two (2) magazines will hold 40 tons each) explosive weight increasing its safety factor. The magazines will be designed in a special structure to store low or high explosive materials used in mining and demolition applications. One of the magazines will house detonators material while the other two magazines will house gelignite materials

Under the Second Schedule of the Environmental Management and Co-ordination Act (EMCA) No. 8 of 1999, the proposed project is listed as high-risk projects which should undergo Environmental Impact Assessment (EIA) study process. Pursuant to Section 58 of the Act, the proponent contracted Envasses Environmental Consultants Limited to prepare an EIA Study Report for the proposal. As part of this authorization process Lahvens Limited was commissioned by Envasses Environmental Consultants Limited to form the Project's Environmental Team (ET) in providing testing services of baseline air quality environment prior to commencement of the construction of the storage facilities.

Environmental Baseline Study is a significant component of monitoring programs for some successful construction activities. Baseline monitoring commences at the reconnaissance phase and continues to incorporate in the feasibility study. It includes all relevant environmental, economic and social issues.

The objective of this Baseline Report is to present the existing air environment in the proposed storage facility and its vicinity. Atmospheric environment has been selected as a valued component because of their fundamental significance to the well-being of humans, flora and fauna.

This Environmental Baseline Study is designed to characterize the environmental resources at the proposed site prior to erection of the explosives storage facility. EBS will provide a benchmark and reference against which to compare the environmental conditions influenced by the construction, operation and closure phases of the storage facility. 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.

The scope of this baseline Report included the study of the available information relevant to the pre-development ambient air concentration in the environment; identification of the major existing air emission sources in the environment; identification of the existing sensitive pollution areas in the environment; and estimation by means of measurements and integration of the results with those of any relevant existing information the present ambient air and noise vibration quality.

The proposed project site was subdivided into four survey locations to accommodate all boundaries to the East, West, North and South. The survey locations were referenced as PB1 to PB4. The compartmentation of the locations also took care of the wind directions.

Five categories of pollutants are measured at the monitoring networks at the proposed explosives storage facility in Kokotoni. The monitored categories of pollutants are sulphur dioxide (SO_2); oxides of nitrogen (NO_x) (which includes nitric oxide (NO) and nitrogen dioxide (NO_2)); carbon monoxide (CO); 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 (PM_{10}) and ozone (O_3). Volatile organic compounds, (VOCs) were also measured. The study includes monitoring over a 1-hour period for six pollutants.

For the purpose of the baseline investigation, samples were taken on site on the 8th day of May 2023 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. Mobile and active monitoring was done by use of real time gas detector-pump suction equipment which integrates the main ambient gases and meteorological parameters and particulate counter meter. The gas sensitive semiconductor (GSS) sensor uses proprietary sensing material, built in automatic Correction (ABC) and interference rejection. This combination results in ppb resolution and a highly linear response.

The gas sensitive electrochemical (GSE) sensors generate nano-amp currents proportional to the gas concentration. The GSE uses low noise electronics to capture these signals resulting in low detection levels. The non-dispersive infrared (NDIR) sensor uses infra-red light, a narrow band-pass filter and photodiode to measure the intensity of light at the gas absorption band. The light intensity is proportional to the gas concentration.

The laser particle counter (LPC) for Particulate Matter (PM) measurements uses optimized signal processing using low noise electronics added algorithms to correct for interferences.

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

Results and Observation:

Sensitive receptors;

The neighborhood is characterized by residential homes to the West and North which could act as sensitive receptors once the operations of the proposed storage facility begins. Kokotoni market is also located 2km away from the project site.

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.

From the site visits the following sources been identified as potential pollution causes;

Exhaust gases;

Heavy commercial vehicles / trucks were observed moving in and out of the Karsan Ramji & Sons-Kokotoni quarry located to the South and Dhanjal Brothers Limited located to East. Vehicular exhausts contain a number of pollutants including carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NOx), 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.

Heavy commercial vehicles / trucks 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 feeder roads moving in to the main entrance. Pulverization and abrasion of surface materials by application of truck mechanical forces generate substantial amount of dust.

Quarrying activities;

The concentration of dust at the proposed site could have resulted from the quarrying and mining of material which are responsible for the generation of fine dust whereas drilling, blasting, and loading were responsible for emission of higher fraction of PM_{10}.

It is confirmed that background levels did not exceed the permissible levels.

The ambient air quality data measured and the meteorological parameters around the project area are considered to be within a typical range of emissions for the neighborhood.

Gaseous parameters, particulate parameters and environmental parameters recorded within the required permissible levels.

All gaseous parameters were measured and quantified at all survey stations.

Particulate parameters concentrations were measured and quantified at all survey stations.

Both gaseous and particulate parameters COMPLIED with the EMC (Air quality) regulations 2014 limits.

There were showers during the survey that could have affected the concentration levels of dust recorded.

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1. INTRODUCTION

"The proposed project will involve the construction, operation and possible decommissioning of two go-downs and three magazines. The proposed project will be located on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County at GPS co-ordinates Latitude 3^{0}54'05" S, and Longitude 39^{0}31'32" E. The site is accessed via an earth road off the Mombasa-Nairobi Highway at SS Mehta and Sons Company junction and approximately 2km from Kokotoni market.
The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines. The proposed site is bordered by Karsan Ramji & Sons-Kokotoni quarry to the South, Dhanjal Brothers Limited to the East and residential homes to the West and North." (Envasses Environmental Consultants Ltd, 2023)

Under the Second Schedule of the Environmental Management and Co-ordination Act (EMCA) No. 8 of 1999, the proposed project is listed as high-risk projects which should undergo Environmental Impact Assessment (EIA) study process. Pursuant to Section 58 of the Act, the proponent contracted Envasses Environmental Consultants Limited to prepare an EIA Study Report for the proposal.

As part of this authorization process Lahvens Limited was commissioned by Envasses Environmental Consultants Limited to form the Project's Environmental Team (ET) in providing testing services of baseline air quality environment prior to commencement of the construction of the storage facilities.

Environmental Baseline Study is a significant component of monitoring programs for some successful construction activities. Baseline monitoring commences at the reconnaissance phase and continues to incorporate in the feasibility study. It includes all relevant environmental, economic and social issues.
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 Impact assessment (EIA) and approval process.
The objective of this Baseline Report is to present the existing air environment in the proposed storage facility and its vicinity. Atmospheric environment has been selected as a valued component because of their fundamental significance to the well-being of humans, flora and fauna.
This Environmental Baseline Study is designed to characterize the environmental resources at the proposed site prior to erection of the explosives storage facility. EBS will provide a benchmark and reference against which to compare the environmental conditions influenced by the construction, operation and closure phases of the storage facility. The information will be used to assess the effectiveness of any proposed mitigation measures and to implement adaptive management, if needed.
The environmental baseline study will collect, assess, and interpret enough physical, chemical and biological information to: (i) support the characterization of the resources at risk; (ii) enable determination of possible impacts; (iii) help predict the significance of impacts and the effectiveness of any proposed mitigation; (iv) establish thresholds for indicators of ecosystem health; and (v) 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 decomissioned.

1.1. Project Description

"The proposed project will involve the construction, operation and possible decommissioning of two go-downs and three magazines (Figure 2). The two go-downs will be built on ground level and mezzanine floor to house ammonium nitrate; and the three (3) magazines of holding weight capacity of 100 tons (where one (1) magazine will hold 20 tons and two (2) magazines will hold 40 tons each) explosive weight increasing its safety factor. The magazines will be designed in a special structure to store low or high explosive materials used in mining and demolition applications. One of the magazines will house detonators material while the other two magazines will house gelignite materials." (Envasses Environmental Consultants Limited, 2023).

1.2. Scope of work

The scope of this baseline Report will be as follows:

- Study the available information relevant to the pre-development ambient air concentration in the environment;
- Identify the major existing air emission sources in the environment;
- Identify the existing sensitive pollution areas in the environment;
- Estimate by means of measurements and integration of the results with those of any relevant existing information the present ambient air quality.

1.3. Monitoring Locations and Climatic Features

The proposed project site was subdivided into four survey locations to accommodate all boundaries to the East, West, North and South. The survey locations were referenced as PB1 to PB4. The compartmentation of the locations also took care of the wind directions.

Table 1: GPS coordinates of proposed storage facility

Measurement Sites	Receivers	Description of monitoring Locations	Dates of sampling
Project boundary 1 S 3°54´10.3176" E 39°31´30.3132" (WEST)	Residential homes	The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines.	08th May 2023
Project boundary 2 S 3°53´53.4264" E 39°31´46.9272" (NORTH)	Residential homes	The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines.	08th May 2023
Project boundary 3 S 3°53´58.4808" E 39°31´48.9576" (EAST)	Dhanjal Brothers Limited	The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines.	08th May 2023
Project boundary 4 S 3°54´09.6120" E 39°31´40.3896" (SOUTH)	Karsan Ramji & Sons-Kokotoni quarry	The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines.	08th May 2023

1.3.1. Land Use and Topography

The proposed site is currently un-developed and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines. The proposed site is bordered by Karsan Ramji & Sons-Kokotoni quarry to the South, Dhanjal Brothers Limited to the East and residential homes to the West and North.

1.3.2. Meteorological information

Climate is influenced by monsoon winds with the rainfall pattern being characterized into long rains (April-June with an average of 1040mm) and short rains (end of October to December with an average of 240mm). The average annual rainfall for the county is 640mm. The annual mean temperature in the county is 27.90C with a minimum of 22.70C and a maximum of 33.10C. The hottest month is February with a maximum average of 33.10C while the lowest temperature is in July with a minimum average of 22.70C. On average, the temperatures are always high in Kokotoni. Most rainfall (rainy season) is seen in April, May, October and November. On average, the warmest month is March and on average, the coolest month is September. May is the wettest month and February is the driest month.

On average, the temperatures in Kokotoni are always high. The warmest month is March and the coolest month is July. The average annual maximum temperature is: 87.8° Fahrenheit (31.0° Celsius) and the average annual minimum temperature is 69.8° Fahrenheit (21.0° Celsius).

On average, the windiest months in Kokotoni are May and June while the least wind is seen in November. Figure 8 below is the mean monthly wind speed (meters per second).

1.3.3. Socio-economic background

The proposed project site is to be at Kokotoni area of Kaliangombe Sub-location, Rabai location, Rabai Sub-County, Kilifi County.
Most farmers in the County are subsistence and most of the purchased inputs are certified seeds. There is limited use of both organic and inorganic fertilizers. Most of the farm holdings are less than a hectare. The County"s variety of micro-climates makes the area suitable for the production of a variety of crops such as mangoes, cashew nuts, maize, beans, pigeon peas and cow peas. The main livestock enterprises include Dairy Cattle, Beef Cattle, Poultry, Sheep, Goats, Pigs, Rabbits and Bee-keeping. The major potentials which exist in the fisheries subsector include mariculture development; exploitation of deep sea fisheries; ice production for fish preservation; acquisition, securing and development of fish landing sites; empowering of fishers to enhance sustainable utilization of fisheries resources.

Tourism is one of the most important economic activities in the County. The major tourist attractions in the County are historic sites; topography; flora and fauna; water sports and recreation; cultural attractions and agro-tourism. The industries in the County are manufacturing industries. Most of them are medium and smallscale enterprises. Small-scale Jua Kali cottage industries are also available in the County. Smallscale manufacturing industries have emerged and they manufacture goods such as Neem Soap and Wood Carvings.

Kilifi County is rich in minerals; mainly titanium and iron ore, that have spurred extensive industrial mining activities. Other minerals extracted include barites, galena, rubies, pozzolana, gypsum and limestone. Salt mining and sand harvesting have been carried out over the years to take advantage of the sandy, salty waters. While these are economically lucrative, they are equally responsible for destruction of its mangrove forests.

1.3.4. Roads and transport

The movement of people for socio-economic and cultural activities depends on good transport and communication system. A good road network provides access to the markets, health and other social facilities and also reduces incidences of insecurity. The improvement of telephone services has made it easier to communicate within the County and other outside areas. This has improved efficiency in service delivery and decision making. The improvement in the communication system makes the communities who can contribute to their development.

1.4. Terms of Reference

As part of the Terms of Reference (ToR), air quality measurements was undertaken in compliance with the EMC (Air quality) regulations 2014 framework legal notice 34.
The following forms the scope 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 (PM_{10} and $PM_{2.5}$)

  Gases - sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO) and Ozone (O_3).

1.5. Aims and Objectives

- The overall aim of this report is to report the state of atmospheric air quality environment of the proposed explosives storage facility on Kokotoni, Kilifi county.
- To assess compliance at the perimeters bordering the proposed explosives storage facility on Kokotoni, through comparisons against the EMC (Air quality) regulations 2014 framework.

1.6. Assumptions

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

1.7. 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

1.8. Definitions.

Table 2: 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
l/min	Liters per minute
µg/m3	Microgram per cubic meter
mg/m3	Milligram per cubic meter
m/s	Meters per second
Mm/s	Millimeters per second
NEMA	National Environment Management Authority
NO_x	Oxides of Nitrogen
NO_2	Nitrogen dioxide
Pb	Lead
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

2. MONITORING NETWORKS

Five categories of pollutants are measured at the monitoring networks at the proposed explosives storage facility in Kokotoni. The monitored categories of pollutants are sulphur dioxide (SO_2); oxides of nitrogen (NO_x) (which includes nitric oxide (NO) and nitrogen dioxide (NO_2)); carbon monoxide (CO); 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 (PM_{10}) and ozone (O_3). Volatile organic compounds, (VOCs) were also measured. The study includes monitoring over a 1-hour period for six pollutants.

2.1. Oxides of Nitrogen (NOx)

In a combustion process, NOx is produced through three mechanisms, namely thermal NOx, fuel NOx and prompt NOx. Thermal NOx is the primary source of NOx 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 NOx is generally achieved through reducing the flame temperature, reducing the residence time, or by operating under fuel rich conditions. Fuel NOx 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 NOx can account for up to 50% of the total NOx emissions. Prompt NOx 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 NOx emissions. Generally, up to 10% of the NOx 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. 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. 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 (PM10) 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 (PM2.5) 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.

2.3. 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:

$$HC + O2 \rightarrow CO2 + H2O$$

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.

2.4. Sulphur Dioxide (SO2)

Levels of sulphur dioxide (SO_2) 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 SO_2, with the remaining 2% producing sulphur trioxide (SO_3). The emitted SO2 can also further oxidize to SO_3 and react with water to produce acid rain in the form of sulphuric acid (H_2SO_4).

Short-term exposures to SO_2 have shown adverse respiratory effects including bronchoconstriction and increased asthma symptoms.

2.5. Ozone (O_3)

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

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.

2.6. Total Volatile Organic compounds (TVOC)

Mobile sources of air pollutants include heavy vehicles used in excavation operations, cars that transport personnel at the mining site, and trucks that transport mining materials. The level of polluting emissions from these sources depends on the fuel and conditions of the equipment. Even though individual emissions can be relatively small, collectively these emissions can be of real concern. In addition, mobile sources are a major source of particulate matter, carbon monoxide, and volatile organic compounds that contribute significantly to the formation of ground-level ozone.

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 PM_{10}, $PM_{2.5}$, SO_2, NO_2, and CO. Statutory requirements relevant to this study FIRST SCHEDULE are detailed in Table 3 below:

Table 3: 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/m3	0.12 PPM	-

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

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 consist of four representative monitoring locations. Information for the report is presented based on air monitoring completed for 1-hour weighted average.
For the purpose of the baseline investigation, samples were taken on site on the 8th day of May 2023 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.

Gaseous parameters:

Mobile and active monitoring was done by use of real time gas detector-pump suction equipment which integrates the main ambient gases and meteorological parameters and particulate counter meter.

The gas sensitive semiconductor (GSS) sensor uses proprietary sensing material, built in automatic Correction (ABC) and interference rejection. This combination results in ppb resolution and a highly linear response.

The gas sensitive electrochemical (GSE) sensors generate nano-amp currents proportional to the gas concentration. The GSE uses low noise electronics to capture these signals resulting in low detection levels.

The non-dispersive infrared (NDIR) sensor uses infra-red light, a narrow band-pass filter and photodiode to measure the intensity of light at the gas absorption band. The light intensity is proportional to the gas concentration.

Particulate matter

The laser particle counter (LPC) for Particulate Matter (PM) measurements uses optimized signal processing using low noise electronics added algorithms to correct for interferences.

An aerosol particle counter works on the principal of either light scattering or light blocking. An aerosol stream is drawn through a chamber with a light source (either Laser Based Light or White Light). When a particle is illuminated by this light beam, it is redirected or absorbed. Light scattered by a single particle in a specific direction in relation to the original direction has a unique signature which relates to the size of the particle. This allows for sizing and counting of individual particles.

Meteorological parameters
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). In order to keep the effects of external influences (e.g. solar radiation) as low as possible, these sensors are located in a ventilated housing with radiation protection. In contrast to conventional non-ventilated sensors, this allows significantly more accurate measurement during high radiation conditions.

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.

4.1. 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

Ongoing measurements (source: Fieldwork May, 2023)

4.2. Monitoring Frequency

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

4.3. Existing air quality environment

The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines. The proposed site is bordered by Karsan Ramji & Sons-Kokotoni quarry to the South, Dhanjal Brothers Limited to the East and residential homes to the West and North. The main source of existing air pollution are fugitive emissions of dust particles and gaseous emissions from the surrounding quarries. The trucks accessing these quarries also add up the gaseous emissions from the fuel combusted during movement and idling.

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/m³	PM_{10} µg/m³	CO mg/m³	SO_2 ppm	NO_2 ppm	NO ppm	O_3 ppm	TVOC µg/m³	HUMIDITY %	TEMPS ^0C
Project boundary 1 S 4°11´51.888″ E 39°35´9.402″	39.0	48.0	0.28	0.018	0.028	<0.001	0.015	<0.001	64.0	28.2
Project boundary 2 S 4°11´51.906″ E 39°35´7.332″	42.0	52.0	0.35	0.022	0.031	<0.001	0.021	<0.001	62.0	28.3
Project boundary 3 S 4°11´54.492″ E 39°35´5.808″	33.0	40.0	0.27	0.020	0.037	<0.001	0.017	<0.001	63.0	27.9
Project boundary 4 S 4°11´56.112″ E 39°35´7.962″	37.0	45.0	0.30	0.019	0.026	<0.001	0.015	<0.001	67.0	28.0
Average Concentration	**37.75**	**46.25**	**0.3**	**0.0198**	**0.0305**	**<0.001**	**0.017**	**<0.001**	**64**	**28.1**

(Source: Site monitoring in MAY 2023).

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)	
PB-1	0.028	0.5	0.018	0.191	0.28	4.0	0.015	0.12	Complies
PB-2	0.031	0.5	0.022	0.191	0.35	4.0	0.021	0.12	Complies
PB-3	0.037	0.5	0.020	0.191	0.27	4.0	0.017	0.12	Complies
PB-4	0.026	0.5	0.019	0.191	0.30	4.0	0.015	0.12	Complies

5.1.3. Particulate matter (PM_{10})

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

Monitoring Locations	*PARTICULATE MATTER ≤10 (PM_{10})*			
	Sampling time	Concentration ($\mu g/m^3$)	Guideline ($\mu g/m^3$)	Remarks
PB-1	1 hour	48.0	-	No guideline for short term emissions
PB-2	1 hour	52.0	-	No guideline for short term emissions
PB-3	1 hour	40.0	-	No guideline for short term emissions
PB-4	1 hour	45.0	-	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 ($\mu g/m^3$)	Guideline ($\mu g/m^3$)	Remarks
PB-1	1 hour	39.0	-	No guideline for short term emissions
PB-2	1 hour	42.0	-	No guideline for short term emissions
PB-3	1 hour	33.0	-	No guideline for short term emissions
PB-4	1 hour	37.0	-	No guideline for short term emissions

5.1.5. Environmental parameters

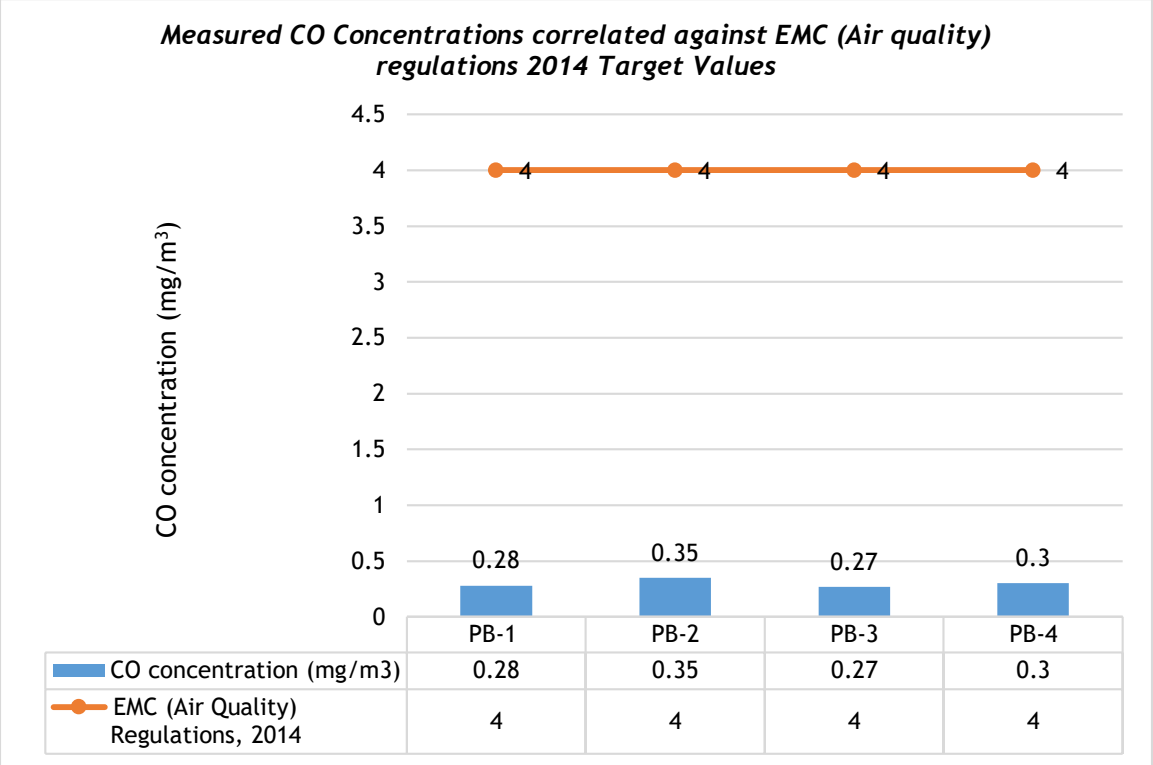
Table 8: Results for Environmental parameters

Monitoring Locations	Environmental parameters				*Remarks*
	Air temps °C	Pressure hPa	Humidity %	Wind Speed km/hr	
PB-1	28.2	1010	64.0	20 km/hr North wind	Ambient conditions present
PB-2	28.3	1010	62.0	20 km/hr North wind	Ambient conditions present
PB-3	27.9	1010	63.0	20 km/hr North wind	Ambient conditions present
PB-4	28.0	1010	67.0	20 km/hr North wind	Ambient conditions present
AVERAGES	**28.1**	**1010**	**64.0 %**	**20 km/hr North wind**	Ambient conditions present

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

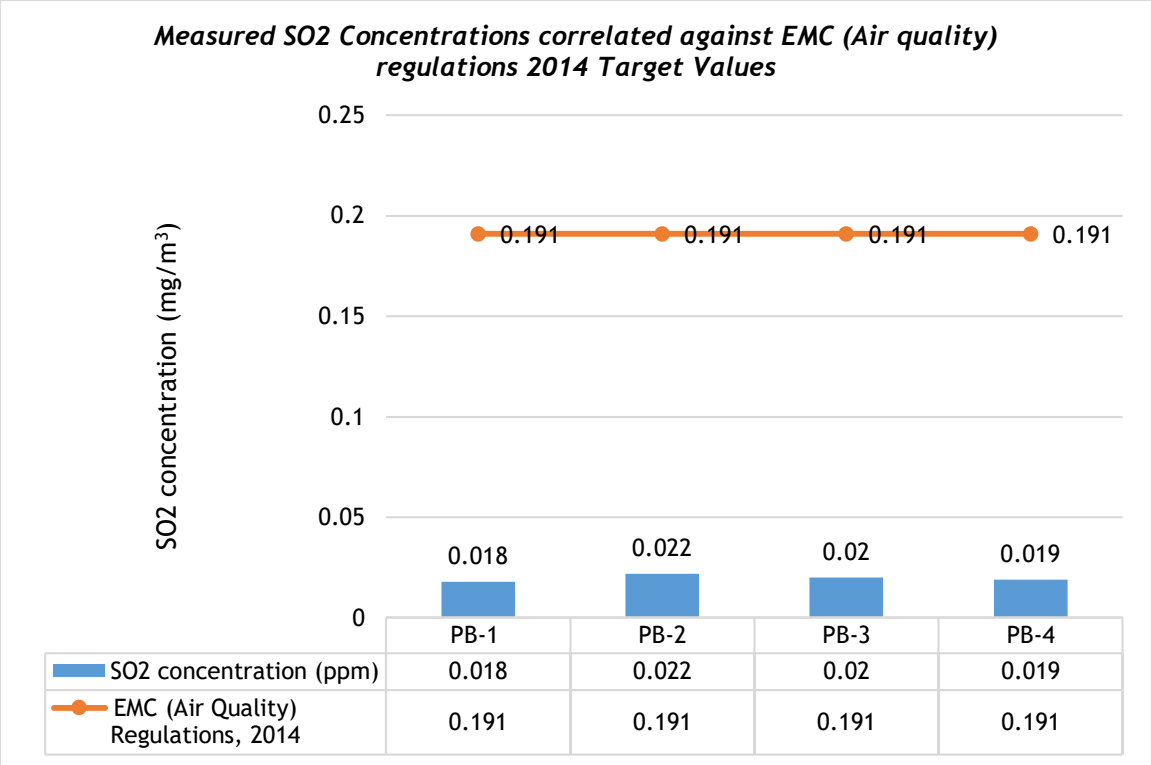


The maximum 1 - hour CO concentration was observed to be 0.35 mg/m^3 at PB-2 while the minimum 1-hour CO concentration was observed to be 0.27 mg/m^3 at PB-3. The maximum and minimum results are 100.00% in compliance of the TOR limits.

All CO concentrations recorded in the proposed project sites complied with the EMC (Air quality) regulations 2014 of 4.0 mg/m^3 before implementation of the proposed storage facility.

The concentration levels of carbon monoxide recorded across the four locations showed some form of consistency therefore, no signs of notable outliers influenced the concentration of CO.

5.2.2. Sulfur dioxide



	PB-1	PB-2	PB-3	PB-4
SO2 concentration (ppm)	0.018	0.022	0.02	0.019
EMC (Air Quality) Regulations, 2014	0.191	0.191	0.191	0.191

The statistical analysis for the 1-hr monitoring of SO_2 as described in the TOR was completed.

The results for the sulfur dioxide (SO_2) concentrations were notably below the air quality guidelines.

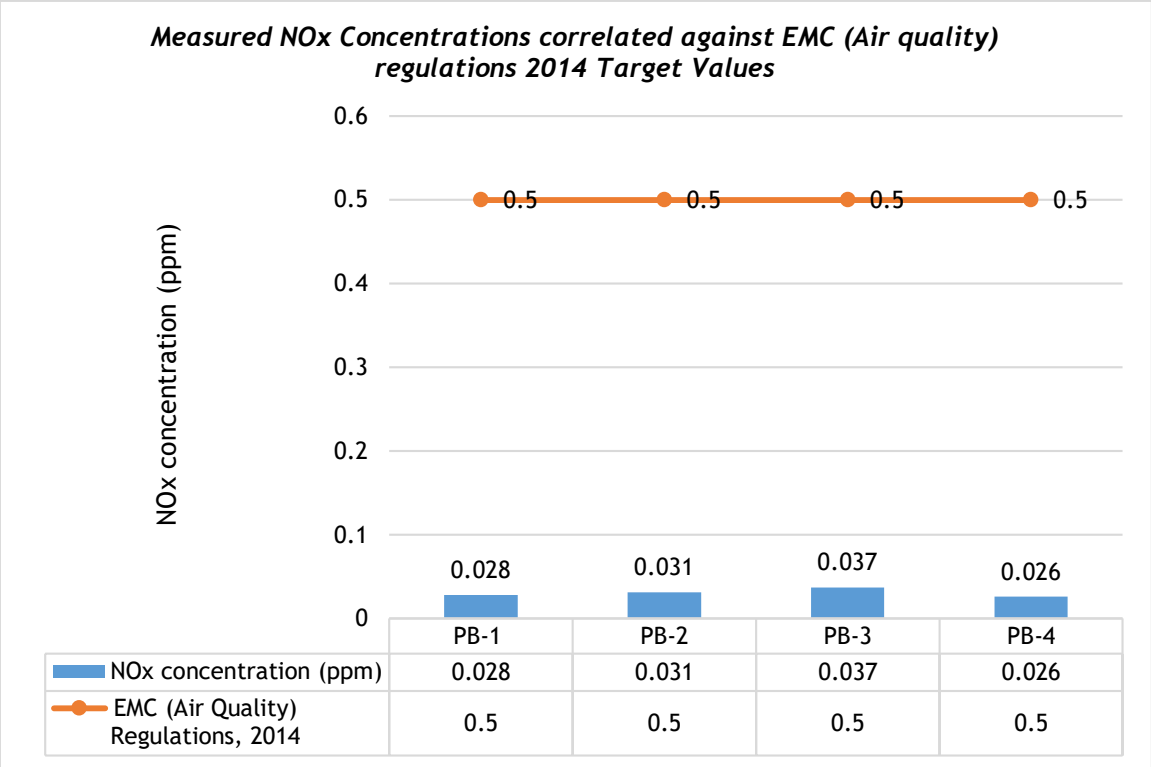
The maximum 1-hour SO_2 concentration of 0.022 ppm was recorded at PB-2 while the minimum SO_2 concentration of 0.018 ppm was recorded at PB-1. Sulfur dioxide concentrations recorded across survey locations PB-2 and PB-3 marginally surpassed the ambient concentrations (0.02 ppm).

The concentration levels of sulfur dioxide recorded across all survey locations were somewhat consistent therefore, no signs of notable outliers influenced the concentration of SO_2.

There was no instant peak exceedance of the AAQTL of 0.191 ppm thus the frequency of exceedance was zero.

This result is 100.00% in compliance of the EMC (Air quality) regulations 2014 maximum limits before implementation of the proposed storage facility.

5.2.3. Nitrogen oxides



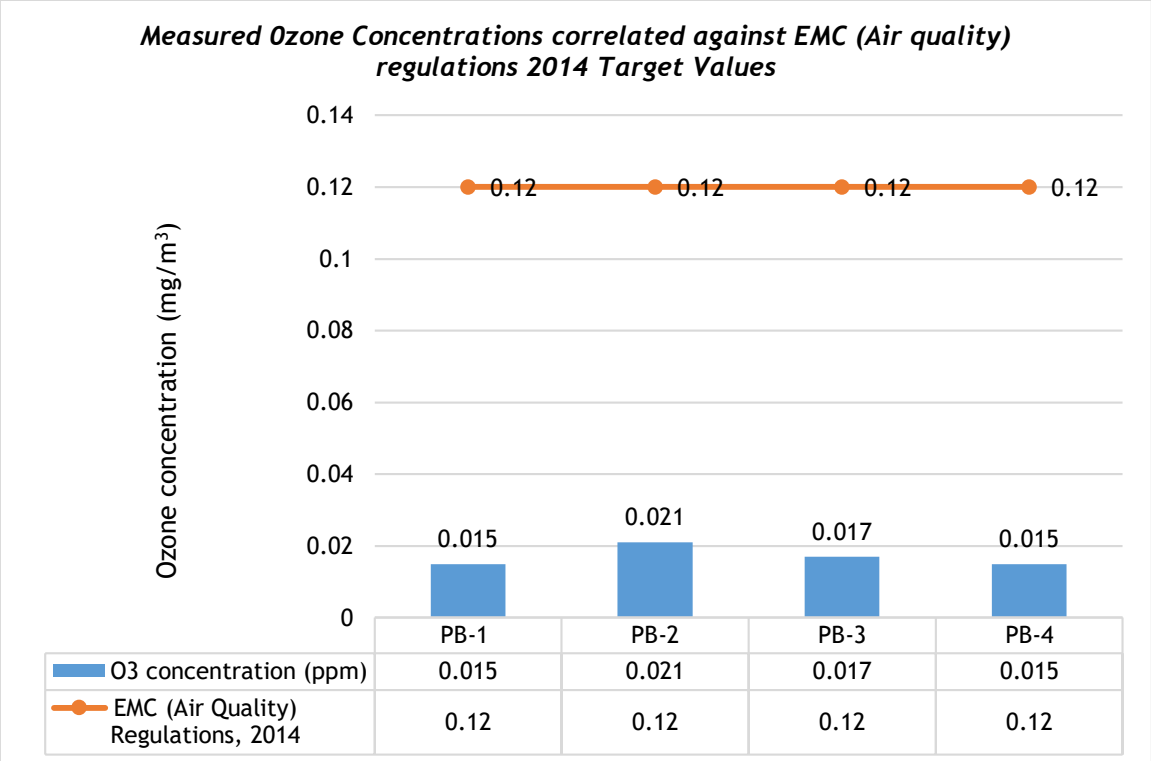
The statistical analysis for 1-hr monitoring of NO_X as outlined in the TOR was completed at four survey sites. The results for the nitrogen oxide (NO_X) concentrations measured below the air quality guidelines.

The maximum 1-hour NO_X concentration (0.037 ppm) was recorded at PB-3 while the minimum 1-hour NO_x concentration (0.026 ppm) was recorded at PB-4. Nitrogen dioxide concentrations recorded at all the four locations were within the ambient levels (0.05ppm).

There were no 1-hour exceedance of the AAQTL of 0.5 ppm thus the frequency of exceedance was zero. The concentrations of NOx at the survey locations were 100.00% in compliance of the EMC (Air quality) regulations 2014 maximum limits before implementation of the proposed storage facility.

The concentration levels of nitrogen oxides recorded across all the four survey locations were fairly consistent therefore, no signs of notable outliers influenced the concentrations of NOx.

5.2.4. Ozone



The statistical analysis for 1-hr monitoring of ozone as outlined in the TOR was completed at four boundary locations.

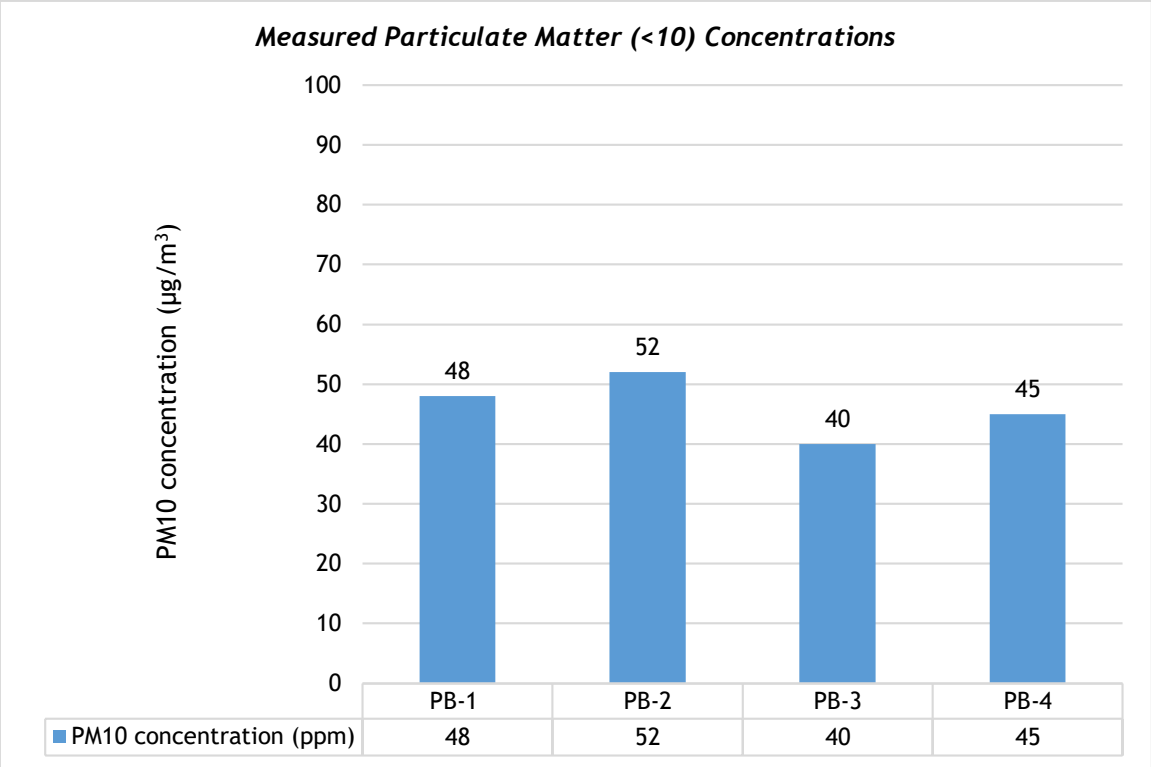
The maximum ozone concentration (0.021 ppm) was recorded at PB -2. The minimum 1-hour OZONE concentration (0.010 PPM) was observed at PB-1 & PB-4.

All ozone concentrations recorded in the project sites complied with the EMC (Air quality) regulations 2014 of 0.12 ppm before implementation of the proposed storage facility.

There was no exceedance of the 1-hour AAQTL of 0.12 ppm thus the frequency of exceedance was zero.

The concentration levels of ground ozone recorded across all survey locations were averagely consistent therefore, no signs of notable outliers influenced the concentration of ozone.

5.2.5. Particulate matter (PM_{10})



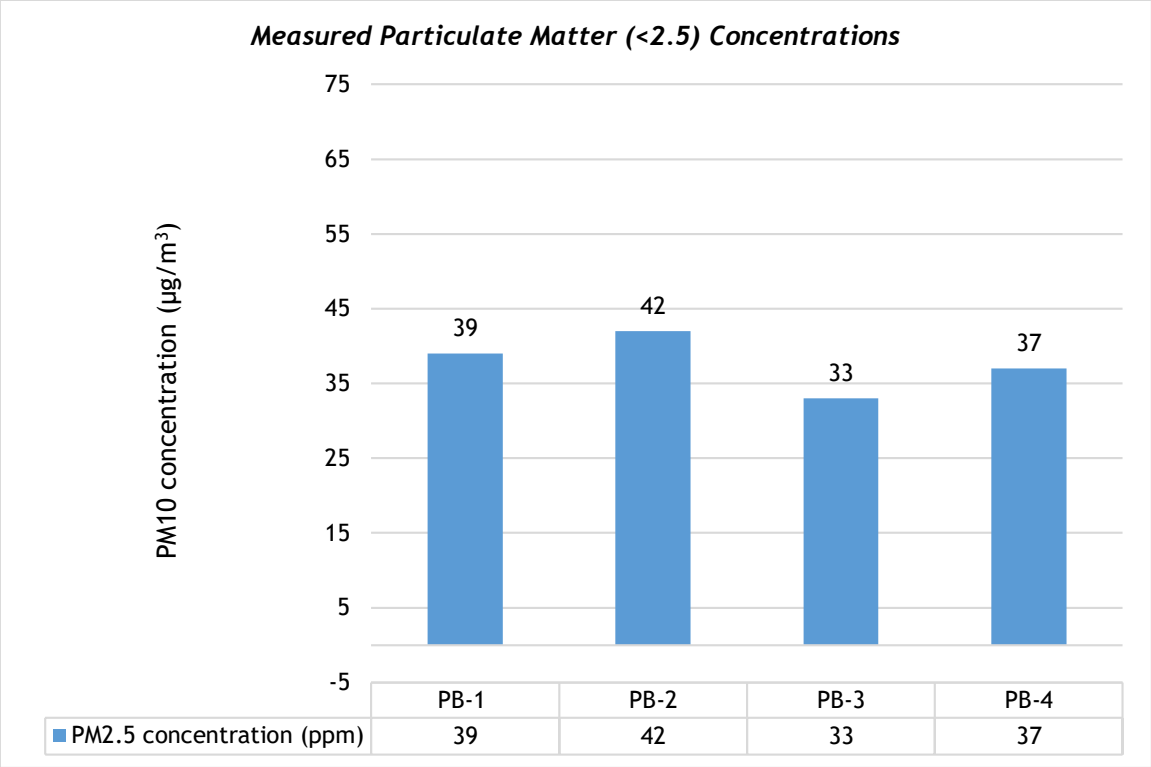
The statistical analysis for the 1-hr monitoring of particulate matter PM_{10} as outlined in the TOR was completed at four survey locations.

The maximum 1-hour PM_{10} concentration extended to levels of 52 µg/Nm^3 at PB-2. Similarly, the minimum 1-hour PM_{10} concentration extended to levels of 40 µg/Nm^3 at PB-3.

Particulate matter concentrations recorded at all the four sites were resulting from fugitive dust from the surrounding quarry activities.

The measurements were taken during the rainy season which could have affected the outcome of the results.

5.2.6. 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 four survey locations.

The maximum 1-hour $PM_{2.5}$ concentration extended to levels of 42 µg/Nm^3 at PB-2. Similarly, the minimum 1-hour $PM_{2.5}$ concentration extended to levels of 33 µg/Nm^3 at PB-3.

Particulate matter concentrations recorded at all the four sites were resulting from fugitive dust from the surrounding quarry activities.

The measurements were taken during the rainy season which could have affected the outcome of the results.

NOTES:

Sensitive receptors

The neighborhood is characterized by residential homes to the West and North which could act as sensitive receptors once the operations of the proposed storage facility begins. Kokotoni market is also located 2km away from the project site.

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.

From the site visits the following sources been identified as potential pollution causes;

Exhaust gases

- Heavy commercial vehicles / trucks were observed moving in and out of the Karsan Ramji & Sons-Kokotoni quarry located to the South and Dhanjal Brothers Limited located to East. Vehicular exhausts contain a number of pollutants including carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NOx), 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.

Heavy commercial vehicles / trucks 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 feeder roads moving in to the main entrance. Pulverization and abrasion of surface materials by application of truck mechanical forces generate substantial amount of dust.

Quarrying activities

- The concentration of dust at the proposed site could have resulted from the quarrying and mining of material which are responsible for the generation of fine dust whereas drilling, blasting, and loading were responsible for emission of higher fraction of PM_{10}.

5.3. Air Quality Survey Conclusions

- It is confirmed that background levels did not exceed the permissible levels.
- The ambient air quality data measured and the meteorological parameters around the project area are considered to be within a typical range of emissions for the neighborhood.
- Gaseous parameters, particulate parameters and environmental parameters recorded within the required permissible levels.
- All gaseous parameters were measured and quantified at all survey stations.
- Particulate parameters concentrations were measured and quantified at all survey stations.
- Both gaseous and particulate parameters COMPLIED with the EMC (Air quality) regulations 2014 limits.
- There were showers during the survey that could have affected the concentration levels of dust recorded.

6. REFERENCES

1) Envasses Environmental Consultants Limited. (2023). Environmental Impact Assessment (EIA) Study Report for the Proposed Explosives Storage Facility on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County. Retrieved April 17, 2023.
2) Environmental Management and Coordination Act (EMCA) 1999 (amended 2015).
3) Environmental Management Coordination (Air Quality) Regulations 2014 (Legal Notice No.34).
4) Environmental Protection Agency. (1976) Quality Assurance Handbook for Air Pollution Measurement Systems – Volume 1 Principles. EPA-600/9-76-005, Research Triangle Park, NC.
5) Quality Assurance and Quality Control (QA/QC) Procedures for UK Air Quality Monitoring under 2008/50/EC and 2004/107/EC
6) 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
7) U.S. Environmental Protection Agency. (1998) EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5, Report EPA/600/R-98/018, EPA Office or Research and Development, Washington DC. This document can be downloaded from website: http://www.epa.gov/swerust1/cat/epaqag5.pdf.
8) U.S. Environmental Protection Agency. (2022) Nitrogen Dioxide (NO2) Pollution basic information" https://www.epa.gov/no2-pollution/basic-information-about-NO_2 (August 2022)
9) World Health Organization. 2000, WHO *Air Quality Guidelines for Europe*, 2nd edition, WHO Regional Office for Europe, Copenhagen, Denmark (WHO Regional Publications, European Series, No 91).

APPENDIX A: EQUIPMENT CALIBRATION CERTIFICATES

CERTIFICATE OF CALIBRATION AND TESTING

TSI Instruments Ltd, Stirling Road, Cressex Business Park
High Wycombe Bucks HP12 3ST England
Tel: (Int +44) (UK 0) 1494 459200 Fax: (Int +44) (UK 0) 1494 459700 http://www.tsiinc.co.uk

ENVIRONMENT CONDITIONS		
TEMPERATURE	20.9	°C
RELATIVE HUMIDITY	45.73	%RH
BAROMETRIC PRESSURE	994.6	hPa

MODEL	7545
SERIAL NUMBER	T75450934010

☒ AS LEFT ☐ AS FOUND
☒ IN TOLERANCE ☐ OUT OF TOLERANCE

– CALIBRATION VERIFICATION RESULTS –

TEMPERATURE VERIFICATION — SYSTEM T-201 — Unit: °C

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	0.0	-0.1	-0.6~0.6	2	60.0	60.2	59.4~60.6

HUMIDITY VERIFICATION — SYSTEM H-201 — Unit: %RH

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	10.0	8.7	7.8~12.2	4	70.0	70.1	67.8~72.2
2	30.0	30.1	27.8~32.2	5	90.0	88.8	87.8~92.2
3	50.0	50.6	47.8~52.2				

CO2 GAS VERIFICATION — SYSTEM G-200 — Unit: ppm

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	0	0	0~50	4	3008	2982	2917~3098
2	518	508	468~568	5	5000	4999	4850~5150
3	1015	1011	965~1065				

CO GAS VERIFICATION — SYSTEM G-200 — Unit: ppm

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	36	37	33~39	2	100	100	97~103

TSI does hereby certify that the above described instrument conforms to the original manufacturer's specification (not applicable to As Found data) and has been calibrated using standards whose accuracies are traceable to members of the European co-operation for Accreditation (EA) (for example: UKAS, SWEDAC, DARKS) or has been verified with respect to instrumentation whose accuracy is traceable to some member of EA, or is derived from accepted values of physical constants. TSI's calibration system is registered to ISO-9001:2015.

Measurement Variable	System ID	Last Cal.	Cal. Due
Temperature	E006116	02-12-22	02-12-23
Humidity	E006126	01-12-22	01-12-23
5000 CO2	5902749	22-03-22	22-03-24
N2	VC6894330	06-11-22	06-11-24
Flow	E006015	27-02-22	27-02-24
Flow	E006143	27-02-22	27-02-24

Measurement Variable	System ID	Last Cal.	Cal. Due
Temperature	E006115	02-12-22	02-12-23
200 CO	3705A	02-12-22	02-12-23
Air	VC6273425	12-08-22	12-09-24
20 C4H8	3743B	02-12-22	02-12-23
Flow	E006016	10-08-22	10-08-23
Flow	E006113	21-09-22	21-09-24

CALIBRATED

10 December, 2022
DATE

Doc ID CERT_GEN_WCC

Calibrate report

Product	Air Quality Monitor System	Model	AQM-09
Quantity	1pcs	Cali date	June ,25, 2022
Product No.	OC20210624615600		
Appearance	☑Clean ☑Non corrosive ☑No damage		
Gas type	H2S: ppm SO2:ppb NO2:ppb O3:ppb TVOC:ppm PM2.5:ug/m³ PM10:ug/m³ TSP:ug/m³ Temperature and humidity: ℃/%RH		
Accuracy	±3%F.S		
resolution	0.1ppm 1ppb 1ug/m³		
Response time	≤30S		
Survey range	H2S:0-100ppm NO2:0-2000ppb SO2:0-2000ppb O3:0-2000ppb TVOC:0-50ppm PM2.5:0-1000ug/m³ PM10:0-1000ug/m³ TSP:0-1000ug/m³ Temperature: -20-50℃ Humidity:0%-100%RH		
Signal output mode	4G LTE		
Power supply voltage	AC 240V/50Hz		
Power dissipation	≤30W		
[illegible]	-20℃-50℃ / 0%RH-100%RH		
Testing condition indoor	Temperature: 25℃ Humidity: 60%RH		
Calibration gas	NO2 SO2 O3 TVOC H2S		
Cali gas test	1.H2S: Cali gas concentration: 100 ppm Inspect concentration: 98.2 ppm 2.NO2: Cali gas concentration: 1000 ppb Inspect concentration: 997 ppb 3.SO2: Cali gas concentration: 1000 ppb Inspect concentration: 998 ppb 4.O3: Cali gas concentration: 1000 ppb Inspect concentration: 996 ppb 5.TVOC: Cali gas concentration: 50 ppm Inspect concentration: 49.3 ppm 6.PM2.5:Measured value: 47 ug/m³ PM10:Measured value: 47 ug/m³ TSP:Measured value: 52 ug/m³ 7.Temperature: Measured value: 28.4℃ Humidity Measured value: 51 %RH		
Test result	Qualified		
Remark			

Check: Approval: Tester: QC PASS

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

Date: June,25, 2022

ENVIRONMENTAL BASELINE STUDY REPORT FOR ACOUSTIC EMISSIONS LEVELS MONITORING.

PROJECT: THE PROPOSED EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY.

PROPONENT: NITRO CHEMICALS LIMITED,
P.O BOX 17897-00500.
NAIROBI, KENYA.

REPORT REFERENCE NUMBER: 50123-024 B

LAHVENS LIMITED

ENVIRONMENTAL BASELINE STUDY REPORT FOR ACOUSTIC EMISSIONS LEVELS MONITORING FOR:

NITRO CHEMICALS LIMITED
P.O BOX 17897-00500
NAIROBI, KENYA.

CLIENT ADDRESS:

LAHVENS LIMITED
P.O BOX 34153, 80118
TEL. NO. +254110093237
EMAIL: LAHVENS@LAHVENS.COM

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED
P. O BOX 2013 - 80100
RALLI HOUSE BUILDING, 1ST FLOOR,
MOMBASA, KENYA

ENVIRONMENTAL CONSULTANTS:

DOCUMENT REVIEW PAGE

This Technical report titled ENVIRONMENTAL BASELINE STUDY REPORT FOR ACOUSTIC EMISSIONS LEVELS MONITORING OF THE PROPOSED CONSTRUCTION OF MINING EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY was authored by Lahvens Limited in accordance to the EMC (Noise And Excessive Vibration pollution) (control) Regulations, 2009.

REVISION HISTORY

03	23-05-2023	Issuance of Final Report
02	22-05-2023	Re-submission to close the given comments and approvals
01	17-05-2023	1st draft issue of the soft copy submitted for review
REV	**DATE**	DESCRIPTION

Accepted by			
Reviewed & Approved by	LOVANS ROBERT SPOO (ENVIRONMENTAL MANAGER) N.E.R. NO.: 7165		23-05-2023
Prepared by	VINCENT AGIN - FIELD ATTENDANT		23-05-2023
	VALENTINE AGUTU - FIELD ATTENDANT		23-05-2023
PROJECT	Name	Signature	Date
DOCUMENT No.:	50123-024 B		REVISION: 00 FINAL

PROJECT REPORTING NFORMATION

REPORT NO. 50123-024 B	CONTRACT NO. AS PER EL / EECL TOR.	CLASSIFICATION: A – Unclassified (open report)
TEST FIRM CONTACT PERSON: LOVANS SPOO: (254 – 728716948)	PROJECT: THE PROPOSED CONSTRUCTION OF MINING EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY	NUMBER OF PAGES: 26

TITLE: THE PROPOSED CONSTRUCTION OF MINING EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY	
AUTHOR(S): LOVANS ROBERT SPOO, VINCENT OKUMU, VALENTINE AGUTU	QUALITY CONTROLLER: SAMSON OBIYA
REPORT PREPARED FOR: NITRO CHEMICALS LIMITED	DOCUMENT REF. NO. **50123-024B-FED**
ABSTRACT: LAHVENS Ltd was commissioned by Envasses Environmental Consultants Limited to form the Project's Environmental Team (ET) in providing testing services of environmental baseline acoustic emissions Level prior to commencement / execution of the PROPOSED CONSTRUCTION OF MINING EXPLOSIVES STORAGE FACILITY ON PLOT L.R. NO. KAWALA "A'/405' IN KOKOTONI, KILIFI COUNTY	
ENGLISH TITTLE	
KEYWORDS	
EBS ACOUSTIC EMISSIONS LEVELS MONITORING AND CONSULTANT REPORTING.	
ABSTRACT (in ENGLISH)	
PUBLICATION TYPE: Digital document (pdf)	LAHVENS LIMITED P.O. BOX 34153-80118 MOMBASA KENYA TUDOR, TOM MBOYA STREET, H03

EXECUTIVE SUMMARY

The proposed project will involve the construction, operation and possible decommissioning of two go-downs and three magazines. The proposed project will be located on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County at GPS co-ordinates Latitude 3^{0}54'05" S, and Longitude 39^{0}31'32" E. The site is accessed via an earth road off the Mombasa-Nairobi Highway at SS Mehta and Sons Company junction and approximately 2km from Kokotoni market.

The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines. The proposed site is bordered by Karsan Ramji & Sons-Kokotoni quarry to the South, Dhanjal Brothers Limited to the East and residential homes to the West and North.

The proposed project will involve the construction, operation and possible decommissioning of two go-downs and three magazines (Figure 2). The two go-downs will be built on ground level and mezzanine floor to house ammonium nitrate; and the three (3) magazines of holding weight capacity of 100 tons (where one (1) magazine will hold 20 tons and two (2) magazines will hold 40 tons each) explosive weight increasing its safety factor. The magazines will be designed in a special structure to store low or high explosive materials used in mining and demolition applications. One of the magazines will house detonators material while the other two magazines will house gelignite materials

Under the Second Schedule of the Environmental Management and Co-ordination Act (EMCA) No. 8 of 1999, the proposed project is listed as high-risk projects which should undergo Environmental Impact Assessment (EIA) study process. Pursuant to Section 58 of the Act, the proponent contracted Envasses Environmental Consultants Limited in April 2023 to prepare an EIA Study Report for the proposal. As part of this authorization process Lahvens Limited was commissioned by Envasses Environmental Consultants Limited to form the Project's Environmental Team (ET) in providing testing services of baseline air quality environment prior to commencement of the construction of the storage facilities.

Environmental Baseline Study is a significant component of monitoring programs for some successful construction activities. Baseline monitoring commences at the reconnaissance phase and continues to incorporate in the feasibility study. It includes all relevant environmental, economic and social issues.

The objective of this Baseline Report is to present the existing air environment in the proposed storage facility and its vicinity. Atmospheric environment has been selected as a valued component because of their fundamental significance to the well-being of humans, flora and fauna.

This Environmental Baseline Study is designed to characterize the environmental resources at the proposed site prior to erection of the explosives storage facility. EBS will provide a benchmark and reference against which to compare the environmental conditions influenced by the construction, operation and closure phases of the storage facility. 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.

The scope of this baseline Report included the study of the available information relevant to the pre-development ambient air concentration in the environment; identification of the major existing air emission sources in the environment; identification of the existing sensitive pollution areas in the environment; and estimation by means of measurements and integration of the results with those of any relevant existing information the present ambient air and noise vibration quality.

The proposed project site was subdivided into four survey locations to accommodate all boundaries to the East, West, North and South. The survey locations were referenced as PB1 to PB4. The compartmentation of the locations also took care of the wind directions.

Noise pollution is considered as one of the key problems of urban communities that has numerous industrial and human activities that affect the urban environment and may result in a great deal of costs on the society. Noise pollution or noise disturbance is the disturbing or excessive noise that may harm the activity or balance of human or animal life.

Lahvens Limited operated mobile stations at four survey locations as part of its noise levels monitoring networks on the 8th May 2023.

Noise emission survey was achieved via initial examination of existing road traffic and other noise sources of significance. Noise levels was evaluated using a Sound Level Meter Model UT – 351, C150107874 class 2 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 its 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.

Results and observations:
The quantity of noise measured and recorded from the four survey locations complied with the EMC noise and vibration regulations 2009 maximum Noise Level Permitted (Leq) during the day.

Baseline results obtained at the monitoring locations show that all the locations are noise insignificant areas hence there is no threat to the sensitive receptors before implementation of proposed construction of the mining explosives storage facility.

Ambient conditions existed at the time of the survey during the day.

The existing identifiable sources of noise emissions included environmental noise (wind breeze), traffic noise from heavy trucks accessing Karsan Ramji & Sons-Kokotoni and Dhanjal Brothers Limited quarries. Quarry activities / operations including drilling, blasting, and loading processes were audible during the survey therefore contributing to the noise levels recorded.

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List of Tables

1. INTRODUCTION

"The proposed project will involve the construction, operation and possible decommissioning of two go-downs and three magazines. The proposed project will be located on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County at GPS co-ordinates Latitude 3^{0}54'05" S, and Longitude 39^{0}31'32" E. The site is accessed via an earth road off the Mombasa-Nairobi Highway at SS Mehta and Sons Company junction and approximately 2km from Kokotoni market.
The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines. The proposed site is bordered by Karsan Ramji & Sons-Kokotoni quarry to the South, Dhanjal Brothers Limited to the East and residential homes to the West and North." (Envasses Environmental Consultants Ltd, 2023)

Under the Second Schedule of the Environmental Management and Co-ordination Act (EMCA) No. 8 of 1999, the proposed project is listed as high-risk projects which should undergo Environmental Impact Assessment (EIA) study process. Pursuant to Section 58 of the Act, the proponent contracted Envasses Environmental Consultants Limited in April 2023 to prepare an EIA Study Report for the proposal.

As part of this authorization process Lahvens Limited was commissioned by Envasses Environmental Consultants Limited to form the Project's Environmental Team (ET) in providing testing services of environmental baseline acoustic emissions Level prior to commencement of the construction of the mining explosives storage facility.

Environmental Baseline Study is a significant component of monitoring programs for some successful construction activities. Baseline monitoring commences at the reconnaissance phase and continues to incorporate in the feasibility study. It includes all relevant environmental, economic and social issues.
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 Impact assessment (EIA) and approval process.
The objective of this Baseline Report is to present the existing acoustic environment in the proposed mining explosives storage facility and its vicinity. Noise environment has been selected as a valued component because of their fundamental significance to the well-being of humans, flora and fauna.
This Environmental Baseline Study is designed to characterize the environmental resources at the proposed site prior to erection of the explosives storage facility. EBS will provide a benchmark and reference against which to compare the environmental conditions influenced by the construction, operation and closure phases of the storage facility. The information will be used to assess the effectiveness of any proposed mitigation measures and to implement adaptive management, if needed.
The environmental baseline study will collect, assess, and interpret enough survey information to: (i) support the characterization of the resources at risk; (ii) enable determination of possible impacts; (iii) help predict the significance of impacts and the effectiveness of any proposed mitigation; (iv) establish thresholds for indicators of ecosystem health; and (v) 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.

1.1. Project Description

"The proposed project will involve the construction, operation and possible decommissioning of two go-downs and three magazines (Figure 2). The two go-downs will be built on ground level and mezzanine floor to house ammonium nitrate; and the three (3) magazines of holding weight capacity of 100 tons (where one (1) magazine will hold 20 tons and two (2) magazines will hold 40 tons each) explosive weight increasing its safety factor. The magazines will be designed in a special structure to store low or high explosive materials used in mining and demolition applications. One of the magazines will house detonators material while the other two magazines will house gelignite materials." (Envasses Environmental Consultants Limited, 2023).

1.2. Scope of work

The scope of this baseline Report will be as follows:

- Study the available information relevant to the pre-development acoustic levels in the environment;
- Identify the major existing acoustic emission sources in the environment;
- Identify the existing sensitive pollution areas in the environment;
- Estimate by means of measurements and integration of the results with those of any relevant existing information of the present noise levels.

1.3. Monitoring Locations and Climatic Features

The proposed project site was subdivided into four survey locations to accommodate all boundaries to the East, West, North and South. The survey locations were referenced as PB1 to PB4. The compartmentation of the locations also took care of the wind directions.

Table 1: GPS coordinates of proposed storage facility

Measurement Sites	Receivers	Description of monitoring Locations	Dates of sampling
Project boundary 1 (PB1) **S 3°54´10.3176"** **E 39°31´30.3132"** **(WEST)**	Residential homes	The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines.	08th May 2023
Project boundary 2 (PB2) **S 3°53´53.4264"** **E 39°31´46.9272"** **(NORTH)**	Residential homes	The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines.	08th May 2023
Project boundary 3 (PB3) **S 3°53´58.4808"** **E 39°31´48.9576"** **(EAST)**	Dhanjal Brothers Limited	The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines.	08th May 2023
Project boundary 4 (PB4) **S 3°54´09.6120"** **E 39°31´40.3896"** (SOUTH)	Karsan Ramji & Sons-Kokotoni quarry	The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines.	08th May 2023

1.3.1. Land Use and Topography

The proposed site is currently un-developed and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines. The proposed site is bordered by Karsan Ramji & Sons-Kokotoni quarry to the South, Dhanjal Brothers Limited to the East and residential homes to the West and North.

1.3.2. Meteorological information

Climate is influenced by monsoon winds with the rainfall pattern being characterized into long rains (April-June with an average of 1040mm) and short rains (end of October to December with an average of 240mm). The average annual rainfall for the county is 640mm. The annual mean temperature in the county is 27.90C with a minimum of 22.70C and a maximum of 33.10C. The hottest month is February with a maximum average of 33.10C while the lowest temperature is in July with a minimum average of 22.70C. On average, the temperatures are always high in Kokotoni. Most rainfall (rainy season) is seen in April, May, October and November. On average, the warmest month is March and on average, the coolest month is September. May is the wettest month and February is the driest month.

On average, the temperatures in Kokotoni are always high. The warmest month is March and the coolest month is July. The average annual maximum temperature is: 87.8° Fahrenheit (31.0° Celsius) and the average annual minimum temperature is 69.8° Fahrenheit (21.0° Celsius).

On average, the windiest months in Kokotoni are May and June while the least wind is seen in November. Figure 8 below is the mean monthly wind speed (meters per second).

1.3.3. Socio-economic background

The proposed project site is to be at Kokotoni area of Kaliangombe Sub-location, Rabai location, Rabai Sub-County, Kilifi County.
Most farmers in the County are subsistence and most of the purchased inputs are certified seeds. There is limited use of both organic and inorganic fertilizers. Most of the farm holdings are less than a hectare. The County"s variety of micro-climates makes the area suitable for the production of a variety of crops such as mangoes, cashew nuts, maize, beans, pigeon peas and cow peas. The main livestock enterprises include Dairy Cattle, Beef Cattle, Poultry, Sheep, Goats, Pigs, Rabbits and Bee-keeping. The major potentials which exist in the fisheries subsector include mariculture development; exploitation of deep sea fisheries; ice production for fish preservation; acquisition, securing and development of fish landing sites; empowering of fishers to enhance sustainable utilization of fisheries resources.

Tourism is one of the most important economic activities in the County. The major tourist attractions in the County are historic sites; topography; flora and fauna; water sports and recreation; cultural attractions and agro-tourism. The industries in the County are manufacturing industries. Most of them are medium and smallscale enterprises. Small-scale Jua Kali cottage industries are also available in the County. Smallscale manufacturing industries have emerged and they manufacture goods such as Neem Soap and Wood Carvings.

Kilifi County is rich in minerals; mainly titanium and iron ore, that have spurred extensive industrial mining activities. Other minerals extracted include barites, galena, rubies, pozzolana, gypsum and limestone. Salt mining and sand harvesting have been carried out over the years to take advantage of

the sandy, salty waters. While these are economically lucrative, they are equally responsible for destruction of its mangrove forests.

1.3.4. Roads and transport

The movement of people for socio-economic and cultural activities depends on good transport and communication system. A good road network provides access to the markets, health and other social facilities and also reduces incidences of insecurity. The improvement of telephone services has made it easier to communicate within the County and other outside areas. This has improved efficiency in service delivery and decision making. The improvement in the communication system makes the communities who can contribute to their development.

1.4. Existing Acoustic environment

The proposed site is currently undeveloped and characterized by a flat terrain and assorted vegetation. The neighborhood depicts mixed land use but predominantly industrial which include quarries and mines. The proposed site is bordered by Karsan Ramji & Sons-Kokotoni quarry to the South, Dhanjal Brothers Limited to the East and residential homes to the West and North. The main source of existing noise emissions are heavy commercial vehicles / trucks accessing Karsan Ramji & Sons-Kokotoni quarry and Dhanjal Brothers Limited quarries. Noise is also generated vide drilling, blasting, and loading processes.

1.5. 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.

1.6. Acoustic Survey Objectives

To quantify ambient acoustic emissions levels at selected four locations. The quantifiable results will then be compared to the Environmental Management Coordination excessive noise and vibration controls regulations 2009.

1.7. Assumptions

The 1-hour noise survey and data collection for L_{eq}, L_{max} and L_{min} is considered sufficient to understand background acoustic conditions at each location.

1.8. Data Validity and Acceptability of noise survey

All noise emission survey data was taken through a 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

1.9. Definitions.

Table 2: List of acronyms

dBA	Decibels (A) weighted
EMC	Environmental Management and Coordination
GPS	Geographic Positioning System
hpa	Hectopascal
km/hr	Kilometer per hour
Leq	Noise equivalent noise
Lmax	Maximum Sound Level
Lmin	Minimum Sound Level
l/min	Liters per minute
NEMA	National Environment Management Authority
TWA	Time Weighted Average
WB	World bank
WHO	World Health Organization

2. ACOUSTIC EMISSIONS OVERVIEW AND NETWORKS

Noise pollution is considered as one of the key problems of urban communities that has numerous industrial and human activities that affect the urban environment and may result in a great deal of costs on the society. Noise pollution or noise disturbance is the disturbing or excessive noise that may harm the activity or balance of human or animal life. The source of most outdoor noise worldwide is mainly caused by machines and transportation systems, motor vehicles engines, aircraft, and trains. Outdoor noise is summarized by the word environmental noise. Poor urban planning may give rise to noise pollution, since side-by-side industrial and residential buildings can result in noise pollution in the residential areas. Outdoor noise can be caused by machines, construction activities, and music performances, especially in some workplaces. Noise-induced hearing loss can be caused by outside (e.g. trains) or inside (e.g. music) noise. High noise levels can contribute to cardiovascular effects in humans and an increased incidence of coronary artery disease. Unwanted sound (noise) can damage psychological health. Sound becomes unwanted when it either interferes with normal activities such as sleeping, conversation, or disrupts or diminishes one's quality of life. Noise pollution can cause hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects. High noise levels can result in cardiovascular effects and exposure to moderately high levels during a single eight-hour period causes a statistical rise in blood pressure of five to ten points and an increase in stress, and vasoconstriction leading to the increased blood pressure noted above, as well as to increased incidence of coronary artery disease. Road traffic, jet planes, garbage trucks, construction equipment, manufacturing processes and lawn mowers are some of the sources of the unwanted sounds that are routinely transmitted into the air. All these problems are direct consequence of rapid growth of population, self-centered human mentality, fast life style, number of instruments in daily life, excessive exploitation of natural resources, rapid rate of urbanization and industrialization. In the present scenario, noise, is becoming an increasingly source of discomfort and danger in the vicinity of the society. The noise generally consists of three inter-related elements – the source, receiver and transmission path.

Ambient sound levels are the cumulative effects of countless sounds generated at various instances both far and near. High measurements may not necessarily mean that noise levels in the area are high. Similarly, a low sound level measurement will not necessarily mean that the area is always quiet, as sound levels will vary over seasons, time of the day, faunal characteristics, vegetation in the area and meteorological conditions (especially wind). This is excluding the potential effect of sounds from anthropogenic origin.

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. So our meter 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.

Lahvens Limited operated mobile stations at four survey locations as part of its noise levels monitoring networks on the 8th May 2023.

3. NOISE LEGISLATIVE POLICY AND 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 3: EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

ZONE		*Sound Level Limits dB (A)* L_{eq}, *14 h*		*Noise Rating Level (NR)* 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 Outdoor	45 50	35 35	35 40	25 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.

4. ACOUSTIC SURVEY METHODOLOGY

A baseline noise survey consisting of an operator attended noise measurements (OANM) was performed.

4.1. Tools and Equipment

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

4.2. Equipment Placement

Noise emission survey was achieved via initial examination of existing road traffic and other noise sources of significance. Noise levels was evaluated using a Sound Level Meter Model UT – 351, C150107874 class 2 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 its 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 that measurement period.

Ongoing diurnal acoustic level measurements at project boundaries (source: Fieldwork May, 2023)

Ongoing diurnal acoustic measurement at the site boundaries

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 legislation/ 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.	---	---	---

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
28th April 2023				Day time	
	Leq	Lmax	Lmin	Leq	
PB-1	48.1	79.5	40.8	55	The prevailing weather was rainy at the time of acoustic survey. Wind speed averaged about 20 km/hr North wind. Measurements are taken to quantify prevailing ambient levels of noise. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities were ongoing during measurements at the proposed site. Environmental noise including Wind breeze and traffic noise were the likely sources of noise emissions. Noise from heavy trucks accessing the nearby quarries were audible during the survey. Ambient conditions were extant.
PB-2	48.6	74.2	40.4	55	The prevailing weather was rainy at the time of acoustic survey. Wind speed averaged about 20 km/hr North wind. Measurements are taken to quantify prevailing ambient levels of noise. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities were ongoing during measurements at the proposed site. Environmental noise including Wind breeze and traffic noise were the likely sources of noise emissions. Noise from heavy trucks accessing the nearby quarries were audible during the survey. Ambient conditions were extant.
PB-3	53.7	82.8	44.3	55	The prevailing weather was rainy at the time of acoustic survey. Wind speed averaged about 20 km/hr North wind. Measurements are taken to quantify prevailing ambient levels of noise. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities were ongoing during measurements at the proposed site. Environmental noise including Wind breeze and traffic noise were the likely sources of noise emissions. Noise from heavy trucks accessing the nearby quarries were audible during the survey. Ambient conditions were extant.
PB-4	54.3	80.9	45.0	55	The prevailing weather was rainy at the time of acoustic survey. Wind speed averaged about 20 km/hr North wind. Measurements are taken to quantify prevailing ambient levels of noise. **Leq** noise levels complied with the EMC 2009 noise permissible levels. No activities were ongoing during measurements at the proposed site. Environmental noise including Wind breeze and traffic noise were the likely sources of noise emissions. Noise from heavy trucks accessing the nearby quarries were audible during the survey. Ambient conditions were extant.

5.1.2. Summary of average diurnal noise equivalents (Leq)

Table 6: Summary results for diurnal noise equivalents

Monitoring locations	Diurnal LAeq results	Maximum noise level permitted (Leq) in dB (A) Day (0601-2000) hrs	Comments
PB-1	48.1	55	Complies
PB-2	48.6		Complies
PB-3	53.7		Complies
PB-4	54.3		Complies

5.1.3. 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
PB-1	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG
PB-2	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG
PB-3	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG
PB-4	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG

5.2. DISCUSSIONS OF RESULTS

Noise measurements was initiated to obtain and quantify the prevailing ambient acoustic levels. The obtained acoustic results were thereafter correlated against the Environmental Management Coordination (Excessive noise and vibration regulations) 2009 to ascertain compliance.

5.2.1. Presentation of singular noise results

a) Diurnal noise results

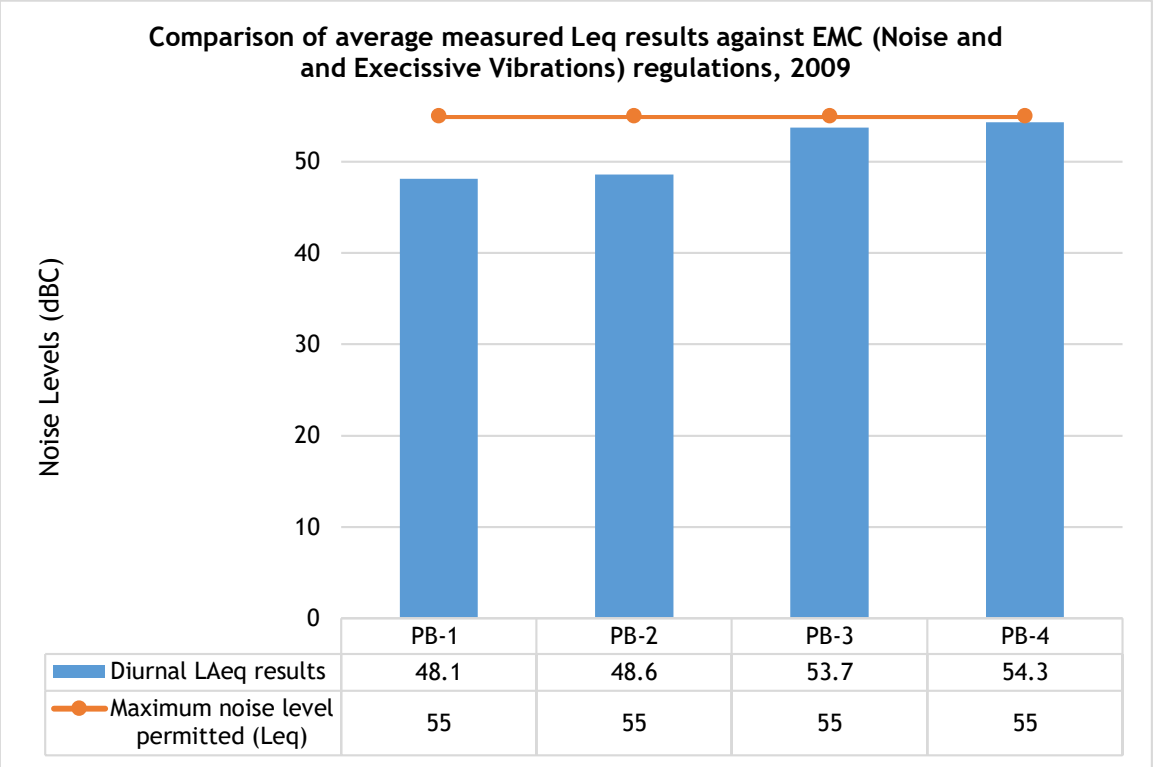
The highest diurnal noise emissions recorded at survey station PB-4 extended to levels of 54.3 dBA while the lowest diurnal noise emission recorded at survey location PB-1 extended to levels of 48.1 dBA at PB-1. The average Leq noise levels was 51.18 dBA.

Diurnal noise equivalent levels (Leq) recorded at the four perimeters / boundaries of the proposed construction of mining explosives storage facility complied with the EMC noise and vibrations regulations of 2009.

5.2.2. 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



- As indicated in above graph, diurnal noise equivalent levels (Leq) results ensuing from all the survey locations complied with the EMC noise and vibration regulations 2009 before implementation of the proposed mining explosives storage facility.
- The distribution of noise levels varied depending on the heavy trucks accessing Karsan Ramji & Sons-Kokotoni quarry and Dhanjal Brothers Limited quarry. Noise also varied depending on the quarry activities operations including drilling, blasting, and loading processes.

5.2.3. Determination of significance

Determination of noise significance of results was done using compliance 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 four survey locations were characterized as noise insignificant areas before the implementation of the proposed mining explosives storage facility.
- From the results of determination of significance, there is no threat to the noise receivers (residential homes) of the noise emissions before implementation of proposed construction of the mining explosives storage facility.

5.3. CONCLUSION.

This ambient noise measurement report documented the current noise levels and meteorological conditions for the proposed mining explosives storage facility as follows:

- The quantity of noise measured and recorded from the four survey locations complied with the EMC noise and vibration regulations 2009 maximum Noise Level Permitted (Leq) during the day.
- Baseline results obtained at the monitoring locations show that all the locations are noise insignificant areas hence there is no threat to the sensitive receptors before implementation of proposed construction of the mining explosives storage facility.
- Ambient conditions existed at the time of the survey during the day.
- The existing identifiable sources of noise emissions included environmental noise (wind breeze), traffic noise from heavy trucks accessing Karsan Ramji & Sons-Kokotoni and Dhanjal Brothers Limited quarries. Quarry activities / operations including drilling, blasting, and loading processes were audible during the survey therefore contributing to the noise levels recorded.

6. REFERENCES

1) Envasses Environmental Consultants Limited. (2023). Environmental Impact Assessment (EIA) Study Report for the Proposed Explosives Storage Facility on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County. Retrieved April 17, 2023.
2) Environmental Management and Coordination Act (EMCA) 1999 (amended 2015).
3) Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009 (Legal Notice No.61).

APPENDIX A: EQUIPMENT CALIBRATION CERTIFICATES

Kenya Bureau of Standards
Standards for quality life

CALIBRATION REPORT

KEBS Head Office
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KEBS North Eastern Region
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E-Mail: kebs-garissa@kebs.org

Certified to:
QMS - ISO 9001
ISMS - ISO/IEC 27001
BCMS - ISO 22301
ABMS - ISO 37001

Page 1 of 3 BS/MET/19/15/3/9/94

REQUESTED BY:	LAHVENS LIMITED
ADDRESS :	P.O. BOX 34153-80118 MOMBASA KENYA
EQUIPMENT:	SOUND LEVEL METER
TYPE/MODEL:	UT351
SERIAL NO.:	C1507
MANUFACTURER:	UNI-T
LAB. NO. :	ACOUSTICS AND VIBRATION-NP 15
DATE :	2022-09-08
REPORT NO.:	BS/MET/19/15/3/9/94

1.0. STANDARDS AND REFERENCE EQUIPMENT USED

Multifunction Acoustic Calibrator Type 4226 S/No. 2532059 with a standard uncertainty of ± 0.075 dB was used in the calibration process.

2.0. METROLOGICAL TRACEABILITY

This calibration report documents traceability to the national measurement standards, and to the units of measurement realized at KEBS, or other recognized national standards laboratories according to the International System of Units (SI). KEBS is a signatory of the CIPM Mutual Recognition Arrangement (CIPM MRA) and where there is no published Calibration and Measurement Capabilities (CMCs), KEBS has documented the traceability of the standard equipment used in 1.0 above

3.0. CALIBRATION PROCEDURE

The Sound Level Meter was calibrated using Kenya Bureau of Standards Laboratory Procedure MET/15/CP/02: *Sound level meter calibration.*

Prepared By: **Collins Taiti** Date: **2022-09-16**

Checked By: Anderson Maina Date: 2022-09-22

Signed: ..... Date: 2022-09-22

For: Director Metrology and Testing

4.0. CALIBRATION RESULTS

4.1 Reading at Reference

Function	Standard Sound Pressure Output (dB)	Reading Before Adjustment (dB)	Reading After Adjustment (dB)	Expanded Uncertainty (dB)
FAST	94.1	93.8	94.1	0.2

4.2 Frequency Response (Inverse A)

Nominal Frequency (Hz)	Expected Sound Pressure Level (dB)	DUT Reading (dB)	Acceptable Tolerance (±dB)	Expanded Uncertainty (dB)
31.5	94.1	94.5	3.5	0.2
63	94.1	94.2	2.5	0.2
125	94.1	94.4	2.0	0.2
250	94.1	94.0	1.9	0.2
500	94.1	93.9	1.9	0.2
1000	94.1	94.1	1.4	0.2
2000	94.1	94.1	2.6	0.4
4000	94.2	93.9	3.6	0.7

4.3 C - Frequency Weighting Response

Nominal Frequency (Hz)	Expected Sound Pressure Level (dB)	DUT Reading (dB)	Acceptable Tolerance (±dB)	Expanded Uncertainty (dB)
31.5	110.0	112.8	3.5	0.2
63	113.3	114.4	2.5	0.2
125	113.9	114.8	2.0	0.2
250	114.1	114.4	1.9	0.2
500	114.1	114.4	1.9	0.2
1000	114.1	114.1	1.4	0.2
2000	113.9	113.6	2.6	0.4
4000	113.3	112.6	3.6	0.7

Bureau Veritas Kenya Limited
North Belgravia Place, Zanzibar Rd, Shimanzi,
P.O. Box 41622-80100,
Mombasa.
Tel: 254 41 2220866/67,
Fax: 254 41 2226015,
Email:laboratory.mombasa@bureauveritas.com

KENYA LIMITED

TEST REPORT

REPORT NO. : M-23-0358

CLIENT: **NITRO CHEMICALS LIMITED**
P.O BOX 17897-00500,
NAIROBI,KENYA.

Designated Product	Soil	**Sampled By**	Client
Date Received	14-05-2023	**Sampling date**	12-05-2023
Container Type	In a Plastic container	**Sampling Location**	Latitude 3° 54'05'' S, Longitude 39° 31'32'' E
Date of Analysis	15-05-2023	**Sample Preservation**	Ambient temperature
Date Reported	17-05-2023	**No.of Pages**	1

Test	Method	Units	Results
pH content	KS ISO 3071	-	6.10
Total Organic Carbon	ISO 19822	%	5.34
Calcium	EPA 3050 B	%	1.28
Magnesium	EPA 3050 B	mg/kg	43.48
Phosphorus	EPA 3050 B	mg/kg	32.14
Potassium	EPA 3050 B	%	0.03
Nitrogen	ISO 13878	%	2.19
Cadmium as Cd	EPA 3050 B	mg/kg	1.46
Chromium	EPA 3050 B	mg/kg	2.80
Lead as Pb	EPA 3050 B	mg/kg	1.40
Nickle	EPA 3050 B	mg/kg	2.66
Mercury	ISO 16772	mg/kg	<0.01

Remarks: ***The test results performed as indicated above.***

Reported By

Alice NGARI
Laboratory Analyst.

RESULTS REPORTED RELATED ONLY TO ITEMS TESTED

Nairobi Office:
Delta Corner, Tower A, 5th Floor
Along Waiyaki Way, Westlands
P. O. Box 34378-00100, Nairobi – Kenya
Tel: +254 (20) 4450560 – 64
Fax: +254 (20) 4450565
Email: fin.nairobi@bureauveritas.com

Mombasa Laboratory:
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Zanzibar Road Shimanzi, Mombasa
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BUREAU VERITAS MOMBASA KENYA LTD.

NITRO CHEMICALS LTD.

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Environmental Impact Assessment (EIA) Study Report for the Proposed Construction of Mining Explosives Storage Facility on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County.

Proceedings of the 1st public participation meeting held at the proposed project site in Misufini Village.

24th January 2023

Proponent	Consultant
Nitro Chemicals Limited P.O Box 17897-00500 Nairobi, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya. Tel: +254 722 347 155 Email: info@envasses.org

1. Introduction

The meeting was called to order at 10:30am by Mr. Anthony Jao, the Area Chief-Rabai location and opened with a word of prayer from Mr. Ustadh Abubakar. Mr. Anthony welcomed the participants to the meeting and proceeded to introductions.

Figure 1: Participants during the first public consultative meeting held on 24th January 2023 at the project site.

2. Overview of the proposed project

The proponent thanked the participants for attending the meeting and cited the legal basis of the meeting as per Section 58 of the Environmental Management and Coordination Act Cap 387 of Laws of Kenya. He then proceeded to give an overview of the proposed project. He informed the participants that the proposed project will involve the construction and operation of two go-downs and three magazines for storage of explosive magazines to service the mining sector. Further, he added that the storage facility will house ammonium nitrate and gelignite materials in magazines to ensure their safety and that of the local community. He emphasized on the statutory requirement under the Constitution of Kenya, 2010 to carry out public participation and local community views and concerns integration in project design, implementation, and operation.

3. Plenary session

Mr. David Swafi from Misufini village area was concerned with the initial approach to the EIA process where the proponent used questionnaires to collect views from the community instead of a consultative meeting approach. He noted that the community had raised concerns and objections to the project, but NEMA had approved the same as a low-risk project based on the questionnaire approach.

In response, Mr. George Oyoo, the NEMA Director-Kilifi County informed the participants that NEMA would review the decision based on new evidence and objections to the way the EIA process had been conducted. He noted that the proponent would consequently be advised to carry out a scoping and screening process and ensure that the EIA process is aligned to the risk rating of the proposed development.

Page 3

Hon. Kenga Mupe, the Member of Parliament-Rabai constituency urged the proponent to allow the youth to use part of the site for football activities. He also questioned the ownership of the project site and requested Mr. Oyoo from NEMA to ensure the issue is clarified before NEMA decides on the fate of the development. Further, he emphasized on need for the proponent and other industries within the surrounding areas to develop and implement Corporate Social Responsibility (CSR) programmes as stipulated by law. He also conquered with Mr. Oyoos' remarks on need to review the licensing process carried out earlier and ensure compliance with the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya.

4. Closure of the meeting

There being no other business, the meeting ended at 1:30pm.

RAMADHAN C. NYORA
ASSISTANT CHIEF
KALIANG'OMBE SUB-LOCATION

Signature: _____ Date: 24/05/2023

Mr. Ramadhan Chisubi

The Assistant Chief-Kaliang'ombe Sub-location

Signature: _____ Date: 24/05/2023.

Mr. Antony Jao

The Chief-Rabai Location

ANTHONY C. JAO
CHIEF - RABAI LOCATION
24 MAY 2023
Sign: ...

Annexure 1: List of participants

No.	Name	Affiliation
1.	Hon. Kenga Mupe	Member of Parliament -Rabai Constituency
2.	George Oyoo	County Director of Environment-Kilifi
3.	Jackson	OCS Rabai Police Station
4.	Antony Jao	The Chief- Rabai Location
5.	Ramadhan Chisubi	The Assistant Chief-Kaliang'ombe Sub-location
6.	Emmanuel	Inspector Mining
7.	Timothy	Inspector Mining
8.	Ahmed Bakari	Environment Officer, NEMA Kilifi
9.	Said Charo	Former CIIr
10.	Said Kahindi	Resident Misufini village
11.	Uwali gdege	Resident Misufini village
12.	Victor Kenga	Resident Misufini village
13.	Rashid Ngoa	Resident Misufini village
14.	Kombo Ali	Resident Misufini village
15.	Rashid Ngale	Resident Misufini village
16.	Safari Kahindi	Resident Misufini village
17.	Jonathan Masha	Resident Misufini village
18.	Daniel Mwamfa	Resident Misufini village
19.	Sunday Taura	Resident Misufini village
20.	Kingi Goerge	Resident Misufini village
21.	Katana Kenga	Resident Misufini village
22.	Mtuwa Mnalo	Resident Misufini village
23.	Khamisi Katana	Resident Misufini village
24.	Fikiri Kenga	Resident Misufini village
25.	Mzee Salim	Resident Misufini village
26.	Moses Wambua	Resident Misufini village
27.	Ismael Karisa	Resident Misufini village
28.	Wanje Katana	Resident Misufini village
29.	Juma Charo	Resident Misufini village
30.	Ngale Mranga	Resident Misufini village
31.	Joshua Mwanzie	Resident Misufini village
32.	Salim Chitibwa	Resident Misufini village
33.	Telengo Mkuzi	Resident Misufini village
34.	William Juma	Resident Misufini village
35.	Michael Tsoma	Resident Misufini village
36.	Ambros Mweni	Resident Misufini village
37.	Ali Suleiman	Resident Misufini village
38.	Hassan Goshi	Resident Misufini village
39.	Dudu Haron	Resident Misufini village
40.	Kitsava Kitsava	Resident Misufini village
41.	Godfrey Rumba	Resident Misufini village
42.	Amos Saha	Resident Misufini village
43.	Paul Banzi	Resident Misufini village
44.	Mzee Athuman Bora	Resident Misufini village

No.	Name	Affiliation
45.	David Kombo	Resident Misufini village
46.	Kiti Tsuma	Resident Misufini village
47.	Ben Arnold uparu	Resident Misufini village
48.	Keneth Nyoka	Resident Misufini village
49.	Elivu Mdigo	Resident Misufini village
50.	Ali Mwinga	Resident Misufini village
51.	Michael Nziwa	Resident Misufini village
52.	Wale Hussein Mwiga	Resident Misufini village
53.	Omar Ngoa	Resident Misufini village
54.	Ali Kaputa	Resident Misufini village
55.	Abdallah Mwamta	Resident Misufini village
56.	Matano wambua	Resident Misufini village
57.	Kisubi Kigwado Mtoro	Resident Misufini village
58.	Eddy Joha	Resident Misufini village
59.	Hassan Mwinga	Resident Misufini village
60.	Abdallah Chondo	Resident Misufini village
61.	Shaban Tsuma	Resident Misufini village
62.	Matano Gande	Resident Misufini village
63.	Dancun Mbigo	Resident Misufini village
64.	Patric Muta	Resident Misufini village
65.	Jefwa Baya	Resident Misufini village
66.	Said Nzuya	Resident Misufini village
67.	Robert Baya	Resident Misufini village
68.	Kenga Mwakamsha	Resident Misufini village
69.	Wanje Ali	Resident Misufini village
70.	Abubakar Juma	Resident Misufini village
71.	Mwakamsha Kazungu	Resident Misufini village
72.	Yusuf kahindi	Resident Misufini village
73.	Justin Nyae	Resident Misufini village
74.	Gona Maisha	Resident Misufini village
75.	Jila Kaingu Ngumbao	Resident Misufini village
76.	David Tsungu mgomba	Resident Misufini village
77.	Saidi Wambua	Resident Misufini village
78.	Mohammed Washe	Resident Misufini village
79.	Gerrard Keroriti	Resident Misufini village
80.	Khamisi Omar Makenzi	Resident Misufini village
81.	Saumu m karuku	Resident Misufini village
82.	Mwanaharusi Dudu	Resident Misufini village
83.	Kerry Edward Saro	Resident Misufini village
84.	Kache Pekeshe	Resident Misufini village
85.	Saumu Mohhammed	Resident Misufini village
86.	Maimuna Malanga	Resident Misufini village
87.	Racheal Mtunda	Resident Misufini village
88.	Florence Washo	Resident Misufini village
89.	Saumu Matano	Resident Misufini village
90.	Mary ganze	Resident Misufini village

No.	Name	Affiliation
91.	Florence Mahere	Resident Misufini village
92.	Saumu Kazungu	Resident Misufini village
93.	Mkambe Masha	Resident Misufini village
94.	Sadaka Charo	Resident Misufini village
95.	Sidi Omar	Resident Misufini village
96.	Salama Ria	Resident Misufini village
97.	Asha Muhindi	Resident Misufini village
98.	Riziki Kakundi	Resident Misufini village
99.	Scholar Kanunga	Resident Misufini village
100.	Amina Kavu	Resident Misufini village
101.	Fatuma Chiginado	Resident Misufini village
102.	Fatuma Begola	Resident Misufini village
103.	Hadya Mwinga	Resident Misufini village
104.	Halima Ali	Resident Misufini village
105.	Priscar Ndune	Resident Misufini village
106.	Mariamu Mwangoa	Resident Misufini village
107.	Mbetsa Poozo	Resident Misufini village
108.	Asha willy	Resident Misufini village
109.	Kibibi Paul	Resident Misufini village
110.	Rehema issa	Resident Misufini village
111.	Mwanahamisi Paul	Resident Misufini village
112.	Neema Athuman	Resident Misufini village
113.	Amina Matembo	Resident Misufini village
114.	Farida Charo	Resident Misufini village
115.	Mariam Charo	Resident Misufini village
116.	Masika Chalako	Resident Misufini village
117.	Rose Tsuma	Resident Misufini village
118.	Rehema Ndeme	Resident Misufini village
119.	Jumwa Katana	Resident Misufini village
120.	Gladys kafedha	Resident Misufini village
121.	Rehema Kazungu	Resident Misufini village
122.	Asha karisa	Resident Misufini village
123.	Rose Rhogas	Resident Misufini village
124.	Mboze Katana	Resident Misufini village
125.	Saumu Gande	Resident Misufini village
126.	Sikukuu Mweza	Resident Misufini village
127.	SalimTsuma	Resident Misufini village
128.	Matilanda Kalama	Resident Misufini village
129.	Bahati Charo	Resident Misufini village
130.	Mwaka Chikuru	Resident Misufini village
131.	Mishi Mnalo	Resident Misufini village
132.	Saumu Charo	Resident Misufini village
133.	Mbuche Mgomba	Resident Misufini village
134.	Sidi Kiwe	Resident Misufini village

NITRO CHEMICALS LTD.

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Environmental Impact Assessment (EIA) Study Report for the Proposed Explosives Storage Facility on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County.

Proceedings of the 2nd public participation meeting held at the proposed project site in Misufini Village.

15th February 2023.

Proponent	Consultant
Nitro Chemicals Limited P.O Box 17897-00500 Nairobi, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya. Tel: +254 722 347 155 Email: info@envasses.org

1. Introduction

The meeting was called to order at 10:45am by Ms. Fatuma Sarai, the Assistant County Commissioner (ACC)-Rabai Division and opened with a word of prayer from Mr. Ali Bakari. Ms. Fatuma welcomed the participants to the public participation meeting and proceeded to introductions.

2. Brief remarks on proposed project

Ms Fatuma informed the meeting that Nitro Chemicals Limited proposes to construct two go-downs and three magazines for storage of explosive materials to supply the mining industry. She further stated that public participation prior to implementation of any project is a mandatory requirement as per the Constitution of Kenya, 2010 as well as the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya. She added that any project which poses significant environmental and health risks to the public should undergo an Environmental Impact Assessment (EIA) process. Hence, the meeting was convened to further sensitize the local community on the project and to obtain the views, comments as well as environmental and social concerns that where outstanding from the previous meeting held on 24th January 2023 at the project site.

Mr. John, the project Architect informed the participants that the issues raised in the previous meeting were taken into consideration and thus the proponent is carrying out an Environmental Impact Assessment Study for the proposal pursuant to Section 58 of the Environmental Management and Coordination Act (EMCA) Cap 387 of the Laws of Kenya. He added that the proposed project will only feature storage facility and no manufacturing will be conducted at the site. He further stated that all safety standards as per the Explosives Act Cap 115 will be observed throughout the project cycle. He further noted that the issue of the local youth using the site occasionally to play football would be discussed and if possible, provisions will be made to allocate another space for recreation by the community as the current site is private land.

Mr. Emmanuel, from the Department of Mining in Mombasa informed the participants that they had carried out a site inspection in accordance to Mining Act, 2016 and established that it is suitable for the proposed project. He added that the assessment report showed that the buffer zone between the site and local settlements is above the required standard (100m) and the construction of the storage facility is rated highly safe.

3. Plenary Session

The community nominated three persons to present their views during the plenary session i.e., David, Mama Saumu and Ali. Mr. David Swafi from Misufini village area suggested that air quality assessment be carried out in collaboration with NEMA designated laboratory to ascertain baseline (ambient) levels. In addition, Mr. David was concerned about safety of the community with respect to the proposed facility which he said should be addressed prior to commencement of the project.

Mama Saumu, a resident of Misufini Village was concerned with air pollution throughout the project cycle. She added that existing quarry facilities and clinker yards in the neighborhood have been emitting air pollutants which could potentially pose health risks. She urged the proponent to effectively mitigate air pollution and other impacts throughout the project cycle.

Mr. Ali Bakari from Misufini village area noted that according to Mining Act, 2016, the explosives magazines should be located away from residential areas. He mentioned an example of a Beirut incident where a plant exploded and caused death of over five hundred people and hence the need to address the concerns of the residents. In response Mr Emmanuel from the Department of

Page 3

mining clarified that the two scenarios are different, and the proposed project is safe. He further noted that similar projects have been carried out in other parts of the country.

After the plenary session, Ms. Fatuma, the ACC informed the participants that their views were important and would be considered account when NEMA reviews the report. She further urged the proponent to ensure continuous dialogue with the local community to materialize harmony throughout the project cycle. She advised on the need to establish and implement a Grievances Redress Mechanism (GRM) during construction and operational phase of the project in accordance with EMCA. She also urged the proponent to consider Corporate Social Responsibility initiatives that enhance the welfare of the community.

4. Closure of the meeting

There being no other business, the meeting ended at 1:30pm with a word of prayer from Mr. Kenneth Mwakoyo.

RAMADHAN C. NYOKA
ASSISTANT CHIEF
KALIANG'OMBE SUB-LOCATION

Signature: _____ Date: 24/05/2023

Mr. Ramadhan Chisubi

The Assistant Chief-Kaliang'ombe Sub-location

Signature: _____ Date: 24/05/2023.

Mr. Antony Jao

The Chief-Rabai Location

ANTHONY C. JAO
CHIEF - RABAI LOCATION
24 MAY 2023
P.O. Box 1[illegible]

Annexure 1: List of participants

No.	Name	Affiliation
1.	Ms. Fatuma Sarai	Assistant County Commissioner-Rabai Division
2.	Mr. Antony Jao	The Chief- Rabai Location
3.	Mr. Ramadhan Chisubi	The Assistant Chief-Kaliang'ombe Sub-location
4.	Mr. Hiren Varaiya	Nitro Chemicals Limited
5.	Mr. Dhruv	Nitro Chemicals Limited
6.	Mr. John	Nitro Chemicals Limited
7.	Mr. Emmanuel	Inspector Mining
8.	Mr. Timothy	Inspector Mining
9.	Mr. Ahmed Bakari	The Environment Officer, NEMA Kilifi
10.	Mr. David Swafi	Misufini village area resident
11.	Mr. Ali Bakari	Misufini village area resident
12.	Mama Saumu	Misufini village area resident

NITRO CHEMICALS LTD.

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Environmental Impact Assessment (EIA) Study Report for the Proposed Construction of Mining Explosives Storage Facility on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County.

Proceedings of the meeting to review and validate the Draft ESIA Study Report held at Serenity Fort Hotel, Mariakani, Kilifi County

19th May 2023.

Proponent	Consultant
Nitro Chemicals Limited P.O Box 17897-00500 Nairobi, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya. Tel: +254 722 347 155 Email: info@envasses.org

1. Introduction

The meeting was called to order at 9:40am by Mr. Ramadhan Nyoka, the Assistant Chief-Kaliang'ombe sub-location and opened with a word of prayer from Mr. Mohammed Garero. Mr. Ramadhan then welcomed the participants to the validation meeting and proceeded to introductions (Annex 1).

Figure 1: Participants during the draft EIA Study Report Validation Meeting held on 19th May 2023 at Serenity Fort Hotel (Source: Validation meeting, May 2023)

Mr. Ramadhan itemized the agenda of the meeting as follows;

1. Opening remarks from Rabai Sub-County Administration
2. Presentation of draft EIA Study Report
3. Plenary discussions on the draft EIA Study Report
4. Validation of the ESIA study report
5. Way forward and AOB

2. Opening remarks

Mr. Ramadhan thanked the participants for attending the meeting stating that it was the third and final stakeholder engagement meeting after those held in January and February 2023. He further noted that it was important that the community and stakeholders review the ESIA report and validate it prior to submission to NEMA in accordance with the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya. He encouraged the participants to keenly review the report, make their comments and afterwards confirm that the report contains the concerns that they had raised during the stakeholder engagement process.

3. Presentation of the draft EIA Study Report

Ms. Fridah thanked the participants for attending the meeting and informed them that it was held pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya. She then detailed the methodology used in carrying out the study and acknowledged that the earlier process where an SPR was carried out but was not sufficient to address stakeholder concerns as per the previous meetings. Afterwards she proceeded to present

the draft report according to the technical scope pursuant to Regulation 18 (1) and (2) of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003 as follows.

(1)

(a) the proposed location of the project;
(b) a concise description of the national environmental legislative and regulatory framework, baseline information,
(c) and any other relevant information related to the project; the objectives of the project;
(d) the technology, procedures and processes to be used, in the implementation of the project;
(e) the materials to be used in the construction and implementation of the project;
(f) the products, by-products and waste generated project;
(g) a description of the potentially affected environment;
(h) the environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated;
(i) alternative technologies and processes available and reasons for preferring the chosen technology and processes;
(j) analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies.
(k) an environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures;
(l) provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects;
(m) the measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
(n) an identification of gaps in knowledge and uncertainties which were encountered in compiling the information;
(o) an economic and social analysis of the project;
(p) an indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures; and
(q) such other matters as the Authority may require.

(2)
A non-technical summary outlining the key findings, conclusions and recommendations of the study and shall be signed by the proponent and environmental impact assessment experts involved in its preparation.

In her presentation, Ms. Fridah emphasized that the consultant in collaboration with Lahvens Limited had carried out baseline study for ambient air quality, noise levels measurements and soil tests to provide a benchmark for implementing the Environmental Monitoring Plan proposed in the ESIA report. In addition, she mentioned that based on results it was noted that the attributed sources of particulate matter and noise levels detected were from quarrying activities, heavy commercial vehicles moving in and out of the neighboring quarry facilities. She added that the levels recorded during the survey were noted to be within the stipulated standards.

Ms. Fridah then invited the participants to give their comments on the draft EIA Study Report.

4. Plenary Discussions on the draft EIA Study Report

Ms Saumu Charo from Misufini village stated that the proposed project has both positive and negative impacts which should be assessed systematically to value the benefits against the environmental and social concerns. She added that the proponent should put in place measures to enhance the positive impacts and minimize and/or avoid the negative impacts.

Mr. David Chilako from Misufini village raised concerns about health of the local community due to the anticipated air pollution during the construction and operation phase. Mr. Anthony Chilodi added that the proponent should ensure effective implementation of measures recommended in the report and suggested the construction of a health facility as part of the CSR activities. Ms. Fridah responded that the recommendations would be documented and forwarded to the proponent for consideration.

Mr. Athman Mbora from Boyani village expressed his gratitude to the proponent and the ESIA consultants' team for engaging community in the ESIA process. He raised concerns on insecurity risks likely to occur during project implementation. In response, Ms. Fridah stated that the proposed project design is structured to ensure maximum security and safety measures. In addition, Mr. Ramadhan suggested the installation of adequate street lights within the facility as well as along the boundary wall to enhance security within the surrounding.

Mr. Nyamau Ndegwa from Misufini village said that he had no objection to the proposed project since it would provide employment of local youths during construction and promote local developments within the region. He urged that the proponent to incorporate an effective storm water drainage system to prevent contamination of surface and underground water resources within the area.

Mr. Emos Saha from Misufini village requested the final ESIA report to be provided in the Assistant Chief's office for easy access by the community members. Ms. Fridah informed the participants that a final report be prepared and submitted to National Environment Management Authority (NEMA) for decision making. She added that the report will be accessible to the public via NEMA website as well as its offices in Nairobi and Kilifi.

Mr. Kithi Tsuma from Boyani village raised concerns on increase of water demand during construction of the proposed project stating that it would increase pressure on the existing resources since the area experiences water scarcity. He was concerned if the EIA Study report has recommended feasible measures to address water shortage. Ms. Fridah responded that the proponent will draw water for construction from an existing borehole of a quarry facility located near the project site and will not in any way draw water from community reservoirs.

Mr. Morris Kilonzo from Misufini village raised concerns about the current use of the proposed project site by local youths for sports. Furthermore, Mr. Ramadhan urged the proponent to provide support to the youth sports activities as a way of empowering them. Ms. Fridah responded that the issue was raised in the previous meetings and was under discussion for provisions to allocate another space for sports activities since the current site is privately owned.

Mr. Douglas Karisa from Misufini village urged the proponent to allow community members to access and fetch rainwater that accumulates at a decommissioned quarry within proposed site or

Page 5

provide water tanks for the neighbors to access water from outside the facility. Ms. Fridah responded that the proposal would be forwarded to the proponent for consideration and action.

Mr. Anthony the Area Chief-Rabai stated that the collaboration between stakeholders and the proponent is key as it ensures will ensure the success and sustainability of the project. He emphasized on the issue of Corporate Social Responsibility (CSR) by the proponent focusing on community health, water provision, supporting youth sports activities and constructing a health clinic assessable to the local community.

5. Review and validation of the ESIA study report

After the presentation of the draft ESIA report and the plenary session, the participants were given an opportunity to review the updated report after which it was validated as the final version to be submitted to NEMA.

6. Way forward

Ms. Fridah stated that the proceedings for the meeting will be prepared and submitted together with the validated ESIA report NEMA. In addition, she informed the participants that the proposed project will be advertised for a period of thirty (30) days in Kenya Gazette, a newspaper with nationwide circulation and local radio station inviting the public to submit oral and written comments on the proposed project to NEMA. She further noted that stakeholders will have an opportunity to provide any additional comments during that period.

7. Closure of the meeting

There being no other business, the meeting ended at 12:30pm with a word of prayer from Mr. Morris Kilonzo.

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED
19th MAY 2023
P.O. Box 2013 - 80100, MOMBASA
Tel: 0722 347 155
Email: info@envasses.org

Signature: _____ Date: 19th MAY 2023

Ms. Joy Alice
Envasses Environmental Consultants Limited
Meeting Secretary

Signature: _____ Date: 24/05/2023

Mr. Anthony Jao
The Area Chief-Rabai

ANTHONY C. JAO
CHIEF RABAI LOCATION
24 MAY 2023

24/05/2023
RAMADHAN C. NYOKA
ASSISTANT CHIEF
KALIANG'OMBE SUB - LOCATION

NCL NITRO CHEMICALS LTD.

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Environmental Impact Assessment (EIA) Study Report for the Proposed Construction of Mining Explosives Storage Facility on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County.

Draft ESIA Report Validation Meeting

Date: 19th May 2023

Venue: Serenity Fort Hotel in Mariakani

Attendance list

NO.	NAME	AFFILLIATION	TELEPHONE NO/EMAIL	SIGN
1.	NYAMAWI NDEGWA N.	MISUFINI	0707960654	
2.	DAVID MWAMUTA CHALAKO	MISUFINI	0115796032	
3.	DOUGLAS KARISA	misufini	0726084447	Chuba
4.	mwaka msha kazungu	misufini	— —	
5.	NAZUA KAHINDI	MSUFINI	0112268132	nazua

NO.	NAME	AFFILLIATION	TELEPHONE NO/EMAIL	SIGN
6.	JOSPHAT SILAS MBAJI	BOYANI	0757982673	
7.	ATHMANI MBERA	BOYANI	0720201802	
8.	MOHAMMED GARERO	BOYANI	0711635919	
9.	PAUL BANSI	MISUFINI	0114551591	Bansi
10.	SAUMU CHARO	MISUFINI	0712662969	
11.	MORRIS M. KILONZO	MISUFINI	0724289397	
12.	KANG'OMBE KARISA	MISUFINI	0735-297547	N'Gambe
13.	EMMANUEL K. TSUMA	BOYANI	0727614819	
14.	EMOS SAHA GANDE	MISUFINI	0745299350	
15.	RAMADHAN CHISUBI NYOKA	ASST. CHIEF - KALIANGOMBE	0724356688	
16.	ANTHONY CHIDDI JAO	CHIEF RABA LOCATION	0720387142	
17.	Fridah Khamalisha	Envasses Environmental Consultants Limited	0704063064	
18.	JOY ALICE NTHAMA	Envasses Environmental Consultants Limited	0103476327	

NO.	NAME	AFFILLIATION	TELEPHONE NO/EMAIL	SIGN
19.	JAMES WATHERI	ENVASSET	0721824497	
20.	Elias Kimaru	Envasses	0724255314	E K
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Environmental Impact Assessment (EIA) Study Report for the Proposed Construction of Mining Explosives Storage Facility on Plot L.R. No. Kawala "A'/405' in Kokotoni, Kilifi County.

Task: Review and Validation Meeting for the Draft ESIA Study Report

Date: 19th May 2023

Venue: Serenity Fort Hotel in Mariakani

Meeting Programme

Time	Activity	Facilitator
09:30am	Arrival and registration of participants	Envasses Environmental Consultants Limited
10:00am	Prayer and introductions	The Area Chief-Rabai location
10:10am	Opening remarks	Rabai Administration
10:20am	Presentation of the Draft ESIA Study Report for the proposed Explosives Storage Facility	Envasses Environmental Consultants Limited
11:00am	Plenary discussions on the Draft ESIA Study Report	Nitro Chemicals Limited/ Envasses Environmental Consultants Limited
11:30am	Way forward and AOB	Envasses Environmental Consultants Limited
12:00pm	**Prayer and departure**	

Payment Receipt

Invoice Number:SRA_2965
Invoice Status:PAID
Payment Date:29/05/2023

Applicant Details:
PIN:P051151500Y
Name:Nitro Chemicals Limited
Phone:0722347155
Email:info@envasses.org

Service	Description	Amount (KES)
EIA Study Report	Payment for EIA Study Report	54,566
Convenience Fee	Ecitizen Convenience Fee	50.00
	Total Amount Paid	54,616
	Balance	0

Payment Mode eCitizen

Note :This document is computer generated and therefore not signed. Present it during licence or permit collection

FORM 7 (r.15(2))

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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/18513

Application Reference No: NEMA/EIA/EL/24308

M/S **Envasses Environmental Consultants Ltd**
(individual or firm) of address
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: **1/12/2023** Expiry Date: **12/31/2023**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2015 Certified

Conditions For Licensing

1. This license expires on 31st December of the year it is issued.
2. The expert shall comply with code of practice and Professional Ethics for EIA/EA experts.
3. The expert shall comply with the attached conditions.

General Conditions

1. All Environment Experts certified and registered in the accordance with the provision of relevant Regulations, may establish professional associations to complement and implement the objectives of the Code of Practice.
2. An Expert shall act professionally, accurately, fairly and in an unbiased manner in undertaking his work.
3. The Director General, in consultation with relevant stakeholders, may from time to time issue guidelines for the proper conduct of registered Environmental Impact and Audit Experts.
4. Every Environmental Expert shall each year attend at least two relevant seminars organized by the authority for the purposes of improving the professional expertise of its members.
5. No Expert shall exploit the inexperience, lack of understanding, illiteracy or other lack of technical knowledge in environmental matters of a project proponent, owner or the public, for his personal gain.

Receiving Instructions

1. No Environmental Expert shall act for any project proponent unless he has received written instructions form such project proponent or his authorized agent.
2. An Environmental Expert shall not unreasonably delay the carrying out of instructions received from the project proponent of his authorized agent.
3. An Environmental Expert shall discharge his responsibilities to the project proponent with due diligence and integrity.
4. An Environment Expert may terminate a contract on carrying out an environmental impact assessment or audit as stipulated in section 8 of the Code of Practice and Professional Ethics of EIA/EA Experts.

Carrying out an EIA/EA

1. An Environmental Expert shall follow relevant regulations or guidelines and directives issued by the Authority.
2. As Environmental Expert shall take due care and diligence to collect the relevant data to address the significant environmental issues in the various stages of the assessment or audit process and fully acknowledge the source of any data that is not the result of his findings.
3. Environmental Expert shall consult widely with all the relevant agencies, stakeholders, interested parties and the general public on all the matters that likely to affect them.
4. An Environmental Impact Assessment or Audit Report shall be based on the Terms of Reference of the Assignment and shall include all the matters relevant to the findings of the study, all the relevant matters are required by statutory provisions, and must be guided by professional standards and judgments.

Responsibility of Lead Environmental Experts

1. (1) An Environmental Lead Expert shall be responsible for the documents prepared by him/her on behalf of the project proponent.
   (2) An Environmental Expert shall guide the proponent throughout the preparation of the environmental impact assessment and/or environmental audit, and/or during implementation of the Environmental Management Plan.
   (3) An Environmental Expert shall disclose to a client or employer any relationships of conflicting or competing interests that may influence his judgment prior to the carrying out of work.

Misconduct of Environmental Experts

1. An Environmental Expert who contrivances a provision of Code of Practice and Professional Ethics shall be deemed to have committed professional misconduct and shall be subject to disciplinary action by the Authority as appropriate and as stipulated in the Code of Practice and Professional Ethics of Environmental Experts.

Disciplinary Action

1. Where an Environmental Expert is found to have committed professional misconduct by the Environmental Experts' Advisory Committee/Authority shall be punished as stated under section 19 of the code of Practice and Professional Ethics.

Appeals

1. (1) An Expert aggrieved by the decision of the Authority may apply for the review of such decision in the High Court.
   (2) If an application for judicial review shall not have been fined at the expiry of 30 days from the date of the decision of the Authority, the director General may publicize the disciplinary action taken against the Expert.

FORM 7 (r.15(2))

mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/18514

Application Reference No: NEMA/EIA/EL/24309

M/S **Simon Kioko Nzuki**
(individual or firm) of address
P.O. Box 2013 - 80100 Mombasa

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

General

registration number **1350**

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

Issued Date: **1/12/2023** Expiry Date: **12/31/2023**

Signature.....

(Seal)
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