Environmental and Social Impact Assessment (ESIA) Study Report for the Proposed Kwale County Aggregation and Industrial Park (CIAP) on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County

Proponent	Firm of Experts
County Government of Kwale, Department of Trade and Enterprise Development, P.O Box 4-80403, Kwale, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya. Tel:+254 722 347 155 Email: info@envasses.org

Version: Final Report
Date: 10th June 2024

CERTIFICATION

Certification by Lead Experts

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

Signed by ESIA Study Experts;

Name	Role	Signature	Date
Mr. Simon Nzuki (Lead Expert No. **1350)**	Team Leader		10th June 2024
Ms. Jane Gitau (Lead Expert No. **2015**)	Environmental Expert		10th June 2024

Certification by Proponent

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

Signed for and on behalf of: **County Government of Kwale**

Name: Mr. Kevin Bongo

Designation: Markets Officer - Department of Trade and Enterprise Development

Signature: 

ACKNOWLEDGEMENT

This ESIA study report was prepared in collaboration with the County Government of Kwale and the local community among other stakeholders. The County Government provided logistical support, project documents and financial resources to carry out the ESIA study. To this end, we are grateful to the support by the Mr. Kevin Bongo and Mr. Samuel Mvurya.

We thank the Dzombo Location Chief, Mr. Mohamed Mwatwepwe, for mobilizing the local community and other stakeholders to attend the three consultation meetings. We also acknowledge the local community (Nguluku, Nguluku B, Maro and Maro Mlimani Villages) for participating in the stakeholder meetings and providing their views, comments and concerns with respect to the proposed project and the ESIA study report.

Lahvens (K) Limited carried out sampling and analysis of baseline environmental media at the project site. i.e., ambient air, noise level measurements and maro stream water quality.

Envasses Environmental Consultants Limited staff supported data collection and analysis, facilitated community engagement meetings as well as preparation of the draft ESIA study report. To this end we acknowledge the input of Mr. Omar Said, Ms. Sabinah Mwandisha and Ms. Fridah Khamalishi.

EXECUTIVE SUMMARY

The County Government of Kwale has received financial and technical support from the National Government for the construction of a County Aggregation and Industrial Park (CAIP) on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County. Under the Second Schedule of the Environmental Management and Coordination Act (EMCA), Cap 387 of the Laws of Kenya, the project is categorized as a High Risk and thus should undergo Environmental and Social Impact Assessment (ESIA) Study process. To comply with this legal requirement the county contracted Envasses Environmental Consultants Limited to carry out the ESIA study from May -June 2024.

The Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003) informed the approach and methodology used in data collection, analysis, and reporting. Data collection methods where a reconnaissance survey carried out in May 2024 to assess the site status and baseline conditions of the project area, literature review, stakeholder consultations and environmental media sampling and analysis. The results of the ESIA study demonstrate that the project will have both positive and negative environmental impacts. The positive impacts include enhancing agricultural production and inclusive economic development, reducing post-harvest losses, helping consolidate and centralize industrial activities, promoting businesses both directly and indirectly, creating employment opportunities and income generation.

Despite the benefits, the proposed project poses environmental and social risks at construction, operational and possible decommissioning phases. Impacts at construction phase include degradation of the physical environment, increased demand for construction materials, energy and water resources, waste generation and safety and health risks. Risk management measures at the construction phase will focus on landscaping and tree planting to offset losses from vegetation clearance, obtaining raw materials from sites which are licensed as per the Environmental Management and Coordination Act, Cap 387 of the Laws of Kenya, recycling and repurposing of materials, sensitizing workers on conservation of water and energy resources, managing wastes through collection bins and contracting a NEMA licensed waste handler for their disposal and Personnel Protective Equipment (PPE) provision to the visitors and the workforce.

At operational phase, the main concerns will be solid waste management especially the organics from farm produce which could also lead to air pollution if left to decay onsite, noise pollution safety and health hazards, fire risks and emergencies, increased water and energy demand and storm water management. Mitigation measures at this stage of the project cycle are provision of waste collection infrastructure with capacity for segregation and designate an area where all wastes will be temporarily held prior to disposal by a NEMA licensed contractor. The study recommends the establishment of a compositing facility in the area to manage the organic solid wastes (agricultural) for use as manure by the farmers and create additional employment opportunities for women and youth. Due to the large number of people who will be carrying out trade at the CAIP, it will be important to develop ensure order in terms of delivery of agricultural produce by farmers including dedicated parking areas for transport vehicles. In addition, an emergency response plan should be prepared and prominently displayed in strategic points at the CAIP as well as provision of firefighting infrastructure. The proponent should also ensure the safety and health of employees working in the cold storage areas due to low temperatures by providing appropriate PPEs and limiting working hours as per the Occupational Safety and Health Act, 2007.

Environmental goods and services to support the project such as water and energy will be sourced from a borehole and the national grid respectively. The proponent will obtain a borehole permit from the Water Resources Authority (WRA), install solar systems for lighting of the facility and sensitize users and employees of the CAIP on water and energy conservation. One of the major components of the CAIP are the cold storage facilities which will account for a significant use of electricity and the attendant carbon footprint through emission of Green House Gases (GHGs). To mitigate these, the proponent should consider future investments in off-grid cooling systems powered by biogas (from the compositing of organic wastes) and solar, purchasing cooling systems with high energy efficiency and behavioral change among workers to conserve energy.

The roof catchment of the CAIP as well as the impervious surfaces will generate substantial quantities of storm water which should be managed through harvesting and construction of a storm water drainage system respectively. The storm water drainage system could potentially terminate into Maro seasonal stream through a screening process to prevent pollution and water quality degradation in the seasonal stream.

At decommissioning phase, the key environmental concerns would be loss of the benefits provided by the CAIP to the community and waste generation and management. The proponent will prepare a due diligence decommissioning audit documenting the specific impacts on the community and the environment and submit it to NEMA for approval at least three months prior.

Overall and despite the attendant environmental and social risks, the CAIP project will transform the agricultural and industrial sector in Kwale County by spurring an all-inclusive economic development. The study acknowledges the importance of addressing the environmental and social risks of the project to ensure its sustainability and hence proposes a suite of Environmental Management Plans (EMPs) corresponding to each project phase. Implementing the EMPs will significantly reduce or in some cases reverse the project's negative environmental and social impacts. On this basis, the study recommends the issuance of an EIA License pursuant to the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

TABLE OF CONTENTS

CERTIFICATION ii
Certification by Lead Experts ii
Certification by Proponent ii
ACKNOWLEDGEMENT iii
EXECUTIVE SUMMARY iv
LIST OF FIGURES ix
LIST OF TABLES x
ACRONMYNS xi

1 INTRODUCTION 1
1.1 Background information 1
1.2 ESIA approach and methodology 2
1.2.1 Reconnaissance survey 2
1.3 Literature review 2
1.4 Baseline environmental media sampling and sampling analysis 3
1.4.1 Ambient air quality 3
1.4.2 Noise level measurements 3
1.5 Stakeholder engagement 3

2 PROJECT DESCRIPTION 5
2.1 Overview and context of County Aggregation and Industrial Parks 5
2.2 Kwale County Aggregation and Industrial Park 5
2.3 Land ownership 6
2.4 Project budget 6

3 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS 7
3.1 Bio-physical environment 7
3.1.1 Climate 7
3.1.2 Geology and soils 7
3.1.3 Topography 7
3.1.4 Water use 8
3.1.5 Wastewater management 8
3.1.6 Solid waste management 9
3.1.7 Baseline air quality 9
3.1.8 Baseline noise levels 9
3.2 Biodiversity 10
3.3 Social-economic environment 11
3.3.1 Demographics and social distribution 11
3.3.2 Land use and socio-economic activities 11
3.4 Public utility infrastructure 12
3.5 Access road 12

4 ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES 13
4.1 Project benefits 13
4.2 Construction phase impacts 13
4.2.1 Degradation of the physical environment 13
4.2.2 Increased demand for construction materials 14
4.2.3 Health and safety risks 14
4.2.4 Air pollution 15
4.2.5 Solid waste management 16

4.2.6 Water demand and effluent management 16
4.2.7 Storm water and increased surface run-off 17
4.3 Operational phase impacts 17
4.3.1 Solid waste generation 17
4.3.2 Health and Safety Risks 18
4.3.3 Air pollution 18
4.3.4 Traffic increase, congestion and accidents 20
4.4 Decommissioning phase impacts 20
4.4.1 Loss of CAIP economic benefits 21
4.4.2 Health and Safety risks 21
4.4.3 Waste generation 21
4.5 Impact analysis 21
4.6 Public and stakeholder consultations and findings 23
4.7 Grievances Redress Mechanism 26
4.7.1 Grievances prevention 26
4.7.2 Grievances Redress Mechanism Tool 27

5 ANALYSIS OF PROJECT ALTERNATIVES 28
5.1 The 'No' project alternative 28
5.2 Relocation alternative 28
5.3 The 'Yes Project' alternative 28
5.4 Alternative to construction material and technology 28
5.4.1 Energy alternatives 28
5.4.2 Water supply alternatives 29

6 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN 30
6.1 Environmental Management Plan for the construction phase 30
6.2 Environmental Management Plan for the operational Phase 30
6.3 Environmental Management Plan for the possible decommissioning phase 30

7 ENVIRONMENTAL MONITORING PLAN 40
7.1.1 Safety and Health Monitoring Plan 40
7.1.2 Air quality monitoring plan 41
7.1.3 Noise level monitoring plan 41
7.1.4 Water Quality 42
7.1.5 Solid waste monitoring plan 43
7.1.6 Energy monitoring plan 44

8 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORKS 45
8.1 Policy Frameworks 45
8.1.1 National Environment Policy, 2013 45
8.1.2 Kenya Vision 2030 45
8.1.3 National Industrialization Policy, 2012 45
8.1.4 Kenya National Climate Change Response Strategy of 2010 45
8.1.5 Kwale County Integrated Development Plan 2023-2027 45
8.1.6 Kwale County Climate Change Framework Policy 45
8.1.7 Kwale County Climate Change Action Plan (KCCCAP) 2022-2027 45
8.1.8 Kwale County State of Environment and Outlook Report (2021-2022) 46
8.1.9 County Land and Environment Policy 46
8.1.10 County Integrated Solid Waste Management Policy 46
8.1.11 Other policies 46
8.2 Legal Frameworks 47
8.2.1 Constitution of Kenya 2010 47

8.2.2 Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya 47
8.2.3 Occupational Safety and Health Act, 2007 49
8.2.4 Sustainable Waste Management Act, 2022 49
8.2.5 Physical and Land Use Planning Act, 2019 49
8.2.6 Public Health Act, 2012. 49
8.2.7 Water Resources Regulations, 2021 49
8.2.8 Energy Act, 2019 50
8.2.9 Climate Change Act, 2023 50
8.2.10 County Government Act, 2012 50
8.2.11 Kwale County Public Participation Act, 2016 50
8.3 Institutional framework 50

9 CONCLUSION AND RECOMMENDATION 52
9.1 Conclusion 52
9.2 Recommendation 52

10 REFERENCES 53
11 ANNEXURES 54

LIST OF FIGURES

Figure 1: Location of the proposed project site in Kwale County (Source: Google Earth, May 2024) 1
Figure 2: Stakeholder analysis and engagement considerations based on interest and influence in the project 4
Figure 3: Site layout plan of the proposed CAIPs (Source: Arch. L.M. Mochama) 5
Figure 4: Aggregation warehouses and cold store (Source: Arch. L.M. Mochama) 6
Figure 5: The value addition warehouses (Source: Arch. L.M. Mochama) 6
Figure 6: Average rainfall and temperature distribution for Kwale County in 2023 (Source: World Weather Online, May 2024) 7
Figure 7: A section of the Dzombo hill which neighbors the project site (Source: Source: Reconnaissance survey, May 2024) 8
Figure 8: A section of Maro seasonal stream (left) and the existing borehole (right) within the project area (Source: Source: Reconnaissance survey, May 2024) 8
Figure 9: Sample tree types at the proposed site (Source: Source: Reconnaissance survey, May 2024) 10
Figure 10: Eucalyptus trees woodlot bordering the project site (Source: Reconnaissance survey, May 2024) 10
Figure 11: Maize farm within the project area (Source: Reconnaissance survey, May 2024) 11
Figure 12: Goats (left) and cattle (right grazing within the project area (Source: Reconnaissance survey, May 2024) 11
Figure 13: A section of the access road to the project site (Source: Reconnaissance survey, May 2024) 12
Figure 14: Stakeholders following deliberations during the kick-off meeting (Source: First Stakeholder meeting, May 2024) 24
Figure 15: Stakeholders following deliberations during the meeting to review the CAIP draft ESIA Study Report (Source: Second Stakeholder meeting, June 2024) 25
Figure 16: Participants following deliberations during the stakeholder meeting to validate the final draft ESIA Study Report 26
Figure 17: Schematic representation of a proposed Grievances Redress Mechanism Tool 27

LIST OF TABLES

Table 1: Summary of the results of screening and scoping exercise for the Kwale CAIP 2
Table 2: Key categories considered during stakeholder identification and analysis 4
Table 3: Average results for gaseous parameters 9
Table 4: Summary results of noise levels measurement equivalents 9
Table 5: Risk rating of Impacts for the Kwale County Aggregation and Industrial Park 22
Table 6: Stakeholder engagement schedule 23
Table 7: Summary of issues raised during the first stakeholder meeting and response provided by the proponent and the consultant on 30th May 2024 24
Table 8: Summary of issues raised during the second stakeholder meeting and response provided by the proponent and the consultant on 6th June 2024 25
Table 9: Summary of issues raised during the third stakeholder meeting and response provided by the proponent and the consultant on 7th June 2024 26
Table 10: Environmental Management Plan for the proposed Kwale County Aggregation and Industrial Park 31
Table 11: Ambient air quality tolerance limits as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014. 41
Table 12: 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. 42
Table 13: The Occupational Health and Safety Exposure Limits for Noise Emissions 42
Table 14: Water Quality Monitoring Parameters and the standards prescribed under the Third Schedule of the Environmental Management and Coordination (Water Quality) Regulations, 2006. 43
Table 15: Sample outline for solid waste monitoring plan. 43
Table 16: Relevant sustainable development goals to the proposed project 46
Table 17: Institutions and their legislative mandate as it applies to Kwale CAIP 51

ACRONMYNS

CAIP	County Aggregation and Industrial Park
Cap	Chapter
CIDP	County Integrated Development Plan
dB	Decibels
DOSHS	Directorate of Occupational Safety and Health Services
EDL	Effluent Discharge License
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Co-ordination Act
EMPs	Environmental Management Plans
ERC	Energy Regulatory Commission
GHGs	Green House Gases
GPS	Global Positioning System
GRM	Grievances Redress Mechanism
HCVs	Heavy Commercial Vehicles
KCCCAP	Kwale County Climate Change Action Plan
KNBS	Kenya National Bureau of Statistics
KPLC	Kenya Power Lighting Company
KWh	Kilowatt hours
NEMA	National Environment Management Authority
OSHA	Occupational Safety and Health Act
PPEs	Personal Protective Equipment
SDGs	Sustainable Development Goals
TORs	Terms of Reference
WRA	Water Resource Authority

1 INTRODUCTION

1.1 Background information

The Ministry of Investment, Trade and Industry intends to construct County Aggregation and Industrial Parks (CAIPs) in all the 47 counties in Kenya. The main objective of the CAIPs is to grow manufacturing and investments through Agro-Industries and enhance productivity of agriculture sector in a sustainable manner hence creating inclusive decent jobs, increase farmers' income; increase foreign exchange, provide platform where farmers, processors, exporters, research in Kenya connect through Commodity Exchange (KOMEX) and Warehouse Receipting. Consequently, County Government of Kwale has received financial and technical support from the National Government to finance the construction of CAIP on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County at **Latitude** 4°24'48" S and **Longitude** 39°14'23" E (Figure 1).

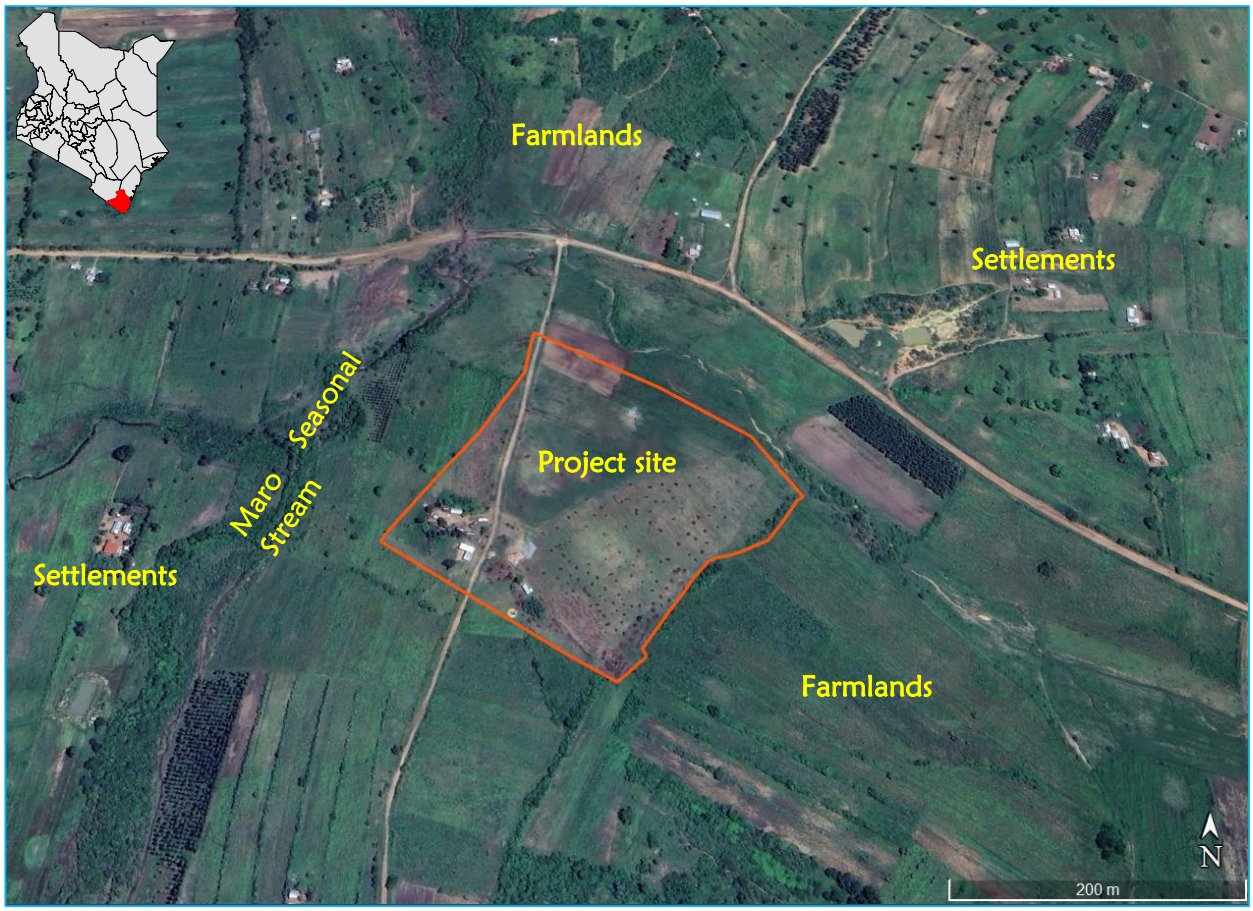


Figure 1: Location of the proposed project site in Kwale County (Source: Google Earth, May 2024)

The proposed development is aimed at boosting agriculture production by adding value to farm produce which will enhance farmers' income and curb postharvest losses for perishable products. Under the Second Schedule of the Environmental Management and Co-ordination Act, Cap 387 of the Laws of Kenya, the project is categorized as a High Risk Projects and thus should undergo Environmental Impact Assessment (EIA) Study process. To comply with this legal requirement, improve environmental performance and ensure sustainability of the proposed project activities, the proponent contracted Envasses Environmental Consultants Limited to carry out the EIA study from May-June 2024.

1.2 ESIA approach and methodology

The ESIA Study was prepared pursuant to Section 58 of the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya. Specifically, the Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003 informed the approach and methodology used in data collection, analysis and reporting. The methods used to gather data and information were reconnaissance survey to assess site status and baseline conditions of the project area, environmental media sampling and analysis (ambient air, and noise level measurements), biodiversity monitoring, literature review including project documentation, published and non-published works on project area and policy documents at the County and National levels.

1.2.1 Reconnaissance survey

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

Table 1: Summary of the results of screening and scoping exercise for the Kwale CAIP

Criteria	Results
Ecological considerations	– Clearance of vegetation will occur – No endangered species of trees and plants were found at the site – No endemic species reported on site
Socio-economic considerations	– No cultural or heritage assets at the site – The project will create employment – The project will boost agricultural production – The project will reduce post-harvest losses – Revenue to the government through taxes & licenses
Landscape impacts	– The proposed project will not impact significantly on the landscape of the area
Land use	– The proposed project area land use includes low density residential houses and farmlands
Water	– Implementation of the proposed project will increase water demand and potential pollution from waste disposal

Following the reconnaissance survey, the consultant prepared a Scoping report and Terms of Reference (TORs) as required under Regulation 11 of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003 which were approved by NEMA.

1.3 Literature review

Literature review provided data and information on the biophysical profile of the site (climate and meteorology, hydrology, topography, geology and soils), biological communities (terrestrial flora and fauna) and socio-cultural environment (population demographics, community structure, cultural properties, land use and land cover, socio-economic profile, planned development and public utility infrastructure) within the project area. Additionally, literature review was used to bridge gaps in data and information collected during site visits and monitoring activities with

respect to the scope of the ESIA. Documents reviewed included CAIP preliminary designs, published works and grey literature on project area, Kwale County Integrated Development Plan, 2023-2027, Kwale County State of Environment Outlook Report 2022, Policy and Legal Instruments by the National and County Governments.

1.4 Baseline environmental media sampling and sampling analysis

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

1.4.1 Ambient air quality

Mobile, static and active monitoring was done by using a 24-hour AQM-09 which integrates the main ambient gases and meteorological parameters. The target value is converted into voltage signal by operational amplifier circuit, and then filtered through high-precision AD data acquisition system. In this method, particulates mainly use laser scattering method to produce different scattering light according to different particle diameters under laser scattering conditions. The scattered light intensity is collected by a response device, and the particle 4 concentration is obtained after amplification, filtering and AD acquisition. The obtained gas concentration and particulate matter concentration are displayed on LCD screen in real time, and potentially transmitted to cloud platform or environmental protection through GPRS, 4G LTE and other network signals, to realize the monitoring of regional environmental quality.

1.4.2 Noise level measurements

Noise levels were evaluated using a Sound Level Meter Model AWA 5636 IEC 61672 – 1:2013 class 2 with a built-in ῶoctave / octave band filters. Noise level measurement was achieved via initial examination of existing road traffic and other noise sources of significance. The equipment does real time 1/1 and 1/3 octave analysis 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 were taken at timed intervals over 10 minutes and stored in SLM's memory. The calibrated sound level meter was placed on the microphone to reduce any wind interference during measurements.

Further, 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.

1.5 Stakeholder engagement

Stakeholder engagement is a legal requirement under Article 69 of the Kenya Constitution, 2010 and Regulation 17 of the Environmental Management and Coordination (Impact Assessment and

Audit) Regulations, 2003. Hence and prior to commencement of the EIA process, the consultants conducted a stakeholder mapping and analysis to determine the individual, groups and institutions that will be affected by and have an interest in the project. The consultants then prepared a comprehensive list of all the stakeholders in consultation with the proponent and categorized them based on interest and influence (Figure 2, Table 2).

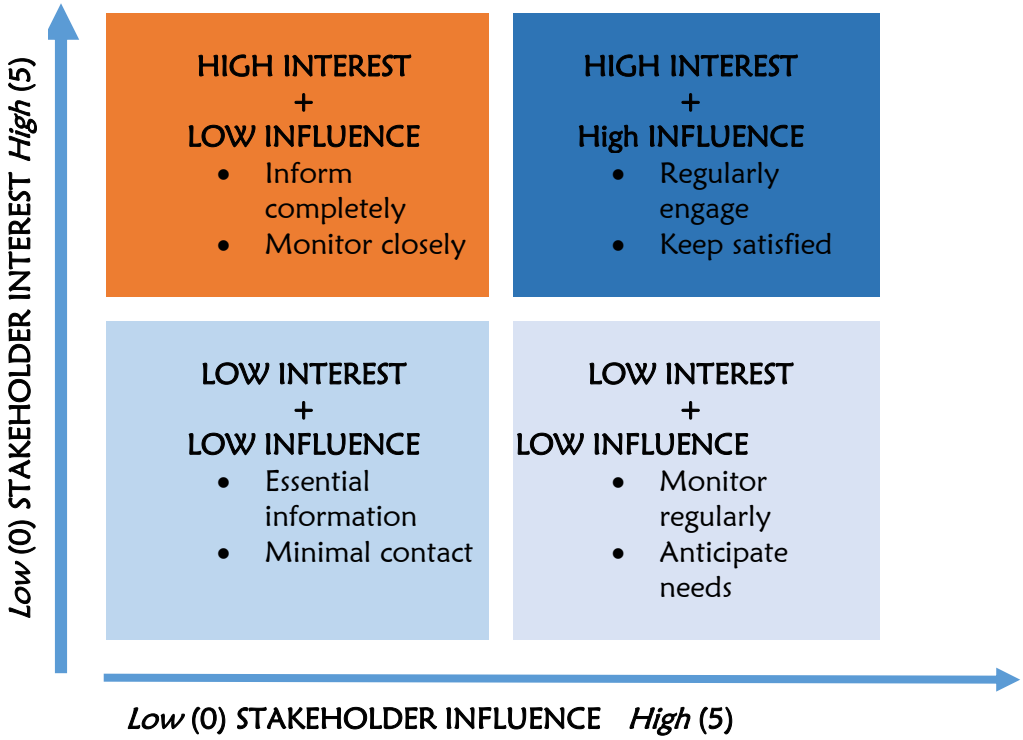


Figure 2: Stakeholder analysis and engagement considerations based on interest and influence in the project

Table 2: Key categories considered during stakeholder identification and analysis

Key stakeholder categories
1. National Government Agencies
2. County Government
3. Opinion Leaders (Community elders)
4. Community Based Organisations (CBOs)
5. Non-Governmental Organisations (NGOs)
6. Faith Based Institutions
7. Civil Society Groups
8. Special Interest Groups
9. Private Sector

Following stakeholder mapping and analysis, three (3) stakeholder consultation meetings i.e., kick off to sensitize stakeholders on the proposed project, a second meeting to review draft ESIA Study Report and third meeting to validate the ESIA Study Report were held on 30th May 2024, 6th June 2024 and 7th June 2024 respectively. The views, comments and information gathered from the stakeholders were subsequently synthesized and incorporated into the ESIA Study Report alongside the proceedings of the meetings which are provided as an addendum.

2 PROJECT DESCRIPTION

2.1 Overview and context of County Aggregation and Industrial Parks

Kenya's long-term development Blueprint, the Vision 2030 aims to transform Kenya into an Industrialized Middle-income country offering a high quality of life to all our citizens. Currently, the Government is promoting the Bottom -Up Economic Transformation Agenda (BETA) in recognition of the role played by agriculture and manufacturing sectors in income generation, wealth & job creation, increase foreign exchange earnings, and poverty reduction. It targets to address the challenges in the agriculture sector through raising the productivity of farmers through cost reduction, enhancing the quality and availability of inputs and providing them with working capital. These interventions are expected to trigger multiplier effects which will promote backward and forward linkages to other sectors of economy including manufacturing sector by provision of required raw materials. Over the years, the growth of manufacturing sector has remained stagnant at approximately 11% of the GDP over the past ten years. This has resulted to reduction on jobs, stagnation in exports while imports have been growing.

In addressing some of these challenges, the Ministry of Investment, Trade and Industry through State Department for Industry targets to Raise manufacturing contribution to GDP from current 7% to 15% by 2027 and to 20% by 2030. Towards this, the National Government through the Ministry of Investment, Trade and Industry and County Governments in partnership with private sector, development partners and United Nation Industrial Development Organization (UNIDO) is establishing County Aggregation and Industrial Parks (CAIPs) in each County. The development and implementation of the project will be jointly accomplished between the National Government, Council of Governors and County Governments.

2.2 Kwale County Aggregation and Industrial Park

The project features include the construction and use of the CAIP which comprises of triple volume (over 9m high) warehouses featuring aggregation and cold storage areas as wells as auxiliary facilities which include an office block, ablution blocks, water supply and parking areas among others (Figures 3, 4 & 5).

Figure 3: Site layout plan of the proposed CAIPs (Source: Arch. L.M. Mochama)

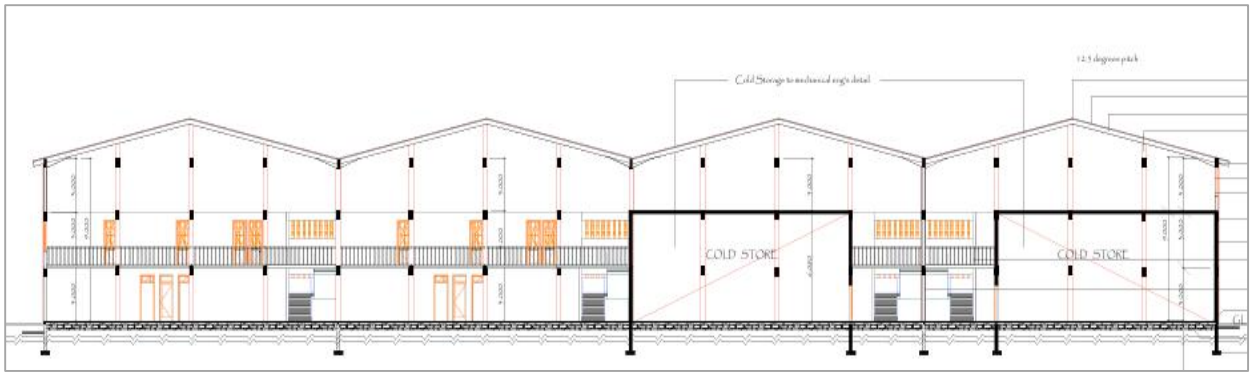


Figure 4: Aggregation warehouses and cold store (Source: Arch. L.M. Mochama)

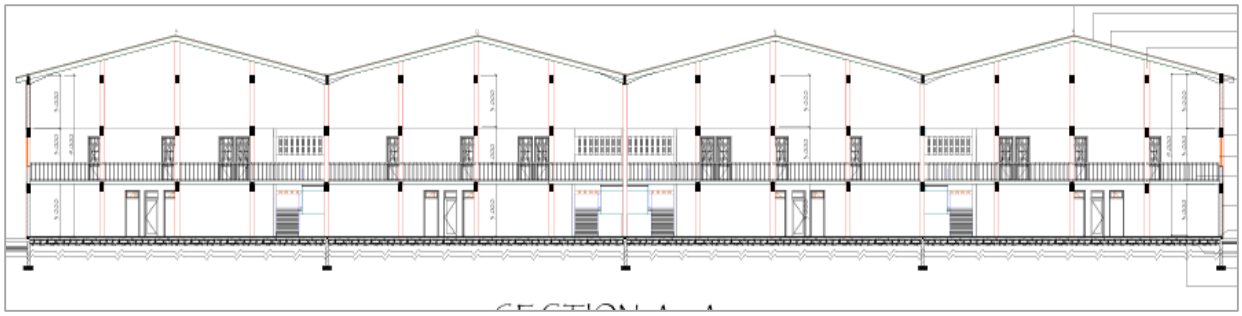


Figure 5: The value addition warehouses (Source: Arch. L.M. Mochama)

The main objective of the Kwale CAIP is to grow manufacturing and investments through Agro-Industries and enhance productivity of agriculture sector in a sustainable manner hence creating inclusive decent jobs, increase farmers' income; increase foreign exchange, provide platform where farmers, processors, exporters, research institutions, industrial bodies and Government can engage for agro-industrial development. In addition to the warehouses and cold storage facilities, the project will comprise of value addition establishments. The warehousing targets handling of agricultural products such as tomatoes, green grams, cashew nuts, cassava, and chili peppers among others. The products will be collected, sorted, graded, cleaned and packaged mainly for the export market. The county anticipates that the investment will have ripple economic effects such as investments by the private sector to support operations at the CAIP which will further transform the area into an industrial zone with incremental benefits such as employment opportunities and enhanced livelihoods.

2.3 Land ownership

The proposed CAIP will be constructed on a portion of land measuring 257.5 Ha and owned by the County Government of Kwale.

2.4 Project budget

The project budget is a tentative of Kenyan Shilling Four Hundred and Ninety-Seven Million Only (KES 497,000,000). The statutory charge of 0.1% payable to NEMA is therefore KES 497,000.

3 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

The assessment of baseline environmental and social conditions of the project site was carried out using both primary and secondary data sources. This section details on the findings of the baseline monitoring which will form the basis for impact and mitigation measures monitoring and improvement of the CAIP's environmental and social performance during the entire project cycle.

3.1 Bio-physical environment

3.1.1 Climate

The project site is located in Kwale County which experiences monsoon type of climate. Rainfall is bi-modal with the long rains usually starting from March and continues until July, while the short rains occur in October to December. The total annual precipitation varies from 900mm to 1500mm per annum along the coast and from 500mm to 600mm per annum in the hinterland. Hot and dry climate is experienced from January to May while coolest period experienced from June to August. Average temperature ranges from 26.3°C to 26.6°C in the coastal lowlands, 25°C to 26.6°C in Shimba Hills and 24.6°C to 27.5°C in the hinterland (Figure 6).

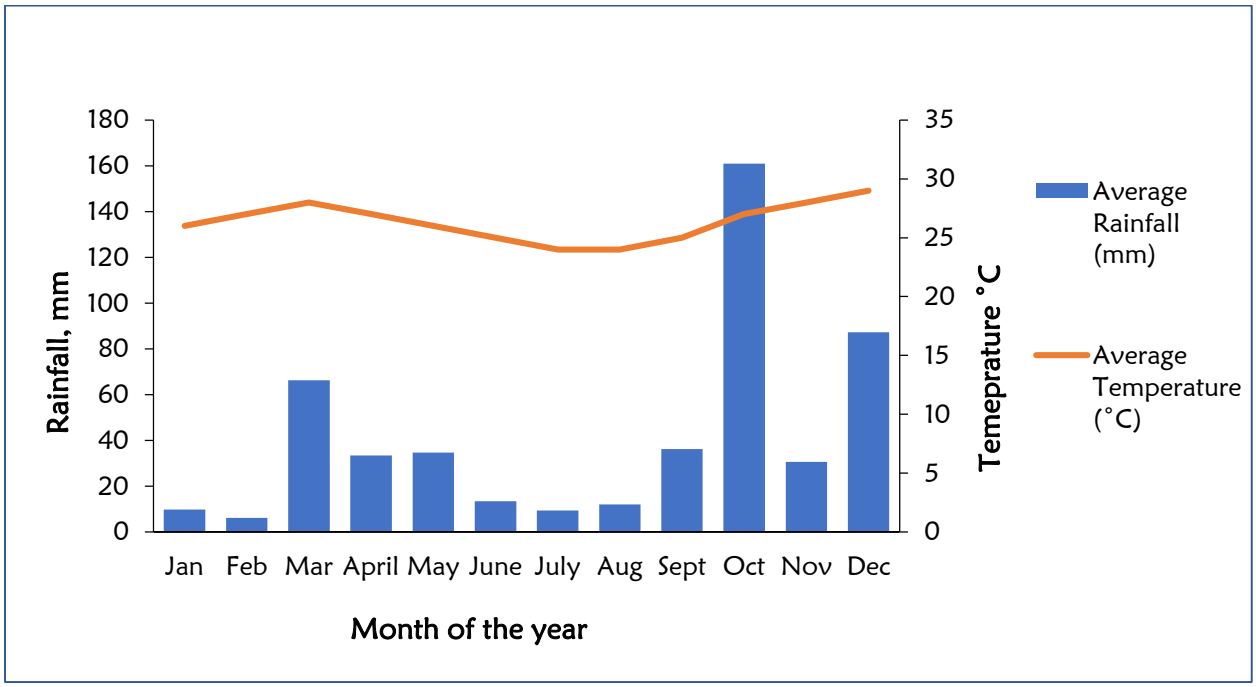


Figure 6: Average rainfall and temperature distribution for Kwale County in 2023 (Source: World Weather Online, May 2024)

3.1.2 Geology and soils

The geological structure of Kwale County comprises of basement rocks (areas of Kinango), Karoo sediments also called Duruma Sandstones (in Taru, Mariakani and Mazeras), Jurassic rocks (in Kinango and Waa areas), and intrusive rocks (in Dzombo, Chiruku, Mrima and Nguluku Hills). The composition of the project site soils ranges from sandy to loamy and their complexes.

3.1.3 Topography

Generally, Kwale County is divided into four distinct topographical zones: the coastal plain, foot plateau, coastal uplands, and Nyika plateau. The project site is situated within the coastal upland region with altitude rising from 9m to 134m asl. This topographical zone is made up of sandstones

hills including Dzombo Hill at 462 meters, Shimba (420m), Tsimba (350m), and Mrima (323m) and has the potential to support medium to high agriculture. The proposed project site is situated approximately 2km from Dzombo Hill (Figure 7).

Figure 7: A section of the Dzombo hill which neighbors the project site (Source: Source: Reconnaissance survey, May 2024)

3.1.4 Water use

The main water resources in Kwale County comprise of rivers, shallow wells, springs (protected and unprotected), water pans, dams, rock catchments and boreholes. The water resources at the site include an existing borehole and the seasonal Maro stream (Figure 8).

Figure 8: A section of Maro seasonal stream (left) and the existing borehole (right) within the project area (Source: Source: Reconnaissance survey, May 2024)

3.1.5 Wastewater management

Water will be required for construction works, general cleaning and sanitation purposes and an estimate of 70% of the water usage is generated as effluent especially from the sanitary facilities. According to Kwale County Integrated Development Plan 2023-2027, the access to basic sanitation facilities remains formidable challenge across the county thus hindering effective effluent management. For the proposed project, effluent generated will be managed through a proposed wastewater treatment system.

3.1.6 Solid waste management

The county has designated a landfill in Mwabungo for disposal of all types of waste which will be used by the project when the need arises through a NEMA licensed contractor.

3.1.7 Baseline air quality

Air quality survey was conducted 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. The results of the gaseous concentrations and particulate parameters were thereafter correlated against the Environmental Management Coordination (Air Quality) Regulations, 2014. The findings of the monitoring indicated that the air quality at the proposed site is generally good and all the measured pollutants were at low concentration levels (Table 3).

Table 3: Average results for gaseous parameters

Monitoring Locations	PM2.5 µg/m³	PM10 µg/m³	CO mg/m³	SO2 ppm	NO2 ppm	NO ppm	O3 ppm	TVOC µg/m3
East Project Boundary 1 (EPB-1) 4°24'48"S, 39°14'23" E	11	19	<0.001	0.016	0.010	0.035	0.038	<0.01
West Project Boundary 2 (WPB-2) 4°24'48"S, 39°14'23" E	13	20	<0.001	0.014	0.008	0.032	0.036	<0.01
North Project Boundary 3 (NPB-3) 4°24'48"S, 39°14'23" E	15	22	<0.001	0.018	0.011	0.039	0.037	<0.01
South Project Boundary 4 (SPB-4) 4°24'48"S, 39°14'23" E	12	18	<0.001	0.017	0.009	0.030	0.035	<0.01

3.1.8 Baseline noise levels

Noise level measurement was conducted on 28th May 2024 at the four selected location within the project site. The survey locations were referenced as Project Boundary (PB)-1 to PB-4. The obtained acoustic results were thereafter correlated against the Environmental Management Coordination (Excessive noise and vibration regulations) 2009 to ascertain compliance. The average Leq noise levels were recorded as 47.8dB therefore, the average noise levels along all the project boundaries complied with the EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 (Table 4).

Table 4: Summary results of noise levels measurement equivalents

Measured Sound Pressure Level (Noise) (dBA)	Diurnal LAeq average results	EMC Noise Regulations, 2009
East Project Boundary 1 (EPB-1) 4°24'48"S, 39°14'23" E	49.6	55
West Project Boundary 2 (WPB-2) 4°24'48"S, 39°14'23" E	47.8	55
North Project Boundary 3 (NPB-3) 4°24'48"S, 39°14'23" E	47.1	55
South Project Boundary 4 (SPB-4) 4°24'48"S, 39°14'23" E	46.7	55
Average	**47.8**	**55**

3.2 Biodiversity

The vegetation cover at the project site comprises of shrubs and various tree species such as *Mangifera Indica* (Mango tree), *Psidium guajava* (Common Guava), *Acacia Nilotica* (Egyptian Thorn), *Anacardium occidentale*, (Cashew tree) and *Moringa oleifera* (Moringa Plant) (Figure 9).

Figure 9: Sample tree types at the proposed site (Source: Source: Reconnaissance survey, May 2024)

During the survey, an eucalyptus trees woodlot was observed at the site which demonstrates restoration potential for lost vegetation cover once construction of the CAIP is completed (Figure 10). The survey did not record any tree species of conservation value and indigenous bird species. Due to the farming activities in the proposed area, the possibility of various animal species occurring within the site can be verified during the biodiversity assessment.

Figure 10: Eucalyptus trees woodlot bordering the project site (Source: Reconnaissance survey, May 2024)

3.3 Social-economic environment

3.3.1 Demographics and social distribution

According to the 2019 Kenya Population and Housing Census report, Lungalunga sub-county has a total population of 198,423. The proposed project site lies within Dzombo ward which has a land area of 220.1m^2, population density of 204 km^2 and a total population of 44,983people out of which 21,654are males and 23,327 are females.

3.3.2 Land use and socio-economic activities

Agriculture is one of the main economic activities carried out in Kwale County with 85% of farmers practicing subsistence farming. The proposed project area covers ≈257.5ha and the main economic activity include subsistence agriculture where crops such as maize (Figure 11) and mangoes are grown. Apart from agriculture, the areas provide important grazing services for livestock production, mainly cattle, sheep and goats (Figure 12).

Figure 11: Maize farm within the project area (Source: Reconnaissance survey, May 2024)

Figure 12: Goats (left) and cattle (right grazing within the project area (Source: Reconnaissance survey, May 2024)

3.4 Public utility infrastructure

The project area is served by electricity from the national grid as seen in the surrounding area. Power for the proposed CAIP will also be sourced from the national grid and supplemented by solar systems.

3.5 Access road

The county includes all-weather roads traversing the area feeding the A-class Likoni-Lunga Lung highway. The site can be accessed via the all-weather Mwananyamala-Nguluku-Bengo-Mwangulu Road. (Figure 13). Telecommunication infrastructure is available throughout the site, covered by mobile phone signals from different service providers.

Figure 13: A section of the access road to the project site (Source: Reconnaissance survey, May 2024)

4 ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

The project will have both positive and negative impacts at all stages of implementation.

4.1 Project benefits

The proposed CAIP will have significant socio-economic benefits to the local community, both the national and county government and the Kwale people at large. There will be both direct and indirect benefits which include.

- Reduction of post-harvest losses and food waste thus improving the sustainability of the county's agricultural sector
- Promoting direct and indirect local businesses during its implementation. Construction materials and food vendors' businesses will be enhanced.
- Integrating small and medium enterprises (SMEs) into the industrial value chains hence empowering the local community, increasing disposable income and reducing poverty
- Enhancing integration of the agricultural and manufacturing sectors and foster inclusive economic development by promoting collaboration between farmers, processors, exporters, and other stakeholders
- Improving infrastructure and services within the area, such as roads, utilities, and logistics hence benefiting the surrounding communities
- Creating employment opportunities which will enhance livelihoods for the local community and beyond
- Generating revenue to both national and county 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
- Consolidating and centralizing industrial activities hence leading to more efficient waste management and resource use helping reduce the environmental footprint

4.2 Construction phase impacts

4.2.1 Degradation of the physical environment

Vegetation at the project site is largely made of grasses and scattered indigenous neem trees but which non the less provides important environmental services such as carbon sequestration, soil stabilization and habitats for a variety of wildlife such as birds. However, the vegetation will be cleared, and excavations will occur to pave way for the construction of the CAIP leading to the loss of these benefits and particularly soil stabilization. The impacts from this project activity are irreversible in nature but mitigation measures can be provided to offset the loss of environmental services.

Recommended mitigation measures

1. Landscaping after completion of the project
2. Tree planting within and around the project site (indigenous tree species are advised)

4.2.2 Increased demand for construction materials

Construction of infrastructure of the proposed nature requires raw materials in form of sand/ballast/aggregates/rocks/murram soil. Extraction and manufacturing of such materials requires quarrying which alters the natural landscape and poses risks to the residents and locals at quarries and industrial establishments that produce them. Industrial processes to produce construction materials such as cement, paint and steel will produce emissions and wastes that impact negatively on the quality of the environment including climate change. It is therefore important to mitigate these impacts to reduce the carbon footprint of the project.

Recommended mitigation measures

1. Source construction materials from sites and industrial establishments that are licensed as per the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya
2. Procure quantities of construction materials in line with the Bill of Quantities prepared by a Licensed Quantity Surveyor
3. Ensure wastage of materials are kept minimal to reduce additional demand and purchase of materials.
4. Re-use and use of recycled construction materials such as wood and metal cuttings which will lead to reduced demand for mining and manufacturing of construction materials.

4.2.3 Health and safety risks

Construction workers and the local community will be susceptible to health and safety hazards during the construction phase of the project. Inherent occupational risks include muscular-skeletal injuries, cuts and bruises, falls into un-marked/ uncovered trenches and accidents from construction vehicles. In addition, the proponent should ensure that the construction phase of the project is supervised by competent engineers and contractors to avert possibilities of the building collapsing and reducing risk of accidents at the site.

Furthermore, the unmanaged wastes may act as breeding sites for disease causing vectors; without proper management of both solid and liquid waste, the workers on site and may fall victim to disease outbreaks such as cholera, typhoid or even malaria. In addition, the influx of construction workers may put pressure on existing local resources, cause social conflicts, promiscuity and the related sexually transmitted diseases.

Recommended mitigation measures

1. Ensure civil and structural designs of the development are prepared by a registered engineer and approved by the County and the National Construction Authority (NCA)
2. Construction works should only be carried out by a contractor who is registered with the National Construction Authority at the appropriate class and supervised by a registered engineer/architect
3. Enforcing adherence to safety procedures and preparing contingency plan for accident and incident responses.
4. Registration of the site as a workplace by the Directorate of Occupational Safety and Health Services (DOSHS)
5. Appropriate sanitation conveniences (mobile toilets and handwash basins) should be provided at the site as required in the OSHA, 2007 and the Public Health Act, 2012.
6. Disabled access features and safety signage should be placed strategically around and within the building
7. Provide workers with correct tools for jobs assigned and train on their use

8. Safety education and training especially work at heights of the warehouses and cold storage areas
9. The contractor should obtain insurance cover for the workers and visitors
10. New employees and visitors should always be inducted on safety at the workplace
11. Procure and provide adequate and appropriate Personal Protective Equipment to workers and visitors to the site and enforce their use
12. Sensitize workers, neighbors and other stakeholders on risks associated with construction works for enhanced self-responsibility on personal safety
13. Ensure moving parts of machines and sharp surfaces are securely protected with guards to avoid unnecessary contacts and injuries
14. Provide a fully equipped first aid kit and trained personnel at the project site
15. Comply with the provisions of the Occupational Safety and Health Act, 2007
16. Comply with guidelines provided under the National Construction Authority Act, 2014

4.2.4 Air pollution

During the construction phase, air pollution will be in form of particulate matters and dust generated during excavation works, construction works activities and exhaust fumes such as carbon monoxides and hydrocarbons from machinery used and Heavy Commercial Vehicles delivering construction materials to the site. Uncovered stockpiles and mortar mixing plant operations are another source of dust. The particulate matter might cause respiratory diseases, cause eye irritation and visual intrusion to workers, neighbors and visitors to the project site if it exceeds the limits as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014.

Recommended mitigation measures

1. Watering all active construction areas as and when necessary, to suppress dust.
2. Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.
3. Install dust screens and arresters around the project site during construction
4. Apply (non-toxic) soil stabilizers on the unpaved access roads, parking areas and staging areas of the construction site.
5. Procure and enforce the use of dust masks by workers and visitors to the project site.
6. Proper maintenance and servicing of machinery and construction equipment.
7. Comply with the provisions of the Environmental Management and Coordination (Air Quality) Regulations, 2014

4.2.4.1 Noise pollution and excessive vibrations

Excessive vibrations and noise generation sources include concrete mixers and hoisting cranes, delivery of building materials by heavy trucks, tiles cutting works, steel works and other construction activities. The levels of noise produced might exceed the limits as stipulated in the Second Schedule of Environmental and Management Co-ordination (Noise and Excessive vibration pollution) (Control) Regulations, 2009. The noise emitting activities will be restricted to daytime to ensure minimal disturbance to the neighboring residential areas.

Recommended mitigation measures

1. Install portable barriers to shield compressors and other small stationary equipment where necessary.

2. Ensure workers are provided with the appropriate Personal Protective Equipment e.g earmuffs.
3. Delivery of raw materials, excavation and construction work should be limited to daytime hours only between 8am to 5pm.
4. Locate machinery that are likely to produce noise as far as practical from local settlements.
5. Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use and sensitize truck drivers to switch off vehicle engines whenever possible.
6. Comply with the provisions of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

4.2.5 Solid waste management

The construction works will generate a significant quantity of wastes that will cause nuisance to the public and environment if poorly disposed. These wastes are in form of biomass, construction materials such as wood, building blocks, metal and steel cuttings, e-wastes and domestic waste such as plastic containers and wrappings among others. The food remains of workers in and around the site will also contribute to solid wastes. Some of these waste materials especially the plastics are not biodegradable hence may cause long-term effects to the environment.

Recommended mitigation measures

1. Adopt an Integrated Solid Waste Management System.
2. Use of durable, long- lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.
3. Use of building materials that have minimal packaging to avoid the generation of excessive packaging wastes.
4. Strategically place adequate and well-labelled solid waste collection bins with a capacity for segregation within the construction site.
5. Use of construction materials containing recycled content when possible and in accordance with accepted standards.
6. Sensitize construction workers on the process of solid waste collection, segregation and proper disposal.
7. Contract a NEMA licensed waste handler to dispose-off the solid wastes.
8. Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006.

4.2.6 Water demand and effluent management

During construction, water will be required for concrete mixing, casting and curing works, general cleaning, drinking and sanitation purposes and will be sourced from a borehole that will be constructed on site. Additional supply of water will be sourced from water browsers supply. Based on the projected workforce at the construction, water demand at the site will be at most 20m^3 per day. Out of these, 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 effluent generated has the potential to pollute underground aquifers. Therefore, it is important to note that without sustainable use of the water resources there is a possibility of adverse impacts on the environment.

Recommended mitigation measures

1. Sensitize the workforce on water conservation and management

2. Record and monitor the amount of water being abstracted from the borehole
3. Procure and deliver to the site mobile toilets from a NEMA licensed waste contractor in the ration recommended under OSHA, 2007 and depending on the number of employees
4. Comply with the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006

4.2.7 Storm water and increased surface run-off

Storm water from the site is likely to affect the construction works especially during the rain season. There will be increased surface runoff due to the impervious areas created during the construction of the warehouses and auxiliary facilities. The impervious areas are more likely to have runoff coefficients as compared to natural areas and this leads to an increase in potential floods and collapse of civil works.

Recommended mitigation measures

1. Design a Storm Water Management Plan that minimizes impervious area runoff by use of recharge areas and use of detention and/or retention with graduated outlet control structures.
2. Limit access road gradients to reduce run-off induced erosion.
3. Provide adequate drainage systems to minimize and control run-off.
4. Providing effective short-term measures for slope stabilization, sediment control and subsidence control until long term measures for the operational phase can be implemented.

4.2.7.1 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, 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.

Mitigation measures

1. Develop and implement an oil spill containment plan for the site.
2. Procure and train workers on the use of oil spill response kits.
3. Avoid servicing of heavy commercial vehicles at the site.

4.3 Operational phase impacts

4.3.1 Solid waste generation

The proposed project is expected to generate solid waste during its operation phase. The bulk of the solid waste generated during the operation phase will consist of organix wastes from agricultural produce processing including value addition. Others solid waste streams will comprise of paper, plastic, glass, and wood. If the waste is not properly managed it might be detrimental to the environment. The organic waste from agricultural produce can be major concern due to potential air pollution and a breeding site for disease causing pathogens if not managed effectively. In addition, some of the wastes from the other streams especially the plastic/polythene are not biodegradable hence may cause long-term effects to the environment. Even the biodegradable ones 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. The wastes could also be washed into Maro seasonal stream leading to water quality degradation.

Recommended mitigation measures

1. Organic wastes from agricultural produce processing should be collected and composted to produce manure and biogas for the farmers and the CAIP respectively. This would also create employment opportunities for women and youth in the area.
2. Provide collection bins with capacity for segregation for the other conventional solid waste.
3. Contract a NEMA licensed waste handler for disposal of the conventional segregated solid waste.
4. Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022.

4.3.2 Health and Safety Risks

Farmers, traders and employees at the CAIP will be exposed to health and safety hazards such as fire, slips, trips and falls. The inherent safety and health risks associated with the operation of the facility include spread of communicable diseases, musculoskeletal injuries, accidents from folk lifts, trips and falls, electrocution and fire risks due negligence among others. In addition, due to the large number of people expected at the CAIP, stampedes and potential accidents leading to injury, permanent disability or even death. Adequate measures should therefore be taken to ensure safety and health of the farmers, traders and workers at the facility.

Recommended mitigation measures

1. Implement the provisions of OSHA Act 2007.
2. County should provide a standby or easy to access ambulance service.
3. Provide safety signage including fire exits.
4. Develop and implement a fire and emergency response plan.
5. Ensure that the premises are annually insured as per statutory requirements.
6. Procure and install adequate firefighting equipment such as fire extinguishers, fire hose reels, smoke detectors, fire alarms and fire hydrants at appropriate locations within the development.
7. Servicing of the fire safety equipment by accredited fire service providers.
8. Designate a fire assembly point and clearly display emergency exits at strategic locations within the development.
9. Undertake regular inspections and maintenance of electrical installations.

4.3.3 Air pollution

During the operational phase, air pollution will mainly result from poorly managed organic wastes from the agricultural produce processing, dust emissions from the processing and manufacturing activities such as, particulate matter, Sulphur oxides and nitrogen oxides, exhaust fumes such as carbon monoxide, hydrocarbons, nitrogen oxides and sulfur dioxide from machinery and vehicles accessing the facility. The most relevant pollutant considered is particulate matter because of its potentially significant increase during the operational phase. Particulate matter may hamper aesthetics of the area, cause respiratory diseases, eye irritation and visual intrusion to workers, visitors to the project site and the neighbors if it is in excess of 75 $\mu g/Nm^3$ as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014.

Recommended mitigation measures

1. Installation of roof cyclones at the warehouses
2. Provisions for adequate ventilation in the warehouse designs

3. Use of appropriate air emission control technologies for the industries set up at the facility in compliance with the Environmental Management and Coordination (Air Quality) Regulations, 2014

4.3.3.1 Noise pollution

The movement of trucks and use of machinery among others may lead to high levels of noise and vibration within the project site and the surrounding area. The noise levels produced may be above the stipulated maximum permissible noise levels as per the First Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and may have auditory effects to the workers, visitors to the site and the neighbors.

Recommended mitigation measures

1. Procure and provide adequate Personnel Protective Equipment such as earplugs to workers at peak noise producing areas
2. Regularly service machinery and equipment to ensure that they are in good condition
3. Sensitize truck drivers to avoid unnecessary hooting and running of vehicle engines
4. Comply with the provisions of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

4.3.3.2 Water use and sanitation

At the operation phase, water will be required for general cleaning, drinking, sanitation, cooling and firefighting purposes and will be sourced from an existing borehole. Water consumption rate will be based on number of workers at the facility as well as the frequency of manufacturing and processing on a daily or monthly basis. Kenya is waster scarcity country hence need to conserve the available water resources. Approximately 70% of water used for sanitation will be released as wastewater and managed through biodigesters as opposed to the proposed septic tank soak pit design. Poor wastewater management has the potential to pollute surface and ground water, harbor pathogens and vectors. The industrial park operations will be water intensive, and the county should ensure that the lessors/investors provide adequate wastewater treatment facilities consistent with the Environmental Management and Coordination (Water Quality) Regulations, 2006.

Recommended mitigation measures

1. Monitor water consumption from the borehole to inform conservation measures
2. Scheduled maintenance of water supply infrastructure to prevent losses through leakages
3. Rainwater harvesting to supplement borehole source
4. Install bio digester for management of effluent
5. Recycling wastewater for use in landscaping and dust management
6. Monitor the quality of wastewater discharged from the facility in compliance with the Third Schedule of Environmental Management and Coordination (Water Quality) Regulations, 2006
7. Apply and ensure timely renewal of Effluent Discharge License (EDL) from NEMA
8. Comply with the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006.

4.3.3.3 Increased energy demand

The facility will be connected to the National grid power supply and the energy will be required for lighting and powering electrical appliances during the operation phases. Cold storage warehouses are energy-intensive and great contributors to carbon emissions. Green House Gases

(GHGs) emissions are great contributors of global warming and based on Defra/DECC company reporting guidelines, emissions resulting from the electricity that the proponent buys –are treated as those actually taking place 'off-site' however it's under the control of the proponents' reporting.

Recommended mitigation measures

1. Keep records on power consumption from the national grid to inform conservation measures and carbon footprint reporting.
2. Ensure regular servicing and maintenance of all electrical equipment to ensure efficiency in energy use.
3. Install solar systems for lighting purposes and thermoelectric micro cold storage systems.
4. Undertake energy audits and carbon footprint reports and implement recommendation measures.

4.3.3.4 Storm water management

During heavy rainfall, storm water is likely to affect the operations of the CAIP due to increased surface runoff from the impervious areas created at the construction phase. The impervious areas are more likely to have runoff coefficients as compared to natural areas and this might lead to an increase of flood peaks in such a developed area.

Recommended mitigation measures

1. Design and implement an effective Storm Water Management Plan that minimizes impervious area runoff by use of recharge areas and use of detention and/or retention with graduated outlet control structures.
2. Harvest rainwater by use of gutters
3. Provide adequate drainage systems to minimize and control run-off

4.3.4 Traffic increase, congestion and accidents

There will be increased traffic in the area caused by trucks delivering farm produce or transporting processed products to the markets. Without proper traffic management, potential conflicts with the local community can arise due to congestion on the access roads, noise and air pollution. In addition, over speeding or reckless driving could result in accidents leading to injury or fatalities.

Recommended mitigation measures

1. Provision of adequate parking space at the CAIP
2. Develop and implement a traffic management plan for the facility
3. Installation of road safety signage
4. Construction of speed control bumps along the access road
5. Sensitizing the community and drivers on road safety
6. Implementation of the Traffic Act, 2019

4.4 Decommissioning phase impacts

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 following environmental and social concerns will manifest at this phase;

1. Loss of economic benefits provided by the CAIP
2. Safety and health risks
3. Waste generation

To address these, the proponent will prepare and submit a due diligence decommissioning audit report to NEMA for approval at least three (3) months in advance.

4.4.1 Loss of CAIP economic benefits

In the event of decommissioning of the CAIP, economic benefits of the project including employment opportunities, reduction of post-harvest losses, local community empowerment and revenue generation to the government will be lost. This will lead to economic decline.

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

4.4.2 Health and Safety risks

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

Recommended mitigation measures

1. Erect signage to forewarn people on ongoing demolition activities
2. Provide and enforce the use of PPE throughout the demolition works
3. Avail first aid kits on site throughout the entire period
4. Ensure the process of demolition is supervised by competent personnel
5. Comply with the Occupational Safety and Health Act,2007

4.4.3 Waste generation

Demolition of the project buildings and related infrastructure will result in large quantities of solid waste. The waste will contain materials such as concrete waste, metal, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to the release of certain hazardous chemicals into the environment. In addition, demolition activities will result in effluent generation from the proposed bio-digester and will need to be disposed off appropriately.

Recommended mitigation measures

1. Recover re-usable materials for sale or use in other project sites
2. Contract a NEMA licensed waste handler to handle and dispose both solid waste and effluent generated from the demolition activities
3. Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006 and the Environmental Management and Coordination (Water Quality) Regulations, 2006

4.5 Impact analysis

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

1. Type of impact (direct, indirect, induced)
2. Size, scale or intensity of impact

3. Nature of the change compared to baseline conditions (what is affected and how)
4. Geographical extent and distribution (e.g. local, regional, international)
5. Duration and/or frequency (e.g. temporary, short-term, long term, permanent)

Magnitude describes the actual change that is predicted to occur in the resource or receptor. It takes into account all the various impact characteristics in order to determine whether an impact is negligible or significant (Table 5). Some impacts can result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes can be regarded as essentially having no impact and are characterized as having a negligible magnitude

1. **Negligible impact (very low)** - Where a resource or receptor would not be affected by a particular activity or the predicted effect is deemed to be imperceptible or is indistinguishable from natural background variations.

2. **Less than significant impact (Low)** - Is a minor impact where a resource or receptor would experience a noticeable effect but the impact magnitude is sufficiently low (with or without mitigation) and /or the resource or receptor is of low sensitivity. In either case, a less than significant impact must be sufficiently below applicable standard threshold limits.

3. **Potentially significant impact (moderate)** - A moderate impact that meets applicable standards but comes near the threshold limit. The emphasis for such moderate impacts is to demonstrate that the impact has been reduced to a level that is as minor as reasonably practicable so that the impact does not exceed standard threshold limits.

4. **Significant impact (high)** - One where an applicable standard threshold limit would or could be exceeded or if a highly valued or very scarce resource would be substantially affected.

Table 5: Risk rating of Impacts for the Kwale County Aggregation and Industrial Park

Environmental and social impact	Magnitude of impact at construction phase	Magnitude of impact at operation phase	Magnitude of impact at decommissioning phase
Increased demand of construction materials			
Loss of vegetation cover			
Occupational safety and health risks			
Fire risks and emergencies			
Air pollution			
Noise pollution			
Workforce sanitation			
Solid waste management			
Increased energy demand			
Storm water management			

Environmental and social impact	Magnitude of impact at construction phase	Magnitude of impact at operation phase	Magnitude of impact at decommissioning phase
Increased post-harvest losses			

Legend

Impact magnitude	Colour
Negligible	
Low	
Moderate	
High	

4.6 Public and stakeholder consultations and findings

Public and stakeholders' participation in the ESIA study process is important as outlined under Regulation 17 of the Environmental Management and Co-ordination (Impact Assessment and Audit) Regulations, 2003 where public participation is a mandatory requirement. The objective of the public and stakeholder participation was to obtain and document comments, views, and concerns that the neighbors and stakeholders have regarding the proposed project (Table 6).

Table 6: Stakeholder engagement schedule

Date	Level of SHM	Nature of SHM	Venue	No. of participants
30th May 2024	Kick-off stakeholder meeting	Sensitization on proposed CAIP	Project site in Nguluku B area, Kwale County	88
6th June 2024	Second stakeholder meeting	Review draft ESIA Study report for the proposed CAIP	Project site in Nguluku B area, Kwale County	53
7th June 2024	Third stakeholder meeting	Validate ESIA Study Report for the proposed CAIP	Project site in Nguluku B area, Kwale County	38
			Total	**179**

A total of 179 participants attended the three meetings comprising of stakeholders from Government agencies and the local community among others.

1. Kick-off stakeholder meetings

The meeting was held on 30th May 2024 at the project site and was attended by 88 participants drawn from the County Government of Kwale, local community and the consultants (Figure 14).

The objective of the kick-off meeting was to sensitize stakeholders on the proposed project, document their views and opinions. During the kick-off meeting, County Government of Kwale provided an overview of the proposed project while the consultant made a presentation on the ESIA study process including scope of the ESIA, the approach and methodology, the timeframe and the stakeholders' roles in the ESIA. Several key issues raised were discussed during the plenary session based on the presentation by the consultant and other matters arising from the project (Table 7 and Annexure 9).

Figure 14: Stakeholders following deliberations during the kick-off meeting (Source: First Stakeholder meeting, May 2024)

Table 7: Summary of issues raised during the first stakeholder meeting and response provided by the proponent and the consultant on 30th May 2024

Issue No.	Description	Response provided
1.	Project feasibility and success	- The project has a diverse group of stakeholders who will leverage on their potential and partnerships to ensure its sustainability. Additionally, the selected products are easily accessible and readily available in the local market.
2.	Air pollution	- The consultants will undertake ambient air monitoring to assess the future impacts of the facility on the environment and provide a baseline for comparative purposes. The ESIA study report will also provide mitigation measures to minimize the potential negative impacts at project's operational phase. - The proponent will conduct annual audits to ensure the facility complies with relevant regulations and standards.
3.	Waste management	- The proponent will adhere to sustainable waste management practices by engaging a NEMA-licensed waste contractor to dispose off solid waste at designated landfills. - Effluent from the facility will be managed through septic tank and soak pit system and bio-digester.
4.	Challenges faced by cashew nut farmers	- County officials should offer training to farmers and provide viable cashew nut seedlings.
5.	Creation of employment opportunities	- Prioritizing the local community for employment opportunities.

2. Stakeholder meeting to review draft ESIA Study Report

The second meeting was held on 6th June 2024 at the project site, Kwale County and was attended by 53 participants drawn from the County Government of Kwale, local community and the consultants (Figure 15).

Figure 15: Stakeholders following deliberations during the meeting to review the CAIP draft ESIA Study Report (Source: Second Stakeholder meeting, June 2024)

The purpose of the meeting was to review the draft ESIA study report for the proposal and summary of issues raised are provided in Table 8 & Annexure 10).

Table 8: Summary of issues raised during the second stakeholder meeting and response provided by the proponent and the consultant on 6th June 2024

Issue No.	Description	Response provided
1.	Clarification on fire assembly point	- A fire assembly point is designated location where staff and visitors will gather in the event of fire.
2.	Noise pollution at construction phase	- The ESIA study report has recommended limiting working hours to daytime from 8:00 AM to 5:00 PM to mitigate potential noise pollution and disturbance to neighbors.
3.	Enhancement of agricultural production	- Training farmers on modern and sustainable agricultural practices
4.	Availability of final ESIA study report for the community members	- The report will be accessible through the County Government, at the NEMA offices and website (www.nema.go.ke).

3. Stakeholder meeting to validate final draft ESIA Study Report

The third meeting was held on 7th June 2024 at the project site in Nguluku B, Kwale County and was attended by 38 participants drawn from the Ministry of Interior and National Administration, County Government of Kwale, local community and Envasses Environmental Consultants Limited (Figure 16). The purpose of the meeting was to validate the final draft ESIA study report for the proposal and summary of issues raised are provided in Table 9 & Annexure 11).

Figure 16: Participants following deliberations during the stakeholder meeting to validate the final draft ESIA Study Report

Table 9: Summary of issues raised during the third stakeholder meeting and response provided by the proponent and the consultant on 7th June 2024

Issue No.	Description	Response provided
1.	Landscaping during operational phase	- The project ESIA study report has recommended landscaping of undeveloped areas during operational phase of CAIP.
2.	Reporting of environmental incidents once they occur	- The incidents should be reported to the County Government of Kwale as they are responsible for management of the CAIP.

4.7 Grievances Redress Mechanism

The affected persons by the proposed project may raise their grievances and dissatisfactions about actual or perceived impacts in order to find a satisfactory solution. These grievances, influenced by their physical, situational and/or social losses, can emerge at the different stages of the project cycle. Not only should the affected persons be able to raise their grievances and be given an adequate hearing, but also satisfactory solutions should be found that mutually benefit both the affected persons and the project. It is equally important that the affected persons have access to legitimate, reliable, transparent and efficient institutional mechanisms that are responsive to their complaints.

4.7.1 Grievances prevention

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

1. Providing sufficient and timely information to communities. Many grievances arise because of misunderstandings; lack of information; or delayed, inconsistent or insufficient information. Accurate and adequate information about a project and its activities, plus an approximate implementation schedule, should be communicated to the communities, especially affected parties, regularly.

2. Conduct meaningful community consultations. The project proponent should continue the process of consultation and dialogue throughout the implementation of the project. Sharing information, reporting on project progress, providing community members with an opportunity to express their concerns, clarifying and responding to their issues, eliciting communities' views, and receiving feedback on interventions will benefit the communities and the project management.
3. Overall good management of the facility will ensure a reduction in potential conflicts with the local community and other stakeholders.

4.7.2 Grievances Redress Mechanism Tool

The CAIP should have a prompter and efficient resolution on individual and collective complaint and provision of feedback on any grievances and dissatisfaction from stakeholders during operations. The flow chart below (Figure 17) shows a proposal consideration for the Grievances Redress Mechanism (GRM) for the Kwale CAIP project that provides an accessible channel for submission of complaints and feedback to stakeholders.

Figure 17: Schematic representation of a proposed Grievances Redress Mechanism Tool

5 ANALYSIS OF PROJECT ALTERNATIVES

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

5.1 The 'No' project alternative

The 'No' Project option in respect to the proposed project implies that the status quo is maintained. From an extreme environmental perspective, this option is the most suitable alternative as it ensures non-interference with the prevailing conditions. The 'No Project Option' is the least preferred from the socio-economic and partly environmental perspective due to increased post-harvest losses, loss of created job opportunities, local skills will remain underutilized and the local people and /or farmers' livelihood will remain unchanged. Therefore, the 'No project' alternative is not considered viable in the light of the benefits and deprivations of the project.

5.2 Relocation alternative

The alternative site for project development is currently not available. It may take long periods for the proponent to look for an alternative site to accommodate the proposed project and official transaction for completion. Furthermore, it's not guaranteed that the site will be primly located as this one and the project planning and design prior to implementation stage will invite expenses already incurred in the proposed site. Considering the above concerns and current proposed site assessment, the relocation of the project is not a viable alternative.

5.3 The 'Yes Project' alternative

Under the 'Yes Project alternative' it's considered as the most viable option and the proposed project would be issued with an EIA License. In issuing the license, NEMA would approve the proponent's proposed project provided all environmental measures and conditions of the license are complied with during the construction period and operational phases. This alternative consists of the applicant's final proposal with the incorporation of the NEMA regulations and procedures as stipulated in the environmental impacts to the maximum extent practicable.

5.4 Alternative to construction material and technology

The proposed project will be constructed using modern, locally and internationally accepted standards of materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water should be given first priority without compromising on cost or availability factors.

Heavy use of timber during construction is discouraged because of destruction of forests. The exotic species would be preferred to indigenous species in the construction where need will arise.

5.4.1 Energy alternatives

5.4.1.1 Natural lighting

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

5.4.1.2 Solar panel

Installation of solar panels is another green technology the proponent should prioritize as energy supply. Solar power is environmentally sound and doesn't produce fossil fuel waste by-products. In addition, this will lower carbon footprint and reduced impact on the environment.

5.4.1.3 Kenya Power & Lighting Company Ltd (KPLC)

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

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

5.4.1.4 Stand by-Generator

The generator will be used as a back-up power supply option for the CAIP in case of emergency or power-outage. The generator will power to all of the rooms and important parts of the apartments. The cost of running the generator is very high and the noise emissions can cause nuisance therefore its recommended to install silencers on the generators to minimize noise, install scrubbers to reduce on fuel emissions and also house it a generator enclosure.

5.4.2 Water supply alternatives

Water is a scarce resource by the day in most parts of the country. Therefore, the proponent should look into alternative methods of sustaining water supply and are discussed below;

5.4.2.1 Rain water harvesting

The proponent should put measures to ensure that the rain water that will be flowing into drainage systems during wet seasons is harvested and stored then can be used in toilet flushing, general cleaning and landscaping.

5.4.2.2 Tanker/water bowsers supply

These are commercial water supply services which haul water to the client to supplement existing water sources. The proponent can use the services as a supply option in times of limited supply.

5.4.2.3 Borehole supply

There's already an existing borehole at the project site that should ideally meet the water demand for the project.

6 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

In the preceding section, the ESIA has identified/predicted the potential environmental and social impacts that are likely to emanate from the proposed CAIP and recommended mitigation measures. The Environmental Management Plan (EMP) provides a framework for implementing the mitigation measures during the three phases of the project cycle, i.e., construction, operational and possible decommissioning phases (Table 10). The EMP has five areas of focus as follows;

1. Environmental/social impact
2. Recommended mitigation measures
3. Implementation responsibility
4. Timeframe
5. Estimated cost (KES)

6.1 Environmental Management Plan for the construction phase

During the construction phase, the anticipated environmental concerns include increased demand for construction materials, loss of vegetation cover, occupational safety and health risks, waste management and workforce sanitation.

6.2 Environmental Management Plan for the operational Phase

During the operation phase, the anticipated environmental and social concerns will include solid waste management, safety and health hazards from use of machinery and equipment such as folk lifts, fire risks and emergencies, air and noise pollution, increased water and energy demand, waste management and storm water management.

6.3 Environmental Management Plan for the possible decommissioning phase

The decommissioning EMP is important in the event of end of project cycle, natural calamities and non-compliance with environmental and health regulations among others. The key issues of concern at this stage will be loss increased post-harvest losses, safety and health risks and waste management.

Table 10: Environmental Management Plan for the proposed Kwale County Aggregation and Industrial Park

Environmental Impacts	Mitigation measures	Implementing agency	Timeframe	Estimated Cost (KES)
Construction phase				
Degradation of the physical environment	Landscaping after completion of the project	Proponent/ Contractor	Upon completion	Nil
	Tree planting within and around the project site	Proponent/ Contractor	Throughout construction	TBD
Increased demand for construction materials	Source construction materials from sites and industrial establishments that are licensed as per the EMC Act Cap. 387 of the Laws of Kenya	Proponent/ Contractor	Throughout construction	In Project Costs
	Procure quantities of construction materials in line with the Bill of Quantities	Proponent/ Contractor	Throughout construction	In Project Costs
	Ensure minimal wastage of construction materials	Proponent/ Contractor	Throughout construction	Nil
	Maximize re-use and recyclable construction materials	Proponent/ Contractor	Throughout construction	Nil
Health and safety risks	Ensure civil and structural designs of the development are prepared by a registered engineer and approved by the County and the NCA	Proponent/ Contractor	Prior to Commencement	In Project Costs
	Construction works should only be carried out by a contractor who is registered with NCA	Proponent	Prior to Commencement	In Project Costs
	Enforcing adherence to safety procedures and preparing contingency plan for accident and incident responses	Proponent/ Contractor	Throughout construction	Nil
	Registration of the site as a workplace by the DOSHS	Proponent/ Contractor	Throughout construction	5,000

Environmental Impacts	Mitigation measures	Implementing agency	Timeframe	Estimated Cost (KES)
	Appropriate sanitation should be provided at the site as required in the OSHA, 2007 and the Public Health Act, 2012	Proponent/ Contractor	Throughout construction	In Project Costs
	Disabled access features and safety signage should be placed strategically around and within the building	Proponent/ Contractor	Throughout construction	In Project Costs
	Provide workers with correct tools for jobs assigned and train on their use	Proponent/ Contractor	Throughout construction	Nil
	Safety education and training especially work at heights of the warehouses and cold storage areas	Proponent/ Contractor	Throughout construction	Nil
	The contractor should obtain insurance cover for the workers and visitors	Proponent/ Contractor	Prior to Commencement	1,000,000
	New employees and visitors should always be inducted on safety at the workplace	Proponent/ Contractor	Upon Deployment	Nil
	Provide adequate and appropriate PPE to workers and visitors to the site and enforce their use	Proponent/ Contractor	Throughout construction	500,000
	Sensitize workers, neighbors and other stakeholders on risks associated with construction works	Proponent/ Contractor	Throughout construction	Nil
	Ensure moving parts of machines and sharp surfaces are securely protected with guards to avoid unnecessary contacts and injuries	Proponent/ Contractor	Throughout construction	Nil
	Provide a fully equipped First Aid box and trained personnel at the project site	Proponent/ Contractor	Throughout construction	20,000
	Comply with the provisions of the Occupational Safety and Health Act, 2007	Proponent/ Contractor	Throughout construction	Nil
	Comply with guidelines provided under the National Construction Authority Act, 2014	Proponent/ Contractor	Throughout construction	Nil

Environmental Impacts	Mitigation measures	Implementing agency	Timeframe	Estimated Cost (KES)
Air pollution	Watering all active construction areas	Proponent/ Contractor	Daily	10,000
	Cover all trucks hauling soil, sand and other loose materials	Proponent/ Contractor	Throughout construction	Nil
	Install dust screens and arresters around the project site	Proponent/ Contractor	Prior to Commencement	In Project Costs
	Apply soil stabilizers on the unpaved access roads, parking areas and staging areas of the construction site	Proponent/ Contractor	During Construction	TBD
	Procure and enforce the use of dust masks by workers and visitors to the project site	Proponent/ Contractor	Throughout construction	100,000
	Proper maintenance and servicing of machinery and construction equipment	Proponent/ Contractor	Throughout construction	Nil
	Comply with the Air Quality Regulations, 2014	Proponent/ Contractor	Throughout construction	Nil
Noise pollution and excessive vibrations	Install portable barriers to shield compressors and other small stationary equipment where necessary	Proponent/ Contractor	Throughout construction	TBD
	Ensure workers are provided with the appropriate PPE	Proponent/ Contractor	Throughout construction	100,000
	Delivery of raw materials, excavation and construction work should be limited to daytime hours only	Proponent/ Contractor	Throughout construction	Nil
	Locate machinery that are likely to produce noise as far as practical from local settlements	Proponent/ Contractor	Throughout construction	Nil
	Limit pickup trucks and other small equipment to a minimum idling time and sensitize truck drivers to switch off vehicle engines whenever possible	Proponent/ Contractor	Throughout construction	Nil

Environmental Impacts	Mitigation measures	Implementing agency	Timeframe	Estimated Cost (KES)
	Comply with the Noise and Excessive Vibration Pollution (Control) Regulations, 2009	Proponent/ Contractor	Throughout construction	Nil
Solid waste management	Adopt an Integrated Solid Waste Management System	Proponent/ Contractor	Throughout construction	Nil
	Use of durable, long- lasting materials that will not need to be replaced as often	Proponent/ Contractor	Throughout construction	Nil
	Use of building materials that have minimal packaging to avoid the generation of excessive packaging wastes	Proponent/ Contractor	Throughout construction	Nil
	Strategically place adequate and well-labelled solid waste collection bins with a capacity for segregation within the construction site	Proponent/ Contractor	Prior to Commencement	100,000
	Use of construction materials containing recycled content when possible and in accordance with accepted standards	Proponent/ Contractor	Throughout construction	Nil
	Sensitize construction workers on the process of solid waste collection, segregation and proper disposal	Proponent/ Contractor	Throughout construction	Nil
	Contract a NEMA licensed waste handler to dispose-off the solid wastes	Proponent/ Contractor	Prior to Commencement	Tender
	Comply with the Waste Management Regulations, 2006	Proponent/ Contractor	Throughout construction	Nil
Water demand and effluent management	Sensitize the workforce on water conservation and management	Proponent/ Contractor	Throughout construction	Nil
	Record and monitor the amount of water being abstracted from the borehole	Proponent/ Contractor	Throughout construction	Nil
	Procure and deliver to the site mobile toilets from a NEMA licensed waste contractor	Proponent/ Contractor	Prior to Commencement	Tender

Environmental Impacts	Mitigation measures	Implementing agency	Timeframe	Estimated Cost (KES)
	Comply with the Water Quality Regulations, 2006	Proponent/ Contractor	Throughout construction	Nil
Storm water and increased surface run-off	Design a Storm Water Management Plan that minimizes impervious area runoff	Proponent/ Contractor	During construction	In Project Costs
	Limit access road gradients to reduce run-off induced erosion	Proponent/ Contractor	Throughout construction	Nil
	Provide adequate drainage systems to minimize and control run-off	Proponent/ Contractor	During construction	In Project Costs
	Providing effective short-term measures for slope stabilization, sediment control and subsidence control	Proponent/ Contractor	During construction	TBD
Soil and water pollution	Develop and implement an oil spill containment plan for the site	Proponent/ Contractor	Prior to Commencement	30,000
	Procure and train workers on the use of oil spill response kits	Proponent/ Contractor	During construction	30,000
	Avoid servicing of heavy commercial vehicles at the site	Proponent/ Contractor	Throughout construction	Nil
Operational phase				
Solid waste management	Organic wastes from agricultural produce processing should be collected and composted	Proponent	Throughout Operations	Nil
	Provide collection bins with capacity for segregation for the other conventional solid waste	Proponent	Throughout Operations	Tender
	Contract a NEMA licensed waste handler for disposal of the conventional segregated solid waste	Proponent	Throughout Operations	Tender
	Comply with the provisions of the Waste Management Regulations, 2006 and Sustainable Solid Waste Management Act, 2022	Proponent	Throughout Operations	Nil

Environmental Impacts	Mitigation measures	Implementing agency	Timeframe	Estimated Cost (KES)
Health and safety risks	Implement the provisions of OSHA Act 2007	Proponent	Throughout Operations	Nil
	County should provide a standby or easy to access ambulance service	Proponent	Throughout Operations	TBD
	Provide safety signage within the development	Proponent	Prior to Operations	Internal Costs
	Develop and implement a fire and emergency response plan	Proponent	Prior to Operations	Internal Costs
	Ensure that the premises are insured as per statutory requirements	Proponent	Annually	
	Procure and install adequate firefighting equipment at appropriate locations within the development	Proponent	Prior to Operations	500,000
	Servicing of the fire safety equipment by accredited fire service providers	Proponent	Quarterly	Internal Costs
	Designate a fire assembly point	Proponent	Prior to Operations	Internal Costs
	Clearly display emergency exits at strategic locations within the development	Proponent	Prior to Operations	Internal Costs
	Undertake regular inspections and maintenance of electrical installations	Proponent	Throughout Operations	Internal Costs
Air pollution	Installation of roof cyclones at the warehouses	Proponent	Prior to Operations	Tender
	Provisions for adequate ventilation in the warehouse designs	Proponent	During Construction	In Project Costs
	Use of appropriate air emission control technologies for the industries set up at the facility	Proponent	During Operations	TBD
Noise pollution	Procure and provide adequate PPE to workers at peak noise producing areas	Proponent	During Operations	200,000
	Regularly service machinery and equipment to ensure that they are in good condition	Proponent	Throughout Operations	Internal Costs

Environmental Impacts	Mitigation measures	Implementing agency	Timeframe	Estimated Cost (KES)
	Sensitize truck drivers to avoid unnecessary hooting and running of vehicle engines	Proponent	Throughout Operations	Nil
	Comply with the provisions of the Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	Proponent	Throughout Operations	Nil
Water use and sanitation	Monitor water consumption from the borehole to inform conservation measures	Proponent	Throughout operations	Nil
	Scheduled maintenance of water supply infrastructure to prevent losses through leakages	Proponent	Throughout operations	Internal Costs
	Rainwater harvesting to supplement borehole source	Proponent	Prior to Operations	Tender
	Install bio digester for management of effluent	Proponent	Prior to Operations	Tender
	Recycling wastewater for use in landscaping and dust management		During Operations	Internal Costs
	Monitor the quality of wastewater discharged from the facility	Proponent	Throughout Operations	40,000 per sample
	Apply and ensure timely renewal of EDL from NEMA	Proponent	Throughout operation	As per invoice
	Comply with Water Quality Regulations, 2006	Proponent	Throughout Operations	Nil
Increased energy demand	Keep records on power consumption from the national grid to inform conservation measures and carbon footprint reporting	Proponent	Throughout Operations	Nil
	Ensure regular servicing and maintenance of all electrical equipment to ensure efficiency in energy use	Proponent	Throughout Operations	Internal Costs
	Install solar systems for lighting purposes and thermoelectric micro cold storage systems	Proponent	Throughout Operations	Tender

Environmental Impacts	Mitigation measures	Implementing agency	Timeframe	Estimated Cost (KES)
	Undertake energy audits and carbon footprint reports and implement recommendation measures	Proponent	Throughout Operations	70,000
Storm water management	Design and implement an effective Storm Water Management Plan that minimizes impervious area runoff	Proponent	During Construction	In Project Costs
	Harvest rainwater by use of gutters	Proponent	Throughout operation	Nil
	Provide adequate drainage systems to minimize and control run-off	Proponent	During Construction	In Project Costs
Traffic increase, congestion and accidents	Provision of adequate parking space at the CAIP	Proponent/Contractor	During Construction	In Project Costs
	Develop and implement a traffic management plan for the facility	Proponent	Prior to Operations	Internal Costs
	Installation of road safety signage	Proponent	Prior to Operations	Internal Costs
	Construction of speed control bumps along the access road	Proponent	Prior to Operations	Internal Costs
	Sensitizing the community and drivers on road safety	Proponent	Throughout Operations	Nil
	Implementation of the Traffic Act, 2019	Proponent	Throughout Operations	Nil
Possible decommissioning phase				
Loss of CAIP economic benefits	Train employees on alternative livelihoods prior to decommissioning	Proponent/ Contractor	Prior decommissioning	Nil
	Prepare and issue recommendation letters to employees to seek alternative employment opportunities	Proponent/ Contractor	Prior decommissioning	Nil
	Comply with labor laws by paying the employees their terminal dues	Proponent/ Contractor	Throughout decommissioning	Nil
Health and Safety risks	Erect signage to forewarn people on ongoing demolition activities	Proponent/ Contractor	Throughout decommissioning	30,000

Environmental Impacts	Mitigation measures	Implementing agency	Timeframe	Estimated Cost (KES)
	Provide and enforce the use of PPE throughout the demolition works	Proponent/ Contractor	Throughout decommissioning	100,000
	Avail first aid kits on site throughout the entire period	Proponent/ Contractor	Throughout decommissioning	15,000
	Ensure the process of demolition is supervised by competent personnel	Proponent/ Contractor	Prior decommissioning	Nil
	Comply with the Occupational Safety and Health Act,2007	Proponent/ Contractor	Throughout decommissioning	Nil
Waste management	Obtain demolition permits from the County Government of Kwale and NEMA	Proponent/ Contractor	Prior decommissioning	5,000
	Recover re-usable materials for sale or use in other project sites	Proponent/ Contractor	Throughout decommissioning	Nil
	Contract NEMA licensed waste handler to dispose demolition wastes	Proponent/ Contractor	Throughout decommissioning	Tender
	Comply with the Waste Management Regulations, 2006 and Water Quality Regulations, 2006	Proponent/ Contractor	Throughout decommissioning	Nil

7 ENVIRONMENTAL MONITORING PLAN

Environmental Monitoring Plans 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, six monitoring plans are proposed. These are;

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

7.1.1 Safety and Health Monitoring Plan

7.1.1.1 Introduction

During construction and subsequent operation of the CAIP, the inherent occupational safety and health risks will emanate from musculoskeletal injuries from use of machinery, injuries from use of folk lifts, cuts and bruises and accidents from vehicles materials and products to the facility. 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.

7.1.1.2 Monitoring strategy

County Government of Kwale 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;

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

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

7.1.1.3 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.

7.1.2 Air quality monitoring plan

7.1.2.1 Introduction

Air pollution will emanate from dust during excavations, concrete mixing activities and exhaust fumes from machinery and Heavy Commercial Vehicles at the construction phase. 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.

7.1.2.2 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 11).

Table 11: 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)	3.1 ppm

7.1.2.3 Monitoring location

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

7.1.2.4 Monitoring frequency

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

7.1.3 Noise level monitoring plan

7.1.3.1 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 12 & 13).

Table 12: 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 13: 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

7.1.3.2 Monitoring location

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

7.1.3.3 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).

7.1.4 Water Quality

7.1.4.1 Introduction

The proponent should put in place a consistent water quality monitoring plan targeting the quality of effluent discharged from the soak pit, 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.

7.1.4.2 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 14).

Table 14: 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

7.1.4.3 Monitoring location

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

7.1.4.4 Monitoring frequency

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

7.1.5 Solid waste monitoring plan

7.1.5.1 Introduction

During construction and operation phases of the proposed project, solid waste management 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.

7.1.5.2 Monitoring frequency

The frequency of solid waste monitoring will differ from the collection to the disposal stage in order to ensure reduced accumulation of heaps of waste. Table 15 describes the outline for which the activity will be monitored but can be adjusted depending on the amount generated.

Table 15: Sample outline for solid waste monitoring plan.

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

7.1.5.3 Monitoring strategy

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

7.1.5.4 Indicator of success

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

7.1.6 Energy monitoring plan

7.1.6.1 Introduction

Main energy will be sourced from the National Grid, supplemented by diesel-powered generators, in times of power outages. The aim of the monitoring plan is to inform substantial practical guidelines for continuous improvement of energy consumption and identifying cost saving opportunities in energy efficiency.

7.1.6.2 Monitoring frequency

Monitoring of energy use will be done monthly in form of power bills and an energy audit done at least once every three years. This should be in collaboration with an energy expert certified by the Energy Regulatory Commission (ERC).

7.1.6.3 Monitoring strategy

Energy consumption will be monitored through keeping records of power bills from the Kenya Power as well as the fuel consumption by the standby generators and other machinery on a monthly basis and analysing areas of use.

8 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORKS

8.1 Policy Frameworks

8.1.1 National Environment Policy, 2013

This policy elaborates the use of environmentally friendly development strategy that integrates and promotes cohesion of development and environmental policies and enhances transfer of environmentally sound technologies.

8.1.2 Kenya Vision 2030

Chapter 5 of the Vision 2030 blueprint focuses on education, health, water, environment, housing and urbanization amongst other sectors.

8.1.3 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.

8.1.4 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. Effects of climate change and mitigation and adaptation measures in relation to the proposed project will be taken into consideration during ESIA process.

8.1.5 Kwale County Integrated Development Plan 2023-2027

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

8.1.6 Kwale County Climate Change Framework Policy

The policy strives to increase resilience and enhance adaptive capacity to climatic changes at the county level. It seeks to ensure that residents engage in activities that ensure low carbon emissions while promoting sustainable development.

8.1.7 Kwale County Climate Change Action Plan (KCCCAP) 2022-2027

The KCCCAP provides a strategic framework to enhance resilience, reduce vulnerabilities, and promote sustainable development in response to climate change. It outlines the county's vision to become a climate-resilient and low-carbon economy, emphasizing the integration of climate change considerations into all sectors of development. It includes a comprehensive assessment of the county's climate risks and vulnerabilities, identifying key areas such as water resources, agriculture, health, infrastructure, and biodiversity that require urgent attention.

The KCCCAP sets forth specific adaptation and mitigation strategies to address these challenges. Adaptation strategies focus on enhancing water security through improved water management practices, promoting climate-smart agriculture, safeguarding coastal and marine ecosystems, and strengthening public health systems to deal with climate-related diseases. Mitigation efforts aim at reducing greenhouse gas emissions through the adoption of renewable energy, energy efficiency measures, sustainable land use practices, and waste management improvements. The plan

emphasizes community participation, capacity building, and inter-sectoral coordination to ensure effective implementation. It also highlights the importance of leveraging local knowledge and integrating gender and social inclusion in climate action initiatives.

Furthermore, the action plan aligns with national and international climate change frameworks, including Kenya's National Climate Change Action Plan and the Paris Agreement, ensuring coherence and synergy in the county's climate response efforts.

8.1.8 Kwale County State of Environment and Outlook Report (2021-2022)

The Kwale County State of Environment and Outlook Report (2021-2022) provides a comprehensive overview of the environmental conditions and trends in Kwale County. It includes detailed analyses and assessments of various environmental factors such as climate, water resources, land use, biodiversity, and waste management. The report is crucial for informing policy-making, development planning, and environmental management in the county. Moreover, the report highlights key issues and trends that must be considered in Environmental and Social Impact Assessments including biodiversity conservation, land use and land cover change, water resources and waste management and stakeholder engagement to ensure sustainable and equitable development.

8.1.9 County Land and Environment Policy

The policy provides for the sustainable utilization, management and conservation of land and environment resources for the socio-economic prosperity of the County. The scope of this policy encompasses a wide range of land and environment issues such as land tenure system, land management, land administration, management of ecosystems and sustainable use of natural resources, environmental quality and health, environmental research and environmental governance. The policy also addresses cross cutting issues affecting land and environment including biodiversity loss, climate change, desertification, environmental pollution, rapid urbanization, emergency preparedness and disaster management, gender and vulnerability and the interaction among these issues.

8.1.10 County Integrated Solid Waste Management Policy

The policy aims to protect the health and environment, create green jobs and wealth through creating an enabling environment for sustainable and integrated solid waste management to protect the circular economy. Proper solid waste management ensures a clean state of environment.

8.1.11 Other policies

Other policies related to the proposed project include the sustainable development goals (SDGs). The SDGs offer a comprehensive framework for addressing global challenges, including those related to sustainable development, environmental protection, and social progress. The relevant SDGs are presented in Table 16.

Table 16: Relevant sustainable development goals to the proposed project

Sustainable Development Goal	Description
SDG 6; Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all
SDG 7: Affordable and Clean Energy	Ensure access to affordable, reliable, sustainable, and modern energy for all

Sustainable Development Goal	Description
SDG 8; Decent Work and Economic Growth	Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all
SDG 9; Industry, Innovation, and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation
SDG 12; Responsible Consumption and Production	To ensure sustainable consumption and production patterns
SDG 13; Climate Action	Take urgent action to combat climate change and its impacts
SDG 15;Life on land	Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

8.2 Legal Frameworks

8.2.1 Constitution of Kenya 2010

The Constitution of Kenya 2010 is the supreme law of the land. It lays the foundation on which the wellbeing of Kenya is founded. The constitution's provisions are specific to ensuring sustainable and productive management of land resources. Chapter IV, article 42 states that 'every person has the right to a clean and healthy environment and article 69 states that "the state shall; encourage public participation in the management, protection and conservation of the environment; establish systems of environmental impact assessment, environmental audit and monitoring of the environment; eliminate processes and activities that are likely to endanger the environment.

Relevance to the proposed project

- The proponent must ensure that the proposed project carried out in an ecologically, economically and socially sustainable manner.

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

EMCA Cap 387 is the principal law that governs the use, management and regulation of environmental resources in Kenya. Section 7 of the Act, establishes NEMA as the authority to coordinate all environmental related activities in Kenya. The Act provides guidelines and recommendations in carrying out environmental assessment. The Act has key regulations that will guide through the ESIA study, these includes; Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019, Air Quality regulations of 2014, Water Quality and the Waste Management Regulations of 2006 as detailed below;

8.2.2.1 Environmental (Impact Assessment and Audit) Regulations, 2003

These regulations stipulate the steps to be followed when undertaking an Environmental Impact Assessment, and Environmental Audit. Under the Second Schedule, amended vide legal notice number 31 of 2019, the proposed project is categorized as a High Risk Project and requires Environmental Impact Assessment study process thus the preparation of an EIA Study Report following recommendations under Part III of the Regulation.

Relevance to the proposed project

- The proponent is conducting an ESIA study for the wale CAIP to assess the potential impacts of the proposed project

8.2.2.2 Environmental Management and Coordination (Waste Management) Regulations, 2006

These regulations stipulate who and how the different types of waste streams should be stored, transported, and disposed of. The type of waste streams described herein include solid waste, industrial waste and hazardous waste among others. 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 contract a NEMA licensed personnel to dispose of wastes

8.2.2.3 Environmental Management and Coordination (Air Quality) Regulations, 2014

These regulations are aimed at controlling, preventing and abating air pollution to ensure clean and healthy ambient air. The Third Schedule provides for emission limits for both controlled and non-controlled facilities and specific reference is made to particulate matter and exhaust emissions for mineral operations.

Relevance to the proposed project

- The proponent should conduct air quality monitoring during project implementation to ascertain conformity with the provisions of this Act

8.2.2.4 Environmental Management and Coordination (Noise & Excessive Vibrations) Regulations, 2009

These Regulations provide for control of noise levels and vibrations to ensure a heathy environment of all people in Kenya. The regulations further provide the permissible noise levels within different neighborhoods at different times. It also stipulates the factors to be considered when determining the amount of noise produced from various sources as well during EIA study the proponent is required to identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from the construction and installation works, operation and possible decommissioning of the industrial park, determine the measures which are needed in the plans and specifications to minimize or eliminate adverse noise or vibration impacts.

Relevance to the proposed project

- The proponent to monitor noise levels on a quarterly basis in collaboration with NEMA designated laboratory

8.2.2.5 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. The First schedule sets out standards for all sources of water for domestic uses and the third schedule provides guidelines and standards for discharge of effluents into the environment.

Part II (4i) states that "Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act.

Relevance to proposed project

- The proponent should apply for and obtain Effluent Discharge License from NEMA throughout the project cycle

8.2.3 Occupational Safety and Health Act, 2007

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

Relevance to proposed project

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

8.2.4 Sustainable Waste Management Act, 2022

The 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 is based on the following principles: precautionary principle; polluter pays principle; payment for ecosystem services; zero waste principle.

Section 13 of the Act requires every producer to bear mandatory extended producer obligations, to reduce pollution and environmental impacts of the products introduced into the Kenyan market and waste arising therefrom. Further, Section 20 of the Act makes provision for waste segregation and disposal by a licensed personnel.

Relevance to proposed project

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

8.2.5 Physical and Land Use Planning Act, 2019

This Act makes provision for the planning, use, regulation and development of land and for connected purposes. Article 5 of the Act under Principles and norms of physical and land use planning notes that 'every person engaged in physical and land use planning development activities shall be in a manner 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 proposed project

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

8.2.6 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 provisions of adequate sanitation facilities throughout project cycle

8.2.7 Water Resources Regulations, 2021

These Regulations implement provisions of the Water Act, No. 43 of 2016 concerning networks, facilities, equipment, applications and assets of all water resources. Part V and VI of the Act makes provisions for authorization of groundwater development and water quality, monitoring, waste disposal and effluent discharge data respectively.

Relevance to the proposed project

- The proponent should obtain a water abstraction permit for the borehole from Water Resource Authority.

8.2.8 Energy Act, 2019

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

8.2.9 Climate Change Act, 2023

This Act amends the Climate Change Act, 2016, providing for the regulation of the carbon markets besides enhancing response to climate change. The Act provides guidance in the development and implementation of carbon markets; participation in carbon markets, as a result of a bilateral or multilateral trading agreement; promoting the mitigation of greenhouse gas emissions, while fostering sustainable development and environmental impact assessment.

Relevance to the proposed project

- The proponent should monitor compliance with levels of greenhouse gas emissions

8.2.10 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 will ensure compliance of the provisions of the Act during the operations phase.

8.2.11 Kwale County Public Participation Act, 2016

An Act of County Assembly of Kwale to establish modalities and platform for public participation in the governance of the county and for connected purposes. It aims to provide a legal framework for involving citizens in the decision-making processes that affect them directly.

Relevance to the proposed project

The consultant in collaboration with the local administration of the proposed project area organized and held three stakeholder consultation meetings to gather views and concerns of the local community

8.3 Institutional framework

A number of institutions have been established to implement the policy and legal frameworks. For the proposed project, the institutions to be involved will include NEMA, DOSHS and County Government of Kwale among others as provided in Table 17 below.

Table 17: Institutions and their legislative mandate as it applies to Kwale CAIP

Name of institution	Mandates and relevance to the project
National Environment Management Authority (NEMA)	To implement the Environmental Management and Coordination Act Cap 387 of Laws of Kenya
Directorate of Occupational Safety and Health Services (DOSHS)	To implement the Occupational Safety and Health Act alongside the subsidiary legislations
County Government of Kwale	To implement the County Government Act, 2012, its by-laws, the Public Health Act, 2012 and the Physical Planning and Land Use Planning Act, 2019
Water Resource Authority	Implement the Water Resources Regulations, 2021

9 CONCLUSION AND RECOMMENDATION

9.1 Conclusion

Kwale CAIP project is considered beneficial in supporting the agricultural sector in Kenya and spurring inclusive economic development. However, despite the benefits there are environmental concerns that will arise during project implementation that will include, waste management, occupational safety and health risks, fire risks and emergencies, air and noise pollution. increased water and energy demand, health and sanitation and storm water management. The ESIA study report proposes a suite of Environmental Management Plans throughout the project cycle i.e. for construction, operation and possible decommissioning phases to mitigate the anticipated negative impacts and enhance the environmental performance during project implementation.

9.2 Recommendation

The main recommendation of the ESIA is the need for concerted implementation of the Environmental Management and Monitoring Plans (EMMP) by the proponent. On the basis of a commitment by the proponent to the EMMPs to the latter, we recommend the issuance of an EIA License alongside its conditions as per the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

10 REFERENCES

1. Constitution of Kenya, 2010. Government Printers, Nairobi, Kenya.
2. County Government Act, 2012. Government Printers, Nairobi, Kenya.
3. County Government of Kwale (2022), County Syae of Environemnt Outlook Report
4. Environmental Impact Assessment and Audit Regulations, 2003. Government Printers, Nairobi, Kenya.
5. Environmental Management and Coordination (Air Quality) Regulations. 2014. Government Printers, Nairobi, Kenya.
6. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. Government printer, Nairobi, Kenya.
7. Environmental Management and Coordination (Waste management) Regulations, 2006. Government Printers, Nairobi, Kenya.
8. Environmental Management and Coordination (Water Quality) Regulations, 2006 Government Printers, Nairobi
9. Environmental Management and Coordination Act (EMCA) Number 8 of 1999 (Amended 2015) Government Printers, Nairobi, Kenya.
10. Kenya National Bureau of Statistics, 2019
11. Kwale County Integrated Development Plan, 2023-2027
12. Occupational Safety and Health Act, 2007. 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. Water Act, 2016. Government Printers, Nairobi, Kenya.

11 ANNEXURES

1. Pin Certificate
2. Title Deed
3. Architectural designs and drawings for the proposed project
4. Bill of quantities
5. Approval of the scoping report and Terms of Reference for the EIA study
6. Baseline monitoring reports for ambient air and acoustic levels
7. Acknowledged meeting invitation letters
8. Stakeholder engagement meetings programmes
9. Proceedings of the first public participation meeting
10. Proceedings of the second public participation meeting
11. Proceedings of the third public participation meeting
12. NEMA practicing license for the firm, Envasses Environmental Consultants Limited
13. NEMA practicing license for Team Leader, Mr. Simon Nzuki
14. NEMA practicing license for Environmental Expert, Ms. Jane Gitau

Annexure 1: Pin Certificate

2630

KENYA REVENUE AUTHORITY

www.kra.go.ke

PIN Certificate

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

Certificate Date : 08/09/2014

Personal Identification Number

P051418637K

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

Taxpayer Information

Taxpayer Name	Kwale County
Email Address	ondukoalex@yahoo.com

Registered Address

L.R. Number :	**Buliding :** KWALE COUNTY OFFICES
Street/Road : KWALE	**City/Town :** MOMBASA CITY (SOUTH)
County : Kwale	**District :** Matuga
Tax Area : Matuga	**Station :** Mombasa South
P. O. Box : 4	**Postal Code :** 80403

Tax Obligation(s) Registration Details

Sr. No.	Tax Obligation(s)	Effective From Date	Effective Till Date	Status
1	Income Tax - PAYE	27/08/2010	N.A.	Active
2	Income Tax - Company	27/08/2010	N.A.	Active

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

COUNTY GOVERNMENT OF KWALE
CHIEF OFFICER
FINANCE ... PLANNING
10 JUL 2019
SIGN.....

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

Annexure 2: Title Deed

40

REPUBLIC OF KENYA

THE REGISTERED LAND ACT

(Chapter 300)

Title Deed

Title Number KWALE/MWANANYAMALA /557

Approximate Area 257.5Ha.

Registry Map Sheet No. 3

This is to certify that KWALE COUNTY COUNCIL

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.

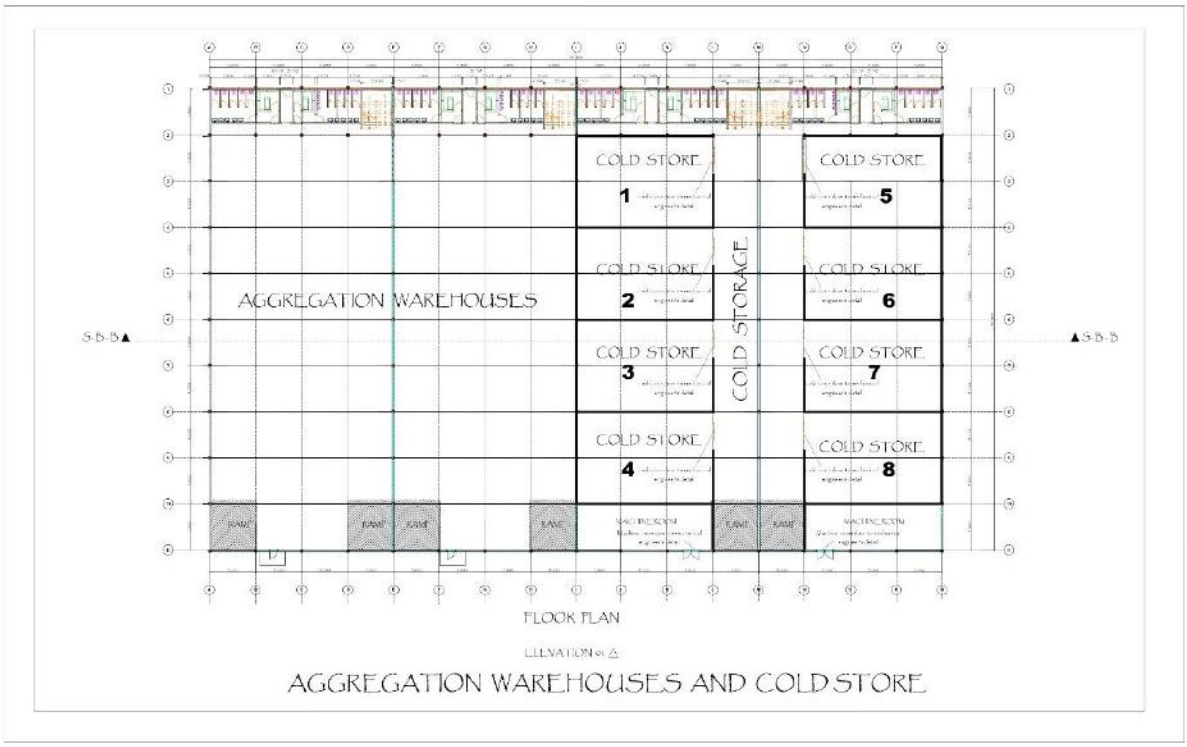
GIVEN under my hand and the seal of the

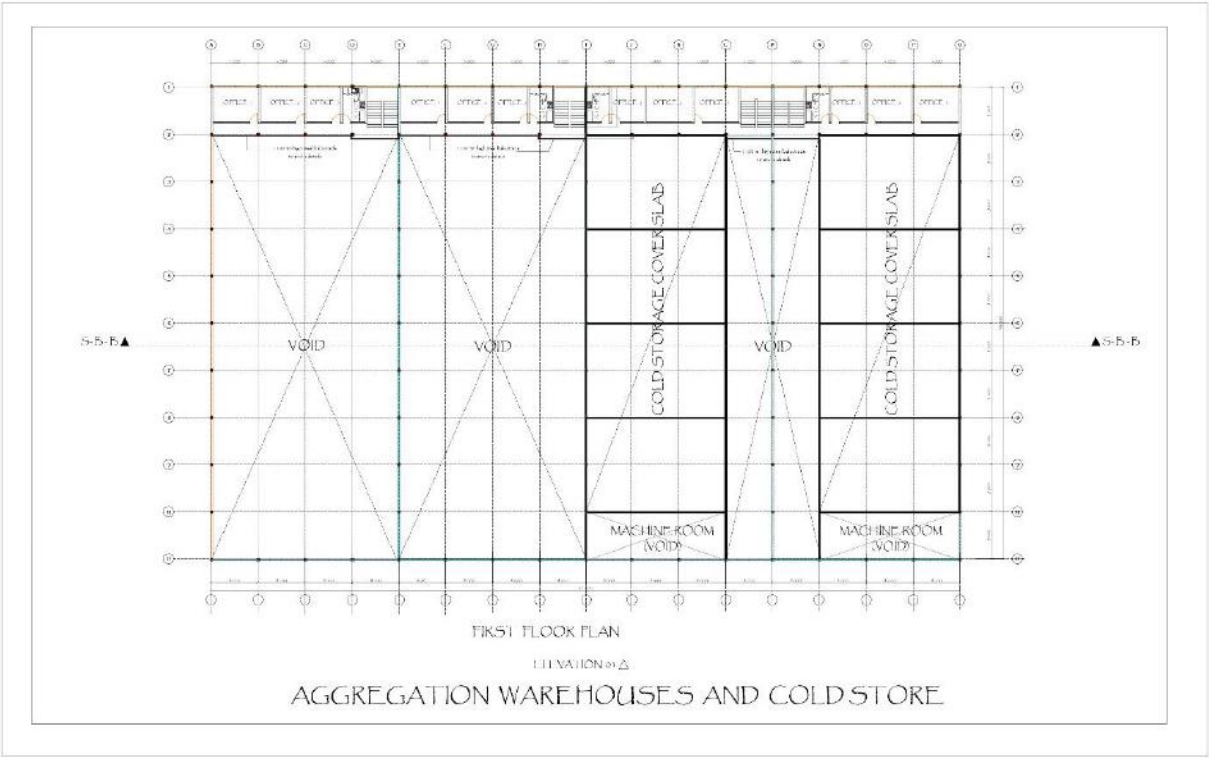
K W A L E District Land Registry

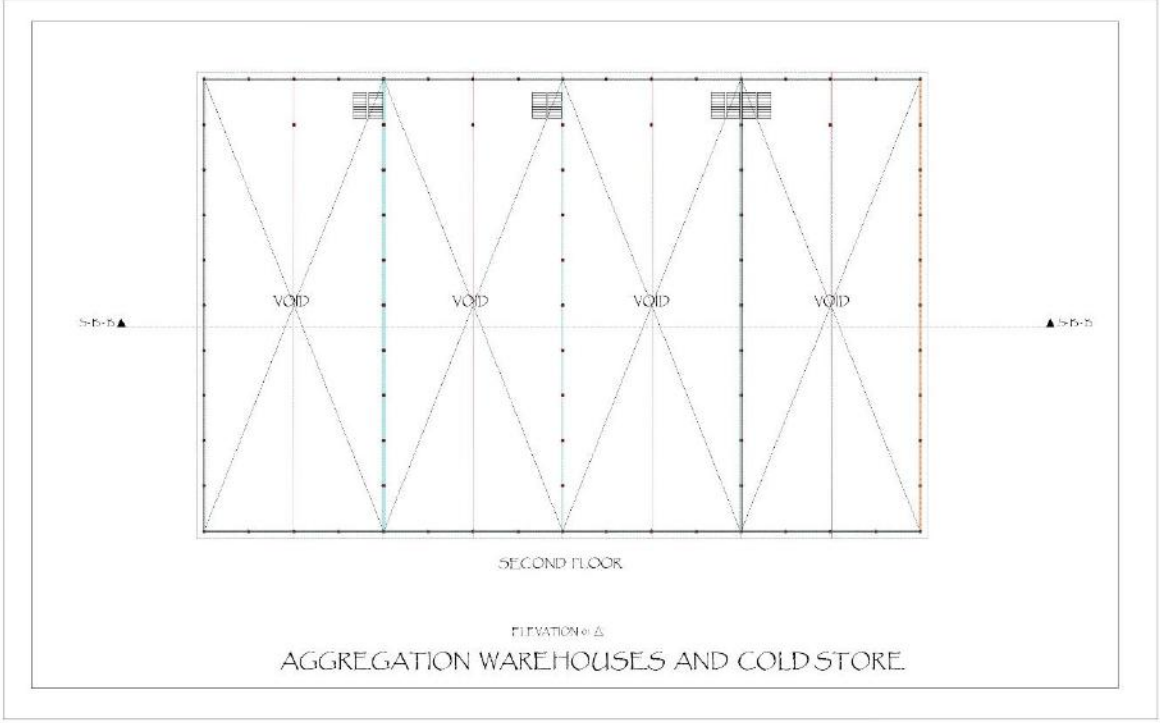
this 18th day of November, 1991

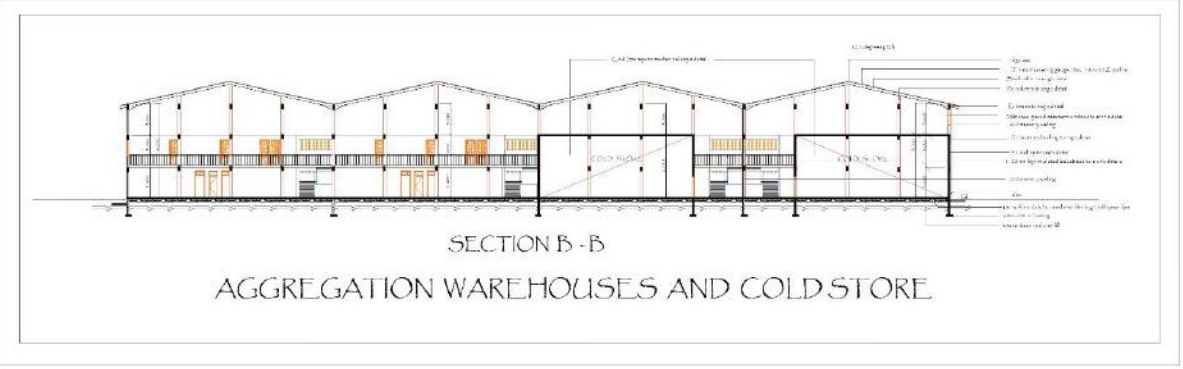
Land Registrar

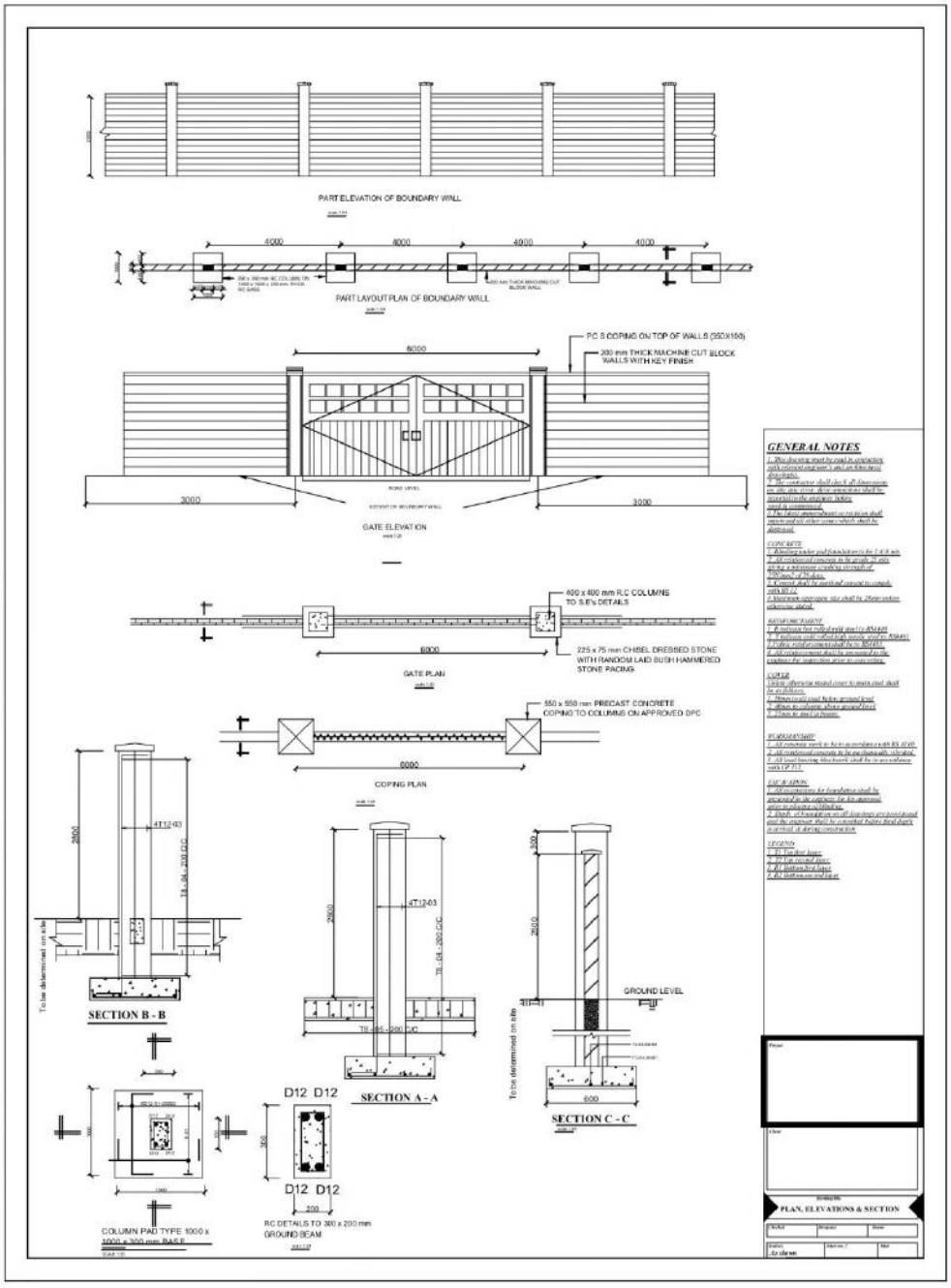
Annexure 3: Architectural designs and drawings for the proposed project





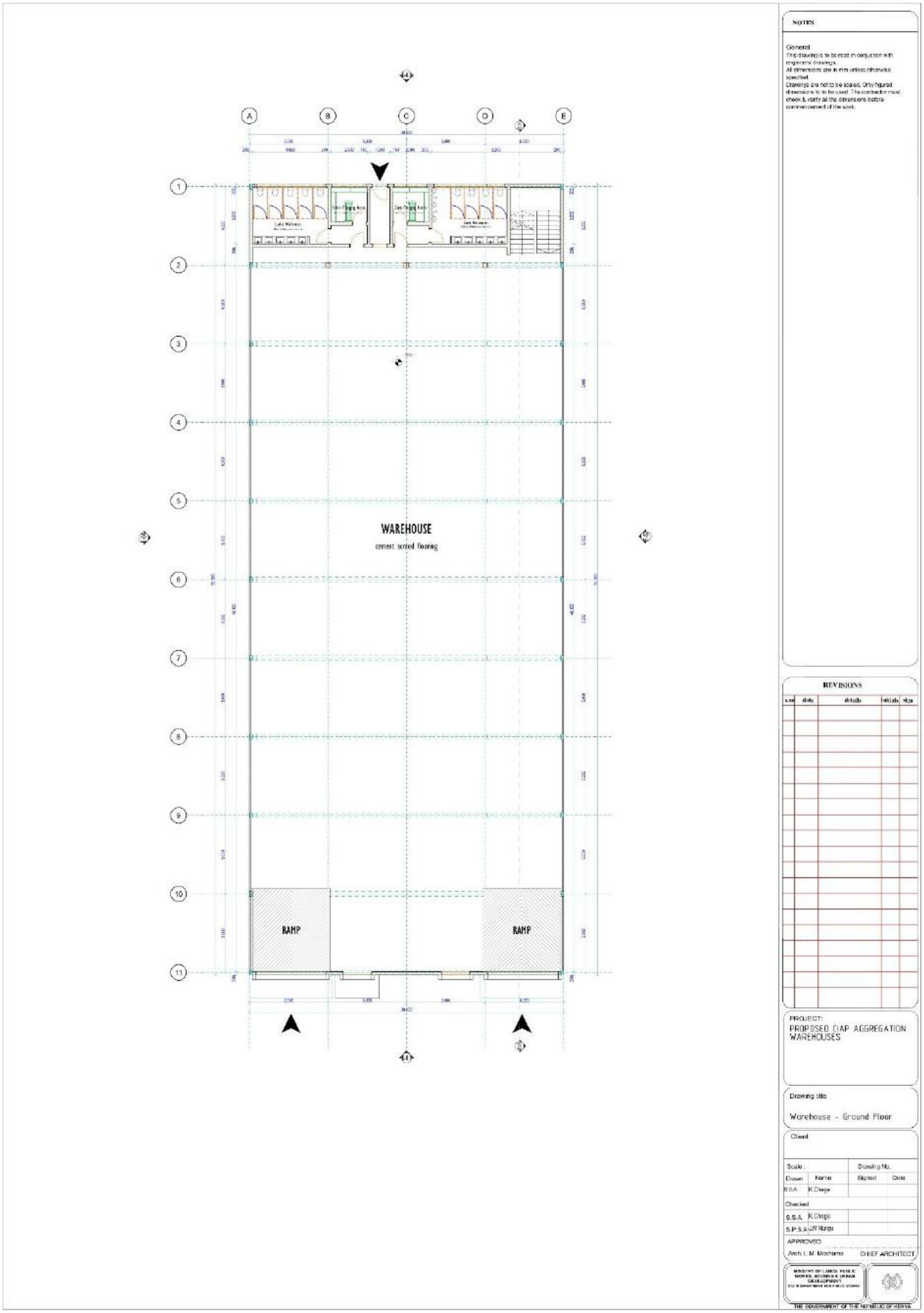

VOID
VOID
VOID
VOID
SECOND FLOOR
AGGREGATION WAREHOUSES AND COLD STORE

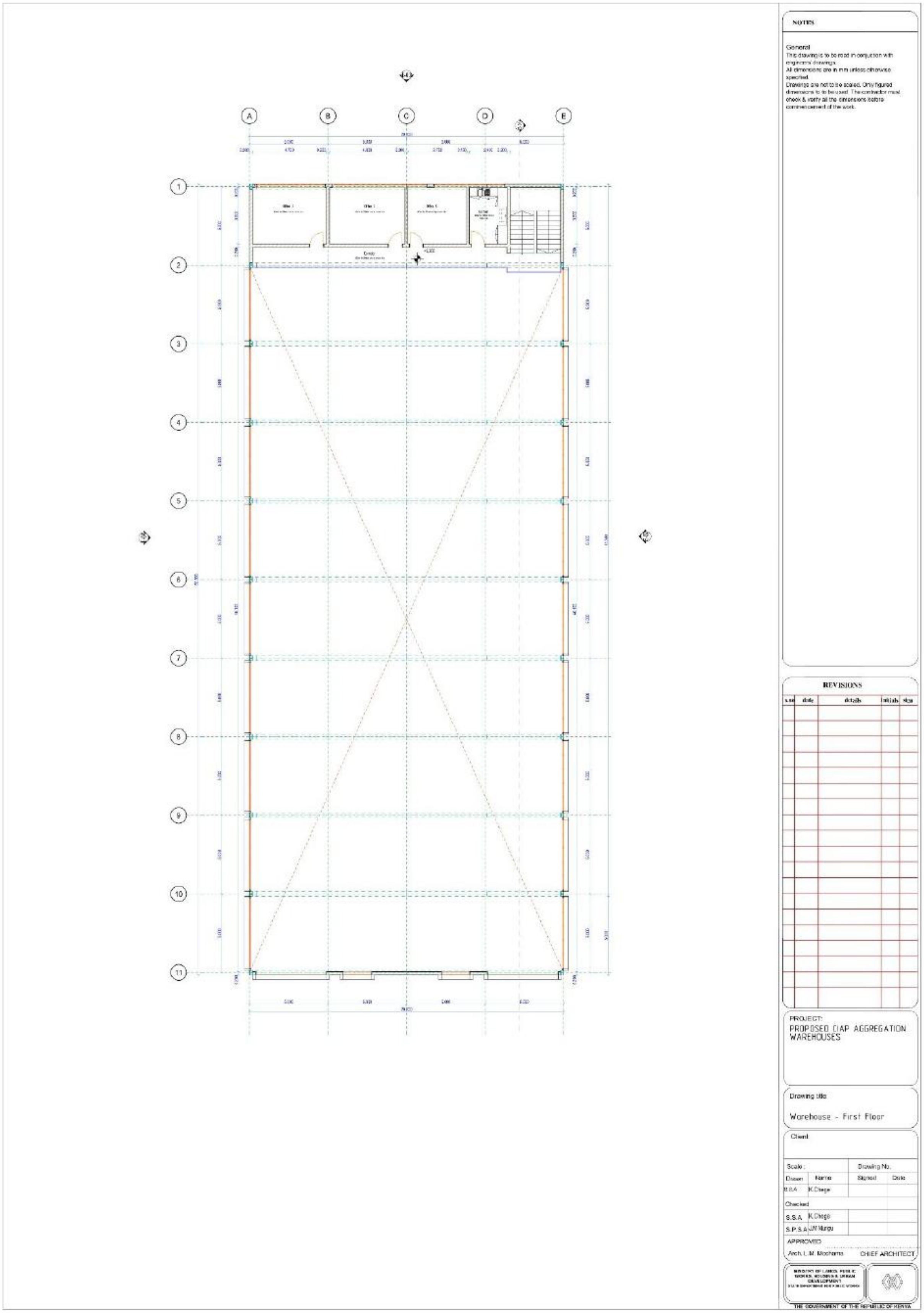

SECTION B - B
AGGREGATION WAREHOUSES AND COLD STORE

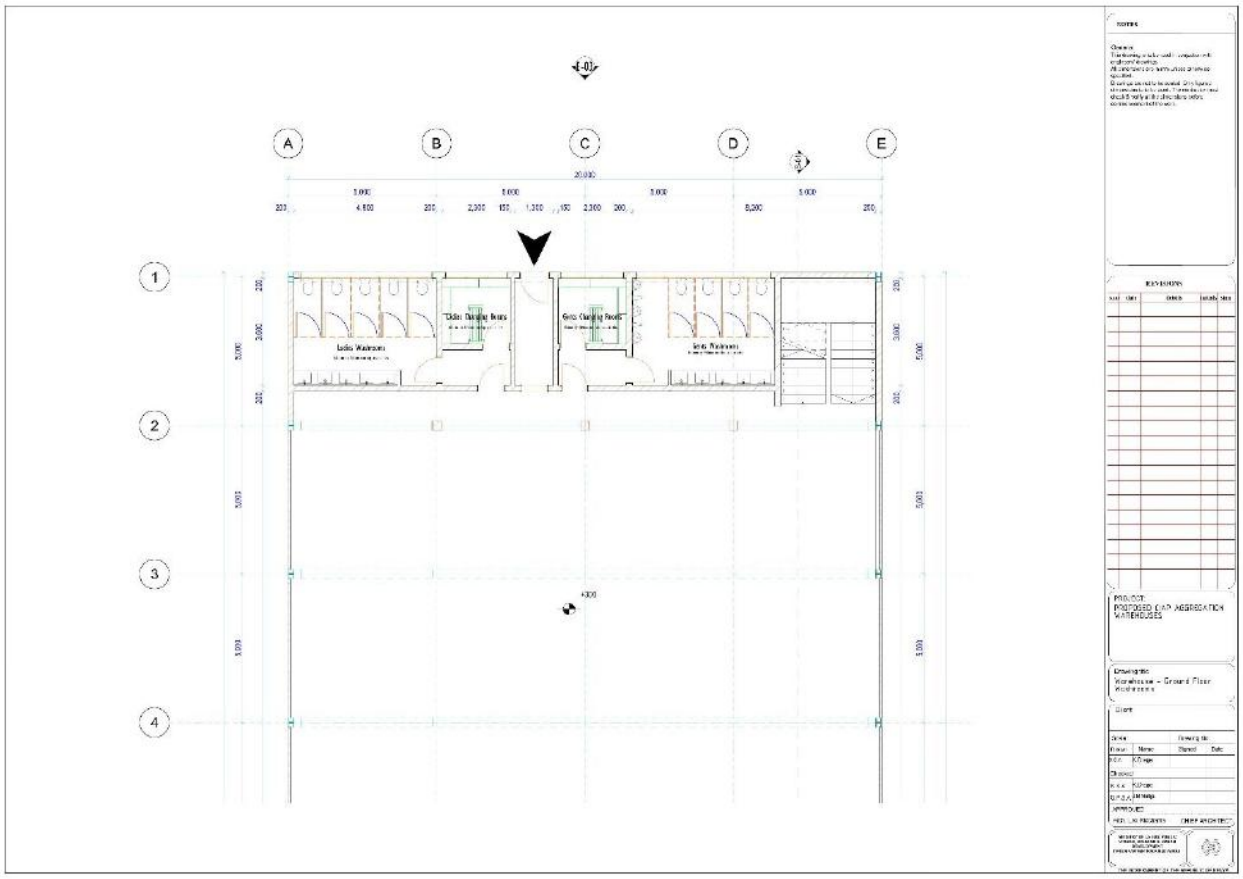

PART ELEVATION OF BOUNDARY WALL
PART LAYOUT PLAN OF BOUNDARY WALL
PC S COPING ON TOP OF WALLS (350X150)
200 mm THICK MACHINE CUT BLOCK WALLS WITH KEY FINISH
GATE ELEVATION
400 x 400 mm R/C COLUMNS TO S/E's DETAILS
225 x 75 mm CHISEL DRESSED STONE WITH RANDOM LAID BUSH HAMMERED STONE FACING
GATE PLAN
550 x 550 mm PRECAST CONCRETE COPING TO COLUMNS ON APPROVED DPC
COPING PLAN
SECTION B - B
SECTION A - A
SECTION C - C
GROUND LEVEL
COLUMN PAD TYPE 1000 x 1000 x 300 mm BASE
RC DETAILS TO 300 x 200 mm GROUND BEAM
GENERAL NOTES
PLAN, ELEVATIONS & SECTION

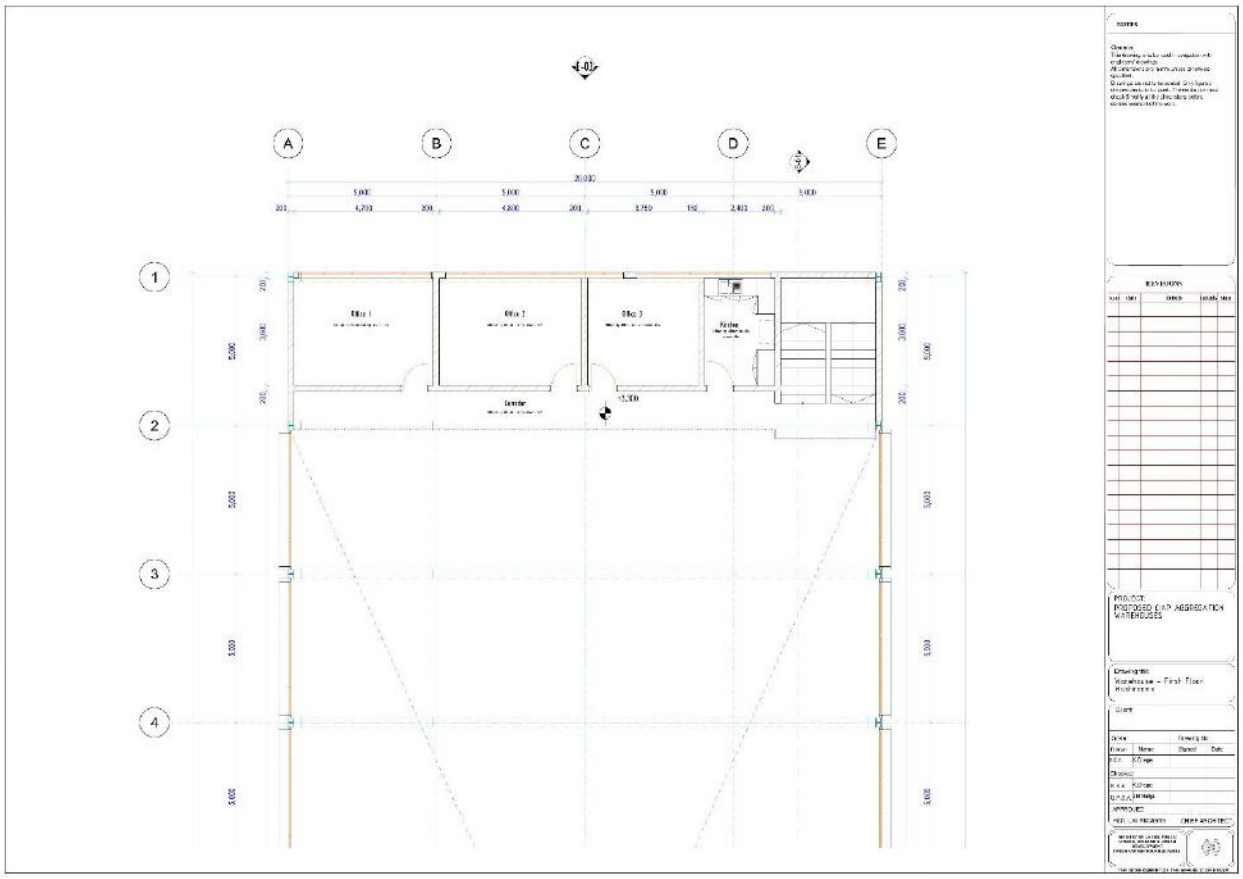

ABLUTION BLOCK
OFFICE BLOCK
PUMP HOUSE
POWER HOUSE
AGGREGATION WAREHOUSES
COLD STORAGE
SOAK PIT
201 M
VALUE ADDITION WAREHOUSES
FUTURE
VALUE ADDITION WAREHOUSES
201 M

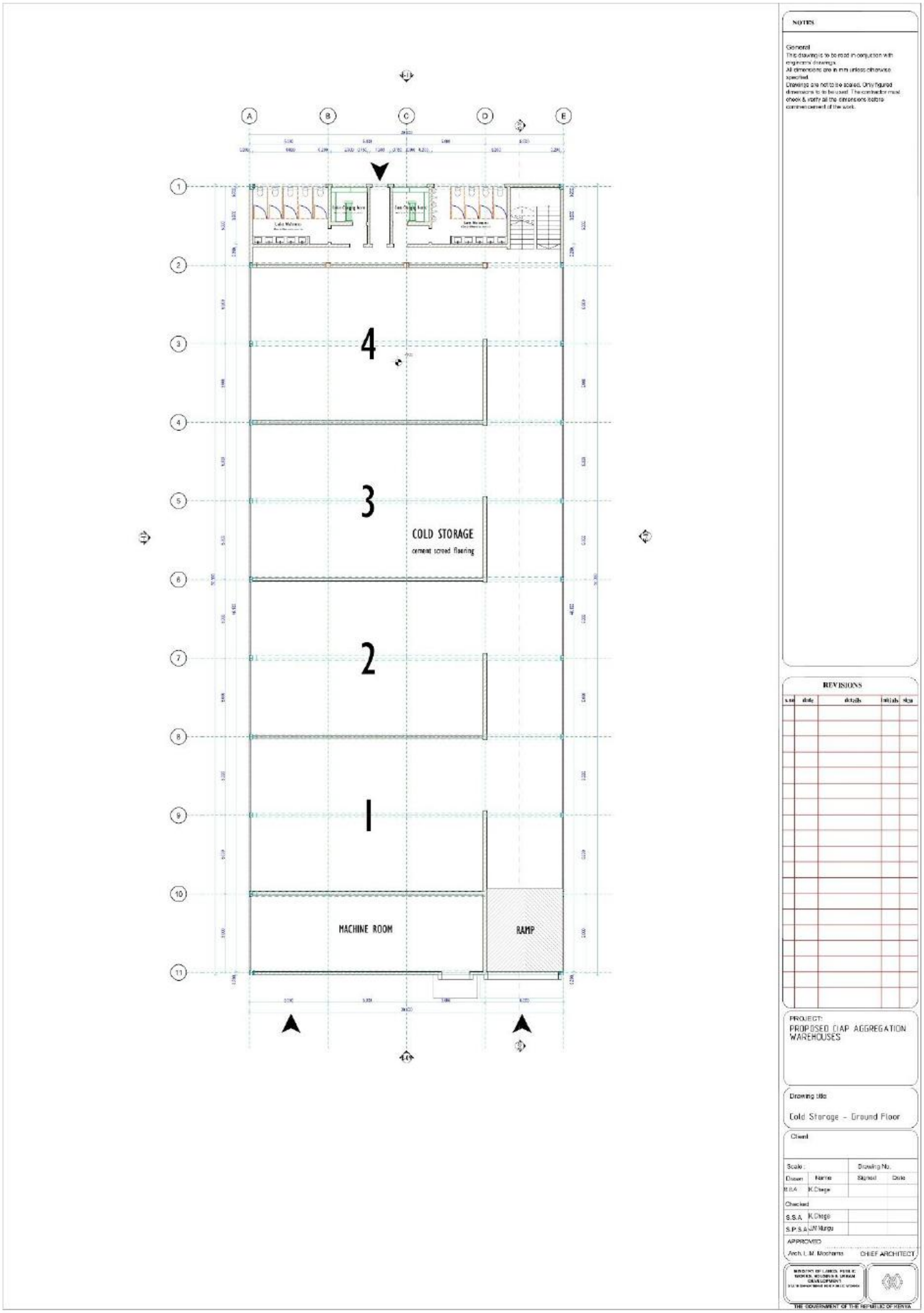

ABLUTION BLOCK
OFFICE BLOCK
PUMP HOUSE
POWER HOUSE
AGGREGATION WAREHOUSES
COLD STORAGE
VALUE ADDITION WAREHOUSES
FUTURE VALUE ADDITION WAREHOUSES
LOAD PIT


NOTES
REVISIONS
WAREHOUSE
cement screed flooring
RAMP
RAMP
PROJECT:
PROPOSED CIAP AGGREGATION WAREHOUSES
Drawing title
Warehouse - Ground Floor
Client
Scale :
Drawing No.
Drawn
Name
Signed
Date
K.Chege
Checked
S.S.A
K.Chege
S.P.S.A
J.W Murgu
APPROVED
Arch. L.M. Mochama
CHIEF ARCHITECT

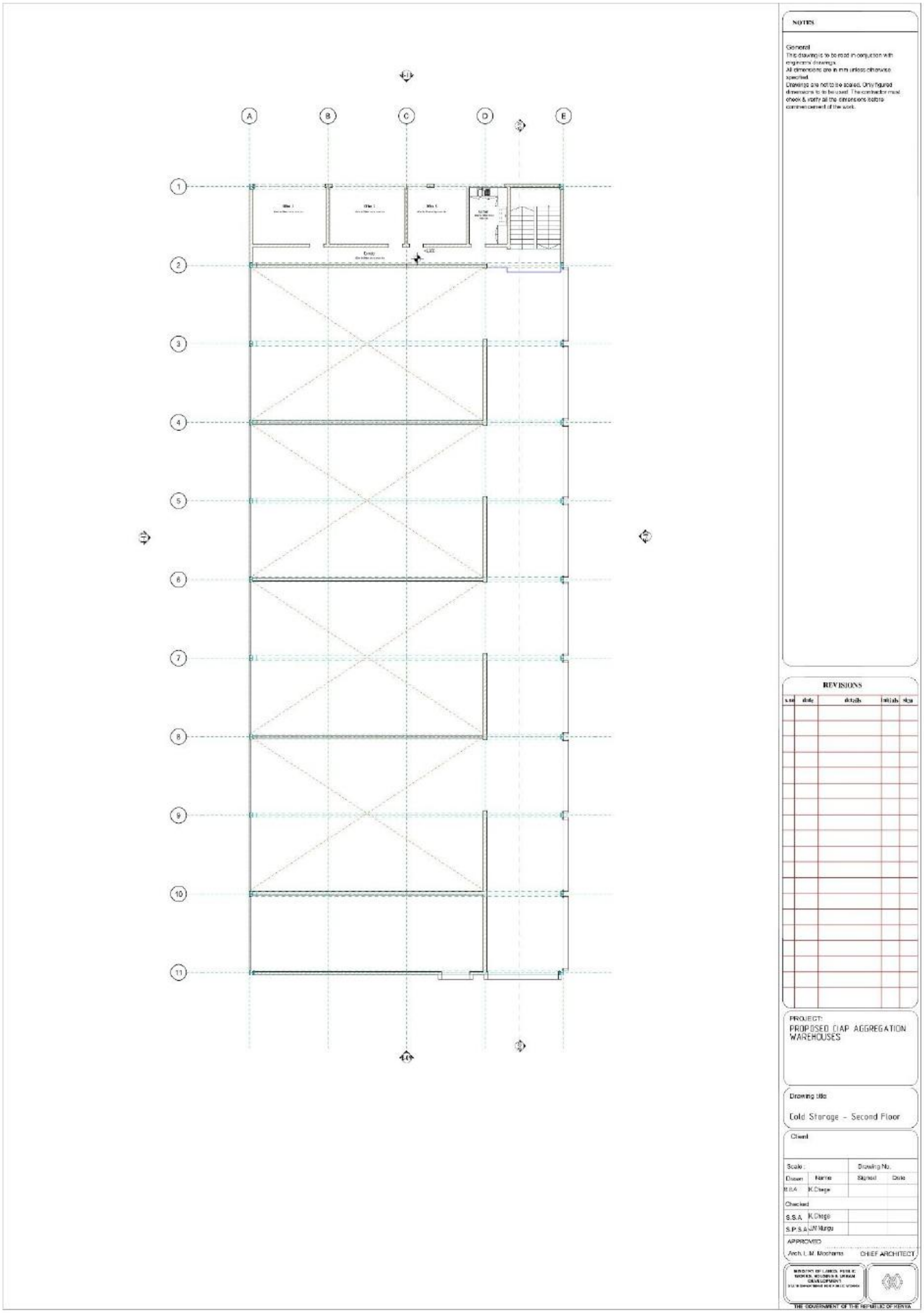

A
B
C
D
E
1
2
3
4
5
6
7
8
9
10
11
NOTES
General
This drawing is to be read in conjuction with engineers' drawings.
All dimensions are in mm unless otherwise specified.
Drawings are not to be scaled. Only figured dimensions to be used. The contractor must check & verify all the dimensions before commencement of the work.
REVISIONS
PROJECT:
PROPOSED CIAP AGGREGATION WAREHOUSES
Drawing title
Warehouse - First Floor
Client
Scale :
Drawing No.
Drawn
Name
Signed
Date
K.Chege
Checked
S.S.A
K.Chege
S.P.S.A
J.W Murgu
APPROVED
Arch. L. M. Mochama
CHIEF ARCHITECT

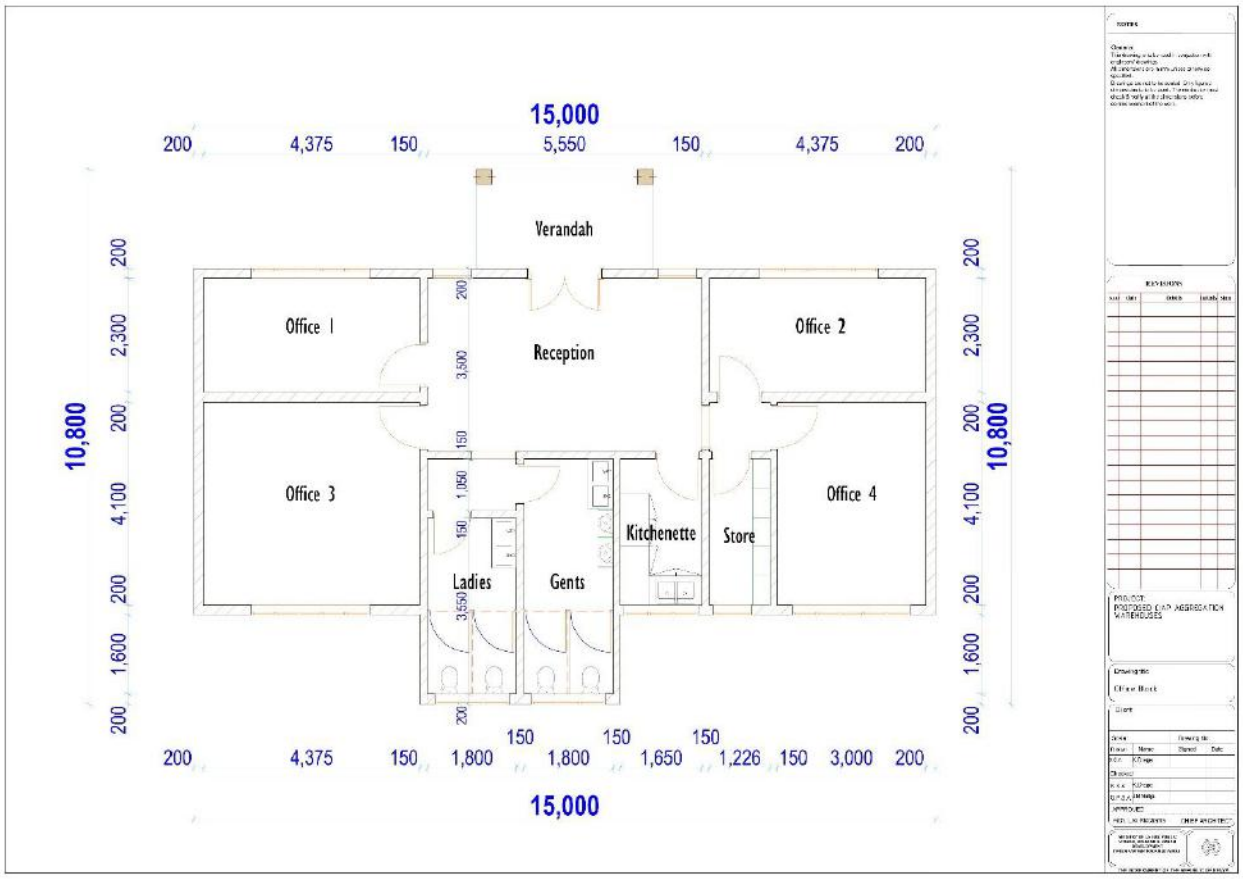

A
B
C
D
E
1
2
3
4
Ladies Changing Rooms
Gents Changing Rooms
Ladies Washroom
Gents Washroom
PROPOSED CGK AGGREGATION WAREHOUSES

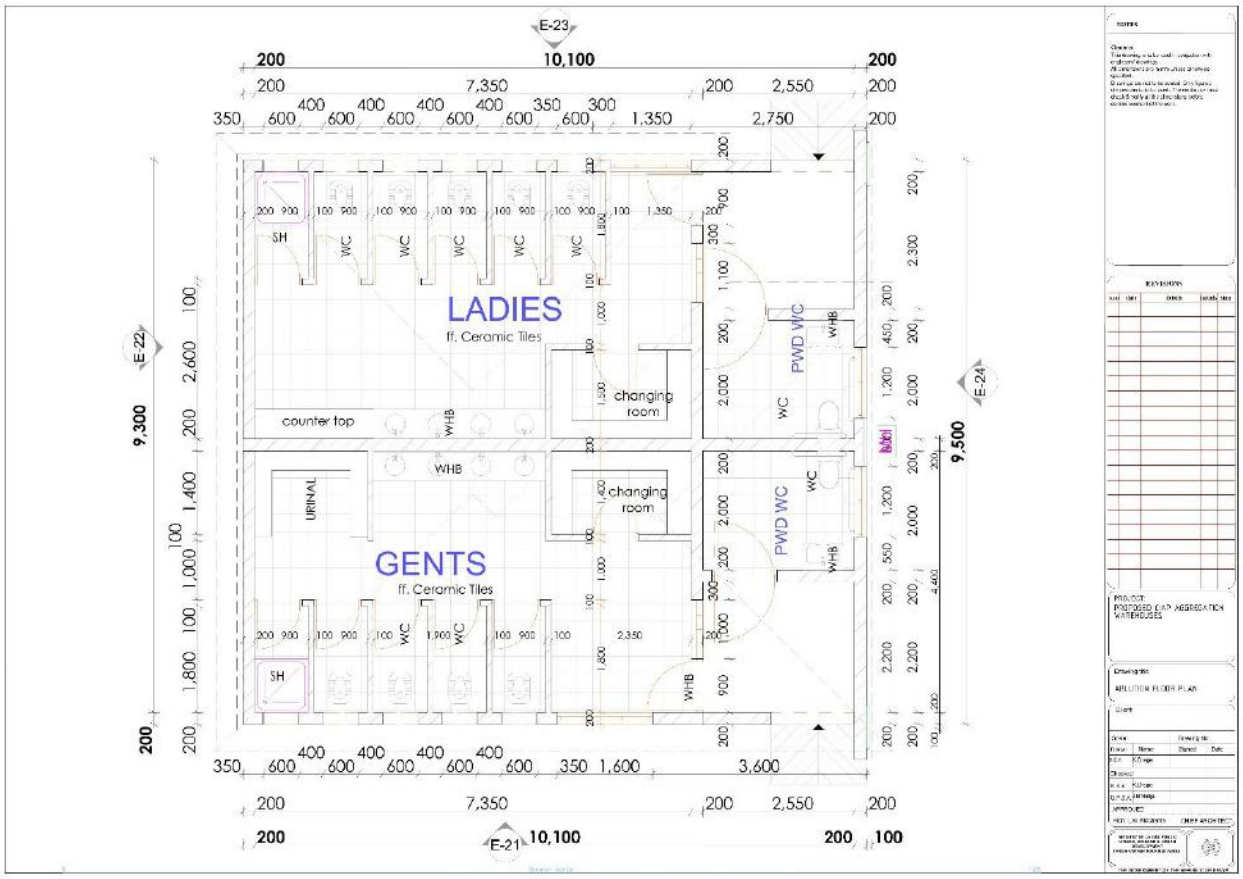

A
B
C
D
E
1
2
3
4
PROPOSED CGK AGGREGATION WAREHOUSES

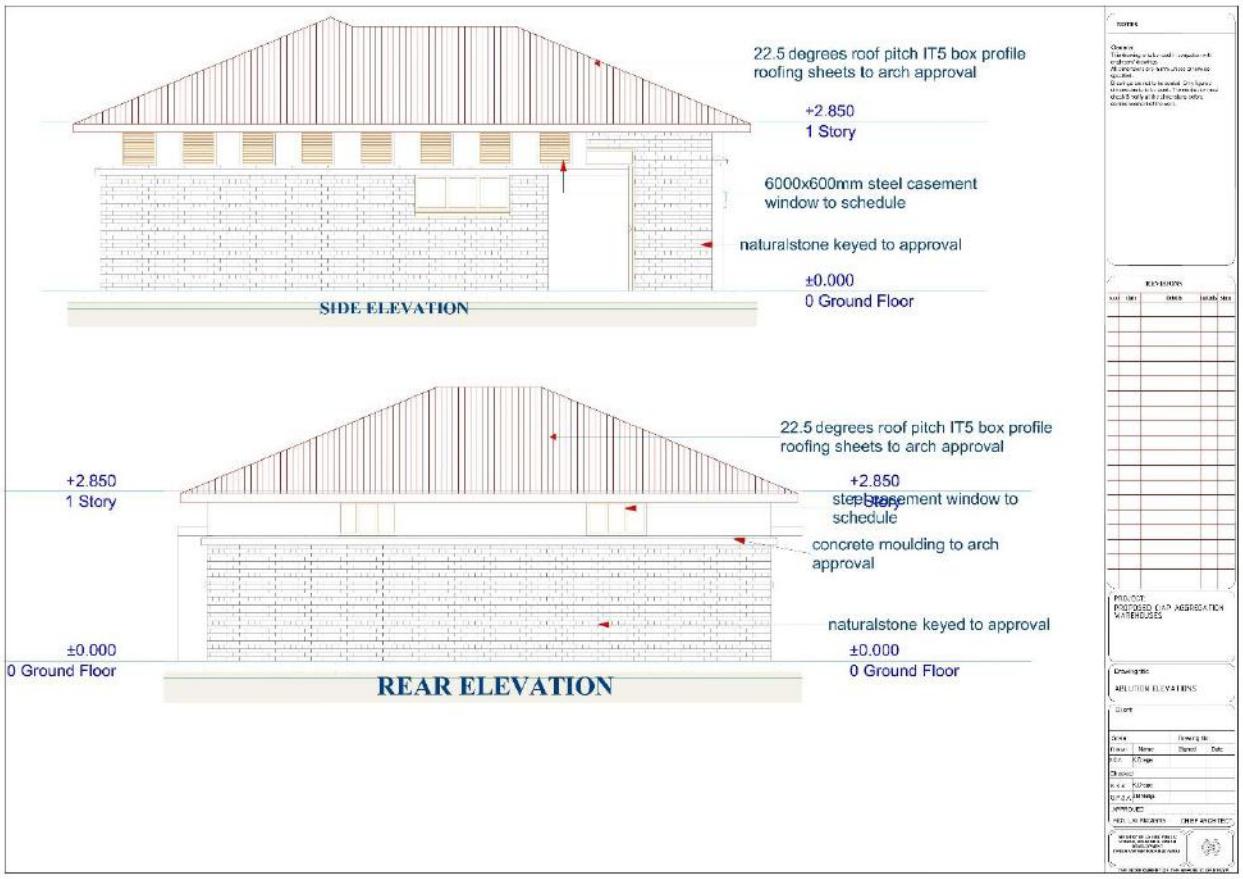


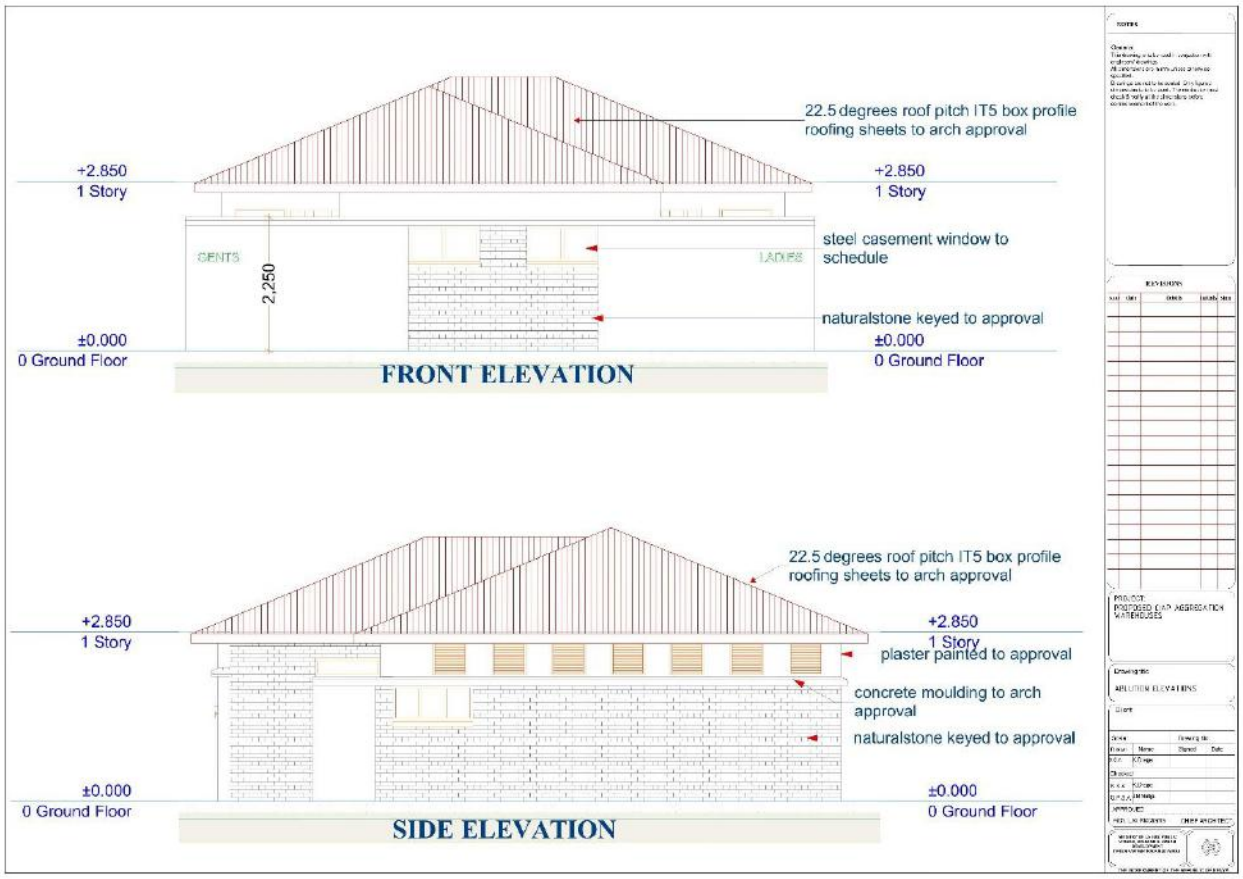
NOTES
General
This drawing is to be read in conjuction with engineers' drawings.
All dimensions are in mm unless otherwise specified.
Drawings are not to be scaled. Only figured dimensions to be used. The contractor must check & verify all the dimensions before commencement of the work.
REVISIONS
4
3
COLD STORAGE
cement screed flooring
2
1
MACHINE ROOM
RAMP
PROJECT:
PROPOSED CIAP AGGREGATION WAREHOUSES
Drawing title
Cold Storage - Ground Floor
Client
Scale :
Drawing No.
Drawn
Name
Signed
Date
K.Chege
Checked
S.S.A
K.Chege
S.P.S.A
J.W Murgu
APPROVED
Arch. L.M. Mochama
CHIEF ARCHITECT
THE GOVERNMENT OF THE REPUBLIC OF KENYA

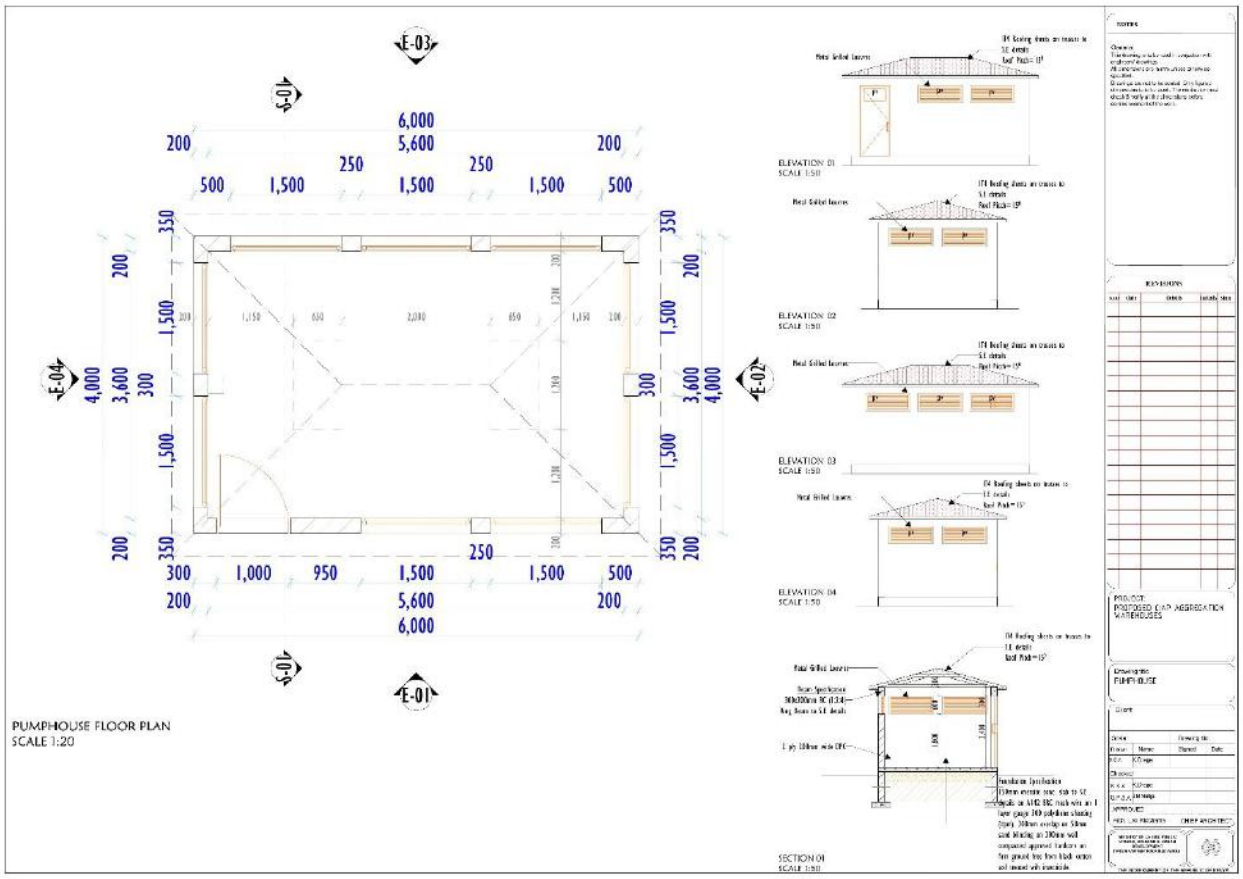

A
B
C
D
E
1
2
3
4
5
6
7
8
9
10
11
NOTES
General
This drawing is to be read in conjuction with engineers' drawings.
All dimensions are in mm unless otherwise specified.
Drawings are not to be scaled. Only figured dimensions to be used. The contractor must check & verify all the dimensions before commencement of the work.
REVISIONS
PROJECT:
PROPOSED CIAP AGGREGATION WAREHOUSES
Drawing title
Cold Storage - Second Floor
Client
Scale :
Drawing No.
Name
Signed
Date
K.Chege
Checked
S.S.A
K.Chege
S.P.S.A
J.W Murgu
APPROVED
Arch. L.M. Mochama
CHIEF ARCHITECT
DEVELOPMENT
THE GOVERNMENT OF THE REPUBLIC OF KENYA

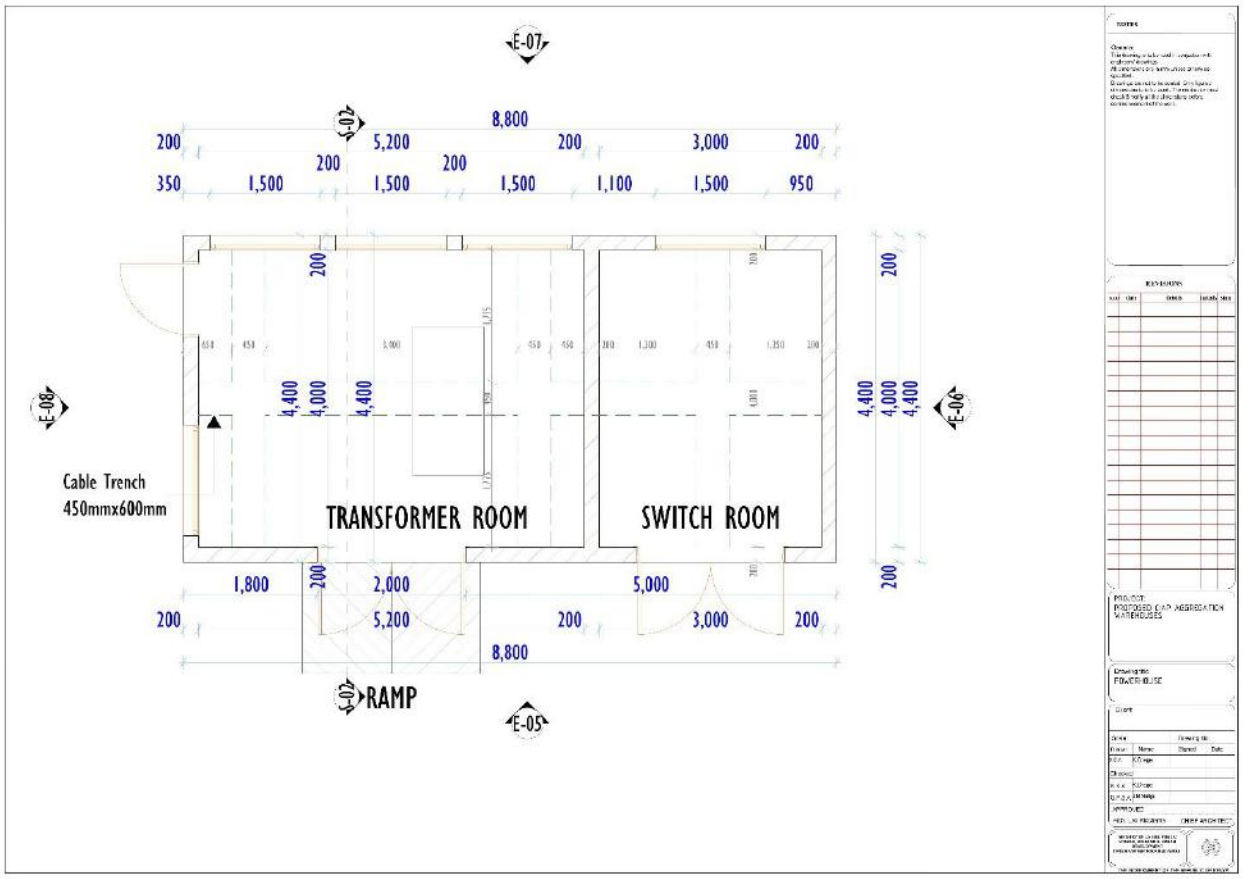

15,000
200
4,375
150
5,550
150
4,375
200
Verandah
Office 1
Reception
Office 2
Office 3
Office 4
Kitchenette
Store
Ladies
Gents
10,800
2,300
4,100
1,600
3,600
1,050
3,550
1,800
1,650
1,226
3,000

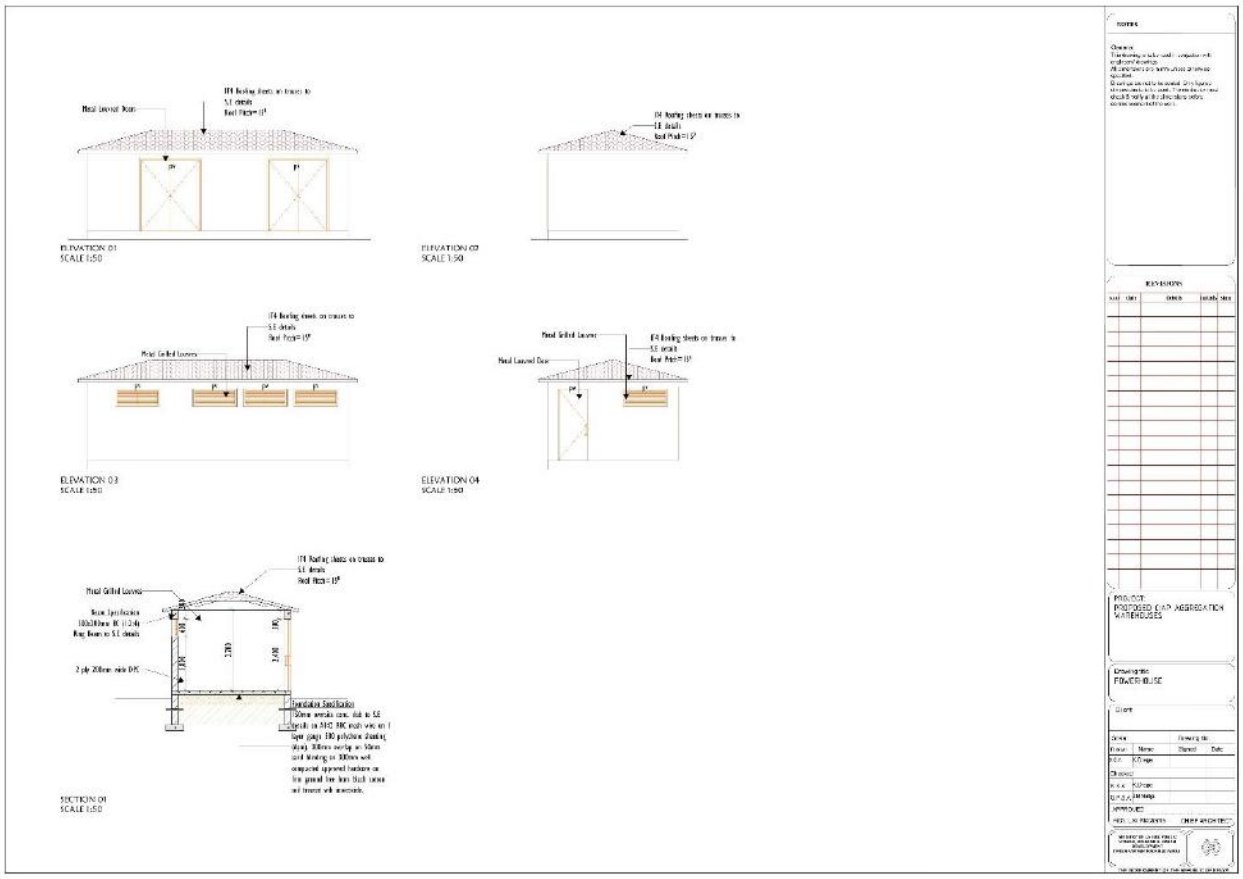

LADIES
ff. Ceramic Tiles
GENTS
ff. Ceramic Tiles
PWD WC
PWD WC
changing room
changing room
counter top
WHB
URINAL
SH
SH
E-23
E-22
E-24
E-21
10,100
7,350
2,550
2,750
1,350
3,600
9,300
9,500

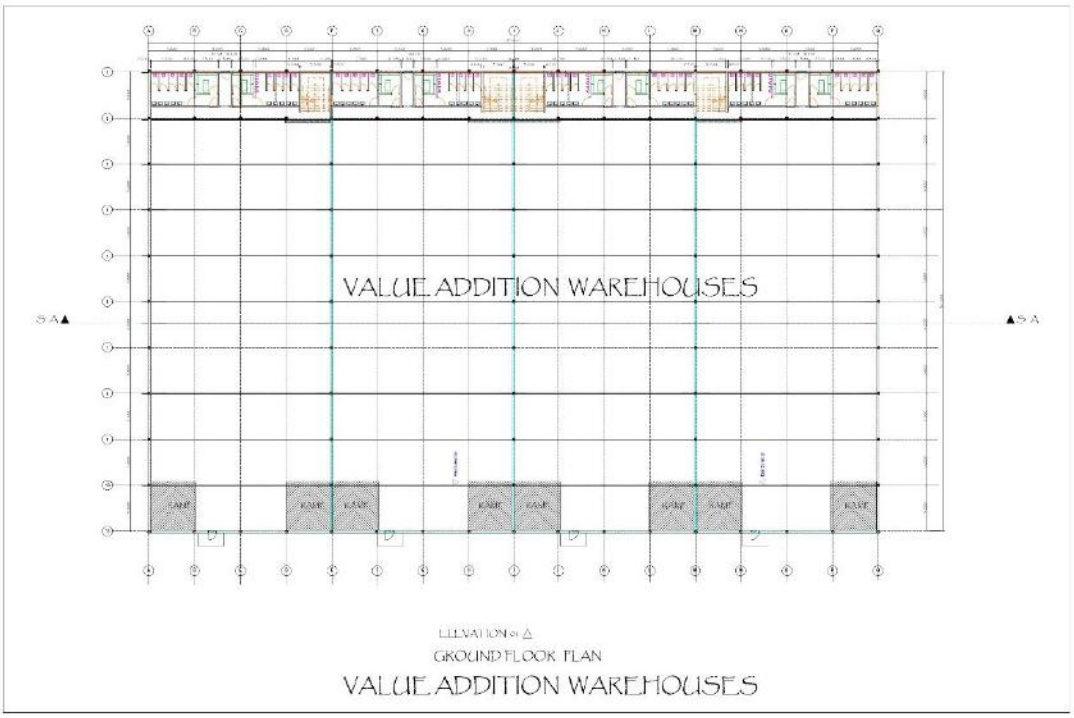

22.5 degrees roof pitch IT5 box profile roofing sheets to arch approval
+2.850
1 Story
6000x600mm steel casement window to schedule
naturalstone keyed to approval
±0.000
0 Ground Floor
SIDE ELEVATION
22.5 degrees roof pitch IT5 box profile roofing sheets to arch approval
+2.850
1 Story
+2.850
steel casement window to schedule
concrete moulding to arch approval
naturalstone keyed to approval
±0.000
0 Ground Floor
±0.000
0 Ground Floor
REAR ELEVATION

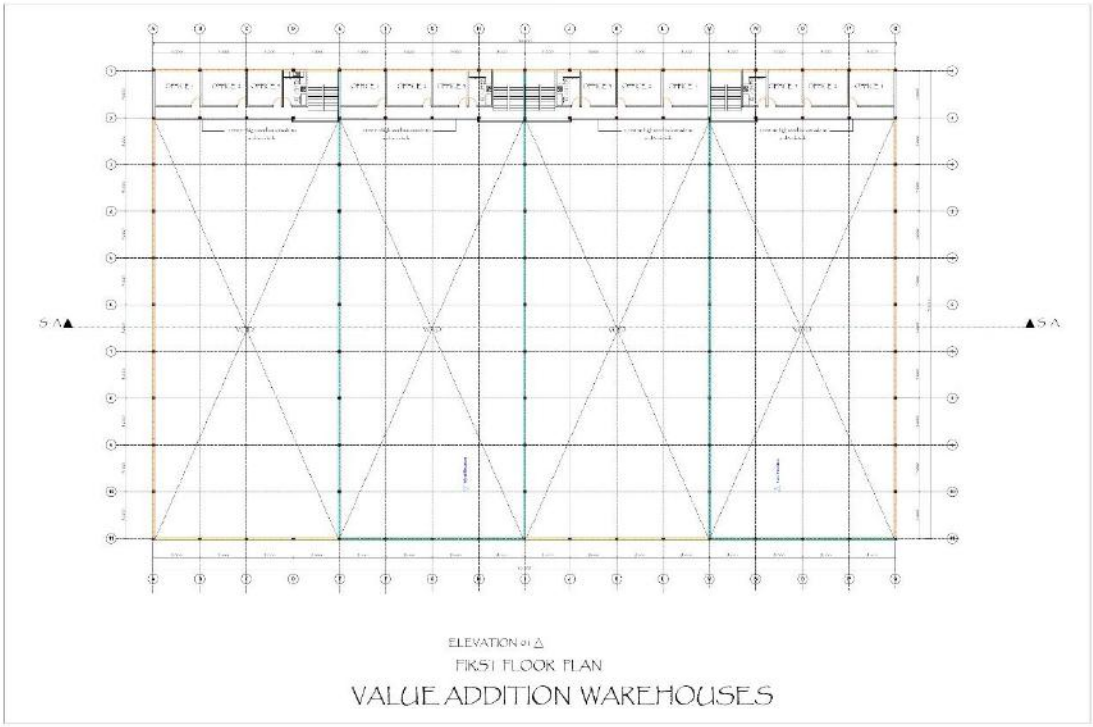

22.5 degrees roof pitch IT5 box profile roofing sheets to arch approval
+2.850
1 Story
+2.850
1 Story
steel casement window to schedule
GENTS
LADIES
2,250
naturalstone keyed to approval
±0.000
0 Ground Floor
±0.000
0 Ground Floor
FRONT ELEVATION
22.5 degrees roof pitch IT5 box profile roofing sheets to arch approval
+2.850
1 Story
+2.850
1 Story
plaster painted to approval
concrete moulding to arch approval
naturalstone keyed to approval
±0.000
0 Ground Floor
±0.000
0 Ground Floor
SIDE ELEVATION

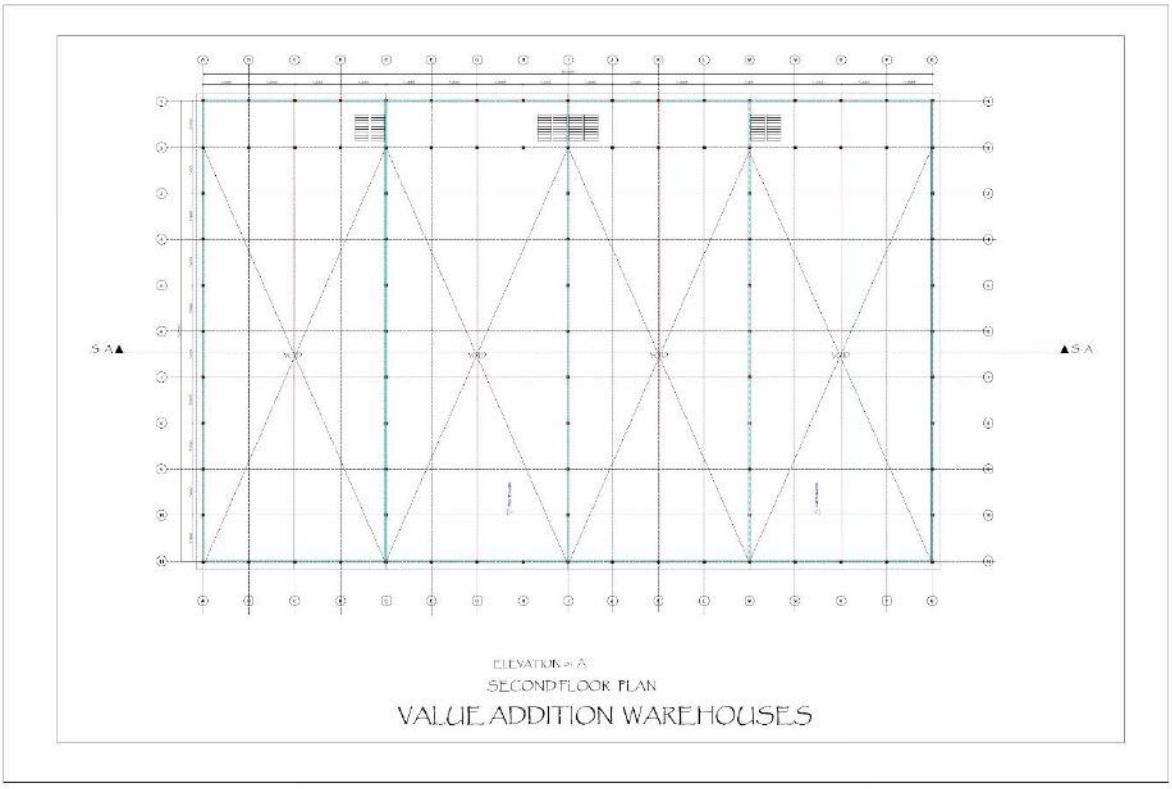

PUMPHOUSE FLOOR PLAN
SCALE 1:20
ELEVATION 01
SCALE 1:50
ELEVATION 02
SCALE 1:50
ELEVATION 03
SCALE 1:50
ELEVATION 04
SCALE 1:50
SECTION 01
SCALE 1:50
PUMPHOUSE


E-07
E-08
E-06
E-05
8,800
200
5,200
200
3,000
200
350
1,500
1,500
1,500
1,100
1,500
950
4,400
4,000
4,400
Cable Trench
450mmx600mm
TRANSFORMER ROOM
SWITCH ROOM
1,800
2,000
5,000
RAMP


ELEVATION 01
SCALE 1:50
ELEVATION 02
SCALE 1:50
ELEVATION 03
SCALE 1:50
ELEVATION 04
SCALE 1:50
SECTION 01
SCALE 1:50
PROPOSED CGK AGGREGATION WAREHOUSES
POWER HOUSE


VALUE ADDITION WAREHOUSES
S A
A S A
ELEVATION of A
GROUND FLOOR PLAN
VALUE ADDITION WAREHOUSES


S A
A S A
ELEVATION of A
FIRST FLOOR PLAN
VALUE ADDITION WAREHOUSES


ELEVATION A-A
SECOND FLOOR PLAN
VALUE ADDITION WAREHOUSES


SECTION A - A
VALUE ADDITION WAREHOUSES

Annexure 4: Bill of quantities

BILLS OF QUANTITIES FOR PROPOSED CONSTRUCTION OF COUNTY AGGREGATION AND INDUSTRIAL PARKS

ITEM	DESCRIPTION				AMOUNT (KSH)
	GRAND SUMMARY **PROPOSED CONSTRUCTION OF COUNTY AGGREGATION & INDUSTRIAL PARKS** GRAND SUMMARY				
1	PARTICULAR PRELIMINARIES				
2	GENERAL PRELIMINARIES				
3	VOL 1:MAIN WORKS (BUILDERS AND CIVIL)				
4	VOL 2:MECHANICAL INSTALLATION WORKS				
5	VOL 3:ELECTRICAL INSTALLATION WORKS				
	INCLUSIVE OF VAT				
	TOTAL AMOUNT CARRIED TO FORM OF TENDER				
	Amount in Words: …… …… Official Stamp Signed: ..... Designation: ..... Date: ..... WITNESSED BY Name…… Adress…….. Date……..				

Industrial park *GRAND SUMMARY PAGE* *2023-2024*

Annexure 5: Approval of the scoping report and Terms of Reference for the EIA study

nema
mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

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

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

REF: NEMA/TOR/5/2/732 **DATE: 31st May, 2024**

The Chief Officer
Department of Trade and Enterprise Development
County Government of Kwale
P.O Box 4-80403
KWALE

RE: TERMS OF REFERENCE (TOR) FOR ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY.

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

Pursuant to the Environmental Management and Coordination Act, 1999, the Environmental (Impact Assessment and Audit) Regulations 2003 and Legal notice 31 & 32 of 2019, your terms of reference for the Environmental Impact Assessment (EIA) for the **PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY** has been approved with the following requirements:

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

You are advised to comply accordingly.

JOSEPH MAKAU
FOR: DIRECTOR GENERAL

Annexure 6: Baseline monitoring reports for ambient air and acoustic levels

AMBIENT ATMOSPHERIC QUALITY MONITORING REPORT

ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY, KWALE COUNTY.

PROJECT INFORMATION:

PREPARED FOR:
COUNTY GOVERNMENT OF KWALE
DEPARTMENT OF TRADE AND ENTERPRISE DEVELOPMENT
P.O BOX 4-80403, KWALE, KENYA.

CLIENT ADDRESS:

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

TESTING CONSULTANTS:

DOCUMENT ID: 50124-0056 A
TEST DATES: MAY 28TH 2024
(FINAL) REPORT ISSUED: JUNE 04TH, 2024

DOCUMENT INFORMATION:

CGK	ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY, KWALE COUNTY	REPORT REF NO.: 50124-0056A REPORT TITTLE: EBSAAQMR-56A DOI: 28TH MAY 2024 PAGE NUMBER PAGE | 1

DOCUMENT REVIEW PAGE

This Technical report titled ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT AIR QUALITY MONITORING OF THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY, KWALE COUNTY was authored by Lahvens Limited in accordance to the EMC (Air Quality) Regulation 2014, Legal Notice 34.

REVISION HISTORY

03	04.06.2024	Issuance of Final Report
02	31-05-2024	Re-submission to close the given comments and approvals
01	28-05-2024	1st draft issue of the soft copy submitted for review
REV	**DATE**	DESCRIPTION

Accepted by			
Reviewed & Approved by	LOVANS ROBERT SPOO (LABORATORY DIRECTOR) N.E.R. NO.: 7165		04.06.2024
Prepared by	VINCENT AGIN - FIELD ATTENDANT		04.06.2024
	VALENTINE AGUTU - FIELD ATTENDANT		04.06.2024
PROJECT	Name	Signature	Date

DOCUMENT & PROJECT PARTICULARS

DOCUMENT REF: 50124-0056A	CLASSIFICATION: A - UNCLASSIFIED (OPEN REPORT)	CONTRACT NO. AS PER EECL TOR.	REVISION: 00 FINAL

TEST FIRM CONTACT PERSON: LOVANS SPOO: (254 - 728716948)	PROJECT: THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK	NUMBER OF PAGES: 38

AUTHOR(S): VINCENT OKUMU, VALENTINE AGUTU	QUALITY CONTROLLER: LOVANS ROBERT SPOO

ABSTRACT (ENGLISH TITTLE):
County Government of Kwale through Envasses Environmental Consultants contracted Lahvens Limited to form part of the Project's Environmental Team (ET). LAHVENS Limited was commissioned to provide consulting services of environmental baseline atmospheric quality concentrations assessment before implementation of the proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County.

KEY WORDS:
EBS Air Quality Monitoring and Consultant Reporting.

ABSTRACT (in ENGLISH) | PUBLICATION TYPE: Digital document (pdf)

CGK: ESIA Study Report for Kwale County Aggregation and Industrial Park Page 81

REVIEW AND CERTIFICATION FROM THE TESTING CONSULTANTS

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

Team Leader: VALENTINE ODUOR

Signature:

Date: 04.06.2024

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

Reviewer: LOVANS ROBERT SPOO

Title: LABORATORY DIRECTOR

Signature:

Date: 04.06.2024

CERTIFICATION FROM THE LEGAL ENTITY OF THE TESTING FACILITY:

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

Signature

07/06/2024
Date

OMAR SAID
Name Printed

MR
Tittle

Kwale County
Company Name

Company stamp

Prepared by: Envasses Environmental Consultants Limited **June 2024**

EXECUTIVE SUMMARY

Lahvens Limited, a NEMA designated laboratory, carried out the baseline ambient atmospheric environment survey at the proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County, in Kwale County on the 28th May 2024. Atmospheric Environment survey was conducted to determine the EXISTING (Do minimum) air pollution around the proposed project for Environmental, Health, Safety and compliance purposes. Air quality remains a valued component in this environmental assessment because of their fundamental significance to the well-being of humans, wildlife and vegetation.

The Ministry of Investment, Trade and Industry intends to construct County Aggregation and Industrial Parks (CAIPs) in all the 47 counties in Kenya. The main objective of the CAIPs is to grow manufacturing and investments through Agro-Industries and enhance productivity of agriculture sector in a sustainable manner hence creating inclusive decent jobs, increase farmers' income; increase foreign exchange, provide platform where farmers, processors, exporters, research in Kenya connect through Commodity Exchange (KOMEX) and Warehouse Receipting. Consequently, County Government of Kwale has received financial and technical support from the National Government to finance the construction of CAIP on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County at Latitude $4^0$24'48" S and Longitude $39^0$14'23".

We live in an age where the expansion of cities and the construction of infrastructure are synonymous with progress. However, these new buildings and facilities can lead to significant air pollution. These anticipated emissions will result from possible demolition work, the movement of machinery or the transport of construction materials. Construction or demolition works deteriorate air quality in three main ways:
Dust nuisance. The circulation of machinery, demolition operations or the loading and unloading of materials release suspended particles (PM_{10}, $PM_{2.5}$ and PM_1) that can cause health risks when inhaled, especially among the most vulnerable groups of people.

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

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

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

- To monitor the existing state of atmospheric air quality environment at predetermined survey locations of the proposed site before any construction and implementation of related works
- The results of these tests shall be used to demonstrate compliance with a set of emission concentration limit values for prescribed pollutants as specified in the EMC (Air quality) regulations 2014 during licensing and continuous assessments.
- Report the findings of the survey in a report.

Air pollution from construction is a real challenge due to the various sources and emanation of different pollutants. Clean air is essential to human health and ecosystems. Breathing clean air can lessen the possibility of disease from stroke, heart disease, lung cancer as well as chronic and acute respiratory illnesses such as asthma. Lower levels of air pollution are better for heart and respiratory health both long- and short-term. Ensuring clean air is achieved throughout the project life cycle begins with the monitoring and documentation of existing atmospheric environment.

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

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

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

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

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

It is important to accurately determine prevailing air quality conditions against which predicted effects can be gauged and assessed for any environmental effects' assessment.
Ambient air quality survey for this study consists of **four** representative monitoring locations. Information for the report is presented based on air monitoring completed for 24-hour weighted average per locale. For the purpose of the baseline investigation, monitoring of air pollutants was achieved on the 28th day of May 2024 and thereafter the results were compared against the guidelines and standards while attention given to relevant referencing sites of similar nature.
Ambient air quality data were obtained from a validated and approved air quality monitoring program.

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

FIELD NOTES AND OBSERVATIONS:

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

Sensitive receptors:

The proposed site neighbors' farmlands to the East, North East and South West, residential homes to the North and South West and River Marwa to the West. The residential homes are considered as sensitive receptors.

Potential Pollution causes;

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

Exhaust gases:

The survey location is accessible to motor vehicles and motor cycles that utilize diesel and petrol. Vehicle and motorcycle exhausts contain a number of pollutants including carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NOx), sulphur and PM_{10}.

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

Vehicular movement;

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

Significant atmospheric dust arose from the mechanical disturbance of granular soils materials exposed to the air from motor vehicle / cycle movement. Pulverization and abrasion of surface materials by application of vehicular mechanical forces generate substantial amount of dust.

Air Quality Survey Conclusions:

Baseline Atmospheric Environment Monitoring was conducted to characterize the existing environment before implementation (DO MINIMUM) of the proposed Kwale CAIP. The conclusions below were drawn from the exercise conducted on the 28th May 2024.

Gaseous Parameters:

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

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

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

The findings of the gaseous monitoring program indicate that the air quality at the proposed Kwale CAIP is generally good before commissioning of the project. All pollutants measured are at levels that do not pose Environmental, Health, Safety and compliance concern.

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

Meteorological Parameters:

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

Particulate Matter (PM_{10} and $PM_{2.5}$):

Particulate parameters concentrations (PM_{10} and $PM_{2.5}$) were measured and quantified across the survey stations.

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

$PM_{2.5}$ and PM_{10} concentration levels recorded were within the typical range of emissions for similar neighborhood.

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

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

Recommendations:

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

TABLE OF CONTENTS

DOCUMENT REVIEW PAGE 1
DOCUMENT & PROJECT PARTICULARS 1
REVIEW AND CERTIFICATION FROM THE TESTING CONSULTANTS 2
CERTIFICATION FROM THE LEGAL ENTITY OF THE TESTING FACILITY: 2
EXECUTIVE SUMMARY 3
Recommendations: 6
TABLE OF CONTENTS 7
DEFINITIONS. 9
1. INTRODUCTION 10
1.1. Project Summary and Objectives 10
1.2. Facility Description; 11
1.3. Appraisal Framework Requirements 11
1.4. Scope of Baseline Air Quality Assessment; 12
1.5. Terms of Reference 12
1.6. Justification of EBS 12
2. CONTEXT OF THE AIR QUALITY & MONITORING NETWORKS 14
2.1. Oxides of Nitrogen (NOx) 15
2.2. Carbon Monoxide (CO) 15
2.3. Sulphur Dioxide (SO2) 15
2.4. Ozone (O_3) 15
2.5. Particulate Matter (PM) 16
3. LEGISLATIVE AND ENVIRONMENTAL POLICY FRAMEWORK 17
3.1. Environmental Management Coordination (Air Quality) regulations 2014 17
4. MONITORING METHODOLOGY 18
4.1. Baseline Study Area; 18
4.1.1. Sensitive Receptors 18
4.1.2. Existing Atmospheric Environment 18
4.1.3. Monitoring Locations 19
4.2. Baseline Air Quality Assessment process 19
4.3. Assessment Criteria for gaseous and particulate parameters 20
4.3.1. Carbon monoxide (CO) 21
4.3.2. Nitrogen dioxide (NO2) 21
4.3.3. Sulphur dioxide (SO2) 22
4.3.4. Ozone (O_3) 22
4.3.5. Total Volatile Organic Compounds (TVOC) 22
4.4. Tools Equipment and materials used 22
4.5. Monitoring Frequency 23
4.6. Assumptions 23
4.7. Data Validity and Acceptability 23
5. PRESENTATION, DISCUSSION & CONCLUSION OF THE AIR QUALITY SURVEY RESULTS 24
5.1. Presentation of Results 24
5.1.1. Summary of singular Air quality measurements 24
5.1.2. Gaseous parameters 24
5.1.3. Particulate matter (PM_{10}) 25
5.1.4. Particulate matter ($PM_{2.5}$) 25
5.1.5. Environmental parameters 25
5.2. Discussions of air quality survey results 26
5.2.1. Carbon Monoxide 26
5.2.2. Sulfur dioxide 27
5.2.3. Nitrogen oxides 28

5.2.4. Ozone 29
5.2.5. Total Volatile Organic Compounds (CH_4)....30
5.2.6. Particulate matter (PM_{10})....31
5.2.7. Particulate matter ($PM_{2.5}$) 32
5.3. FIELD NOTES AND OBSERVATIONS: 33
5.3.1. Sensitive receptors 33
5.3.2. Potential Pollution causes; 33
5.4. Air Quality Survey Conclusions 33
5.5. Recommendations....34
6. REFERENCES 35

LIST OF TABLES

Table 1: List of acronyms 9
Table 2: Ambient Air Quality Tolerance Limits 17
Table 3: Description of the measurement locations....19
Table 4: Summary results for air quality and environmental measurements 24
Table 5: Average results for gaseous parameters 24
Table 6: Results for Particulate matter (<10 microns) 25
Table 7: Results for Particulate matter (<2.5 microns) 25
Table 8: Results for Environmental parameters 25

TABLE OF FIGURES

Figure 1: National Baseline Assessment Process 19
Figure 2: Local / Site Specific Baseline Assessment Process 20
Figure 3: Permapure drier unit Figure 4: Air purge gas 21

DEFINITIONS.

Table 1: List of acronyms

µg/m^3	Microgram per cubic meter
AAQTL	Ambient Air Quality Threshold Limits
AQG	Air Quality Guidelines
CBS	Comprehensive Baseline Study
CGK	County Government of Kwale
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
mg/m3	Milligram per cubic meter
NEMA	National Environment Management Authority
NO_x	Oxides of Nitrogen
NO_2	Nitrogen dioxide
PM_{10}	Particulate matter (<10 microns)
$PM_{2.5}$	Particulate matter (<2.5 microns)
SO_2	Sulfur dioxide
QAQC	Quality Assurance / Quality Control
TVOC	Total volatile Organic compounds
TWA	Time Weighted Average
WB	World bank
WHO	World Health Organization
µg/m^3	Micro gram per cubic meter
VOCs	Volatile organic compounds

1. INTRODUCTION

1.1. Project Summary and Objectives

Lahvens Limited, a NEMA designated laboratory, carried out the baseline ambient atmospheric environment survey at the proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County, in Kwale County on the 28th May 2024. Atmospheric Environment survey was conducted to determine the EXISTING (Do minimum) air pollution around the proposed project for Environmental, Health, Safety and compliance purposes. Air quality remains a valued component in this environmental assessment because of their fundamental significance to the well-being of humans, wildlife and vegetation.

The Ministry of Investment, Trade and Industry intends to construct County Aggregation and Industrial Parks (CAIPs) in all the 47 counties in Kenya. The main objective of the CAIPs is to grow manufacturing and investments through Agro-Industries and enhance productivity of agriculture sector in a sustainable manner hence creating inclusive decent jobs, increase farmers' income; increase foreign exchange, provide platform where farmers, processors, exporters, research in Kenya connect through Commodity Exchange (KOMEX) and Warehouse Receipting. Consequently, County Government of Kwale has received financial and technical support from the National Government to finance the construction of CAIP on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County at Latitude $4^0$24'48" S and Longitude $39^0$14'23".

We live in an age where the expansion of cities and the construction of infrastructure are synonymous with progress. However, these new buildings and facilities can lead to significant air pollution. These anticipated emissions will result from possible demolition work, the movement of machinery or the transport of construction materials. **Construction or demolition works deteriorate air quality** in three main ways:
Dust nuisance. The circulation of machinery, demolition operations or the loading and unloading of materials release suspended particles (PM_{10}, $PM_{2.5}$ and PM_1) that can cause health risks when inhaled, especially among the most vulnerable groups of people.

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

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

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

- To monitor the existing state of atmospheric air quality environment at predetermined survey locations of the proposed site before any construction and implementation of related works.
- The results of these tests shall be used to demonstrate compliance with a set of emission concentration limit values for prescribed pollutants as specified in the EMC (Air quality) regulations 2014 during licensing and continuous assessments.
- Report the findings of the survey in a report.

Air pollution from construction is a real challenge due to the various sources and emanation of different pollutants. Clean air is essential to human health and ecosystems. Breathing clean air can lessen the possibility of disease from stroke, heart disease, lung cancer as well as chronic and acute respiratory illnesses such as asthma. Lower levels of air pollution are better for heart and respiratory health both long- and short-term. Ensuring clean air is achieved throughout the project life cycle begins with the monitoring and documentation of existing atmospheric environment.

1.2. Facility Description;

The proposed CAIP on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County at Latitude $4^0$24'48" S and Longitude $39^0$14'23". The proposed site neighbors' farmlands to the East, North East and South West, residential homes to the North and South West and River Marwa to the West.

The proposed project will involve the construction and operation of Kwale County Aggregation and Industrial Park (CAIP). It will comprise of double volume warehouses featuring aggregation and cold storage areas as wells as auxiliary facilities which include office, ablution blocks, water supply and parking among others.

1.3. Appraisal Framework Requirements

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

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

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

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

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

According to the EMC (IMPACT ASSESSMENT AND AUDIT) regulations 2003 framework legal notice 101 PART IV, THE ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT section 18 which states that *(1) A*

proponent shall submit to the Authority, an environmental contents of impact assessment study report incorporating but not limited to the environmental following information; - (b) a concise description of the national environmental legislative and regulatory framework, ***baseline information.*** PART VI - MISCELLANEOUS PROVISIONS section 43 (2) states that *the proposed policy, programme or plan specified in this regulation shall state - (d) an environmental analysis covering: (i)* ***baseline information focusing on areas potentially affected****.*

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

1.4. Scope of Baseline Air Quality Assessment;

The baseline air quality report includes the National and local assessments. At the National scale the assessment considers the total mass emission of general pollutants associated with construction activities. These are sulfur dioxide (SO_2), Nitrogen oxide (NO_x), Ozone (O_3), Particulate Matter (PM_{10} and $PM_{2.5}$) - particles with aerodynamic diameters of less than 10 and 2.5 microns respectively. Background information on these pollutants and why they are of concern is summarized in section 2 'CONTEXT OF THE AIR QUALITY & MONITORING NETWORK'. The current concentrations of these pollutants are at risk of exceeding their respective Air Quality Limit Values during construction, commissioning and decommissioning phases. The estimates of the existing concentrations will be measured and compared to any relevant existing information and when the project commences, will be used as the background data. Relevant available information related to the pre-development ambient air concentration in the environment was looked into while identifying the major existing air emission sources in the environment and the existing sensitive pollution areas in the environment.

1.5. Terms of Reference

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

- Review of the legal context relating to air pollutants;
- Evaluation of site meteorology;
- Monitoring of background air quality:
  Particulate Matter (PM) - particulate matter with aerodynamic diameter less than 10 microns and 2.5 microns (PM_{10} and $PM_{2.5}$).
  Gases - sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon dioxide (CO_2) Total Volatile Organic Compounds (TVOC) and Ozone (O_3).

1.6. Justification of EBS

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

The environmental baseline study will collect, assess, and interpret enough physical and chemical atmospheric information to: support the characterization of the atmospheric resource; enable determination of possible impacts; help predict the significance of impacts and the effectiveness of any

proposed mitigation; establish thresholds for indicators of ecosystem health; and facilitate the design of monitoring programs.

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

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

The CBS is being prepared as part of an environmental Social Impact assessment (ESIA) and approval process.

2. CONTEXT OF THE AIR QUALITY & MONITORING NETWORKS

Clean air is essential to human health and ecosystems. Five categories of general pollutants were measured at the monitoring networks at the proposed site in Kwale county. The monitored categories of pollutants were sulphur dioxide (SO_2); oxides of nitrogen (NO_x) (which includes nitric oxide (NO) and nitrogen dioxide (NO_2)); carbon monoxide (CO); Total Volatile Organic Compounds (TVOC); ozone (O_3); 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}). The EB study includes monitoring over a 4-hour period for the above pollutants.

Construction or demolition works deteriorate air quality in three main ways: **Dust nuisance**. The circulation of machinery, demolition operations or the loading and unloading of materials release suspended particles (PM10, PM2.5 and PM1) that can cause health risks when inhaled, especially among the most vulnerable groups of people; **Atmospheric emissions** from machinery. Machinery on a construction site generates noise, dust and gases such as NOx or CO; **Transport of construction materials** - the handling of construction materials also contributes to higher pollution levels, especially in the case of particulate matter.

Air pollution from construction is a real challenge due to the various sources and emanation of different pollutants. In this respect, particulate matter is one of the most harmful emissions. Their hazardous nature derives from their size, for example, particles ranging from 10 microns (PM_{10}) to 1 micron (PM_1). In addition to this characteristic, sometimes the nature of the particle must also be taken into account, since, in the case of asbestos, silica or wood, it can represent an added risk factor. However, detailed analyses are necessary to ascertain this.

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

- Ecological impacts: pollutants from construction activities can alter the quality of water resources. But they can also affect the vegetation and animal species that make up ecosystems and upset the ecological balance.
- Impact on public health: the emissions mentioned in the previous section may have a significant impact on local communities and inhabited areas in the vicinity of the construction site.
- Climate connection: the soot or black carbon which is part of fine particulate matter (PM2.5) absorbs sunlight, thus contributing to global warming.

Having clean air to breathe is necessary for good health. Poor air quality reduces quality of life. Some air pollutants are irritants. Some smell bad. Some air pollutants can cause respiratory disease or even cancer. Air quality is important both indoors and outdoors. Ground level ozone, particulate matter and allergens are common outdoor air pollutants. Air in its purest state is best suited for the essential task sustaining life. Air pollution is a major environmental risk to health. Air pollution can trigger heart attacks or strokes. In fact, one in three persons who have heart disease can be potentially worsened by air pollution. Breathing clean air can lessen the possibility of disease from stroke, heart disease, lung cancer

as well as chronic and acute respiratory illnesses such as asthma. Lower levels of air pollution are better for heart and respiratory health both long- and short-term.

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. 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.

2.3. 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.

2.4. 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.

2.5. Particulate Matter (PM)

Particulate matter is the term for particles and aerosols found in the air, including dust, dirt, soot, smoke, and liquid droplets, and can be large and dark enough to be seen with the naked eye or so small that they can only be detected with an electron microscope. Particulate matter is one of the most harmful emissions. Their hazardous nature derives from their size, for example, particles ranging from 10 microns (PM_{10}) to 1 micron (PM_1). In addition to this characteristic, sometimes the nature of the particle must also be taken into account, since, in the case of asbestos, silica or wood, it can represent an added risk factor. However, many manmade and natural sources emit particulate matter directly while others emit gaseous pollutants that react in the atmosphere to form particulate matter. The size of the particulate has important health considerations. Particulate matter less than or equal to 10 microns in diameter (PM_{10}) poses a health concern because it can be inhaled into and accumulate in the respiratory system. Particulate matter less than or equal to 2.5 microns in diameter (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 $1/30^{th}$ 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.

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, 0_3 and CO. Statutory requirements relevant to this study FIRST SCHEDULE are detailed in Table 2 below:

Table 2: Ambient Air Quality Tolerance Limits

	Pollutant	Time weighted Average	Industrial area	Residential, Rural & Other area	Controlled areas***
1.	Respirable particulate matter (<10 µg/m^3) (RPM)	24 hours**	150µg/Nm^3	100µg/Nm^3	75µg/Nm^3
2.	$PM_{2.5}$	24 hours	75 µg/m^3	-	-
3.	Sulphur dioxide	Instant Peak		500 µg/m^3	-
4.		Instant peak (10min)		0.191 ppm	-
5.	Non-methane hydrocarbons	instant Peak	700ppb	-	-
6.	Total VOC	24 hours**	600 µg/m^3	-	-
7.	Oxides of Nitrogen	24 hours	100 µg/m^3	0.1 PPM	-
8.		Instant peak		0.5 PPM	-
9.	Nitrogen dioxide	One hour		0.2 ppm	-
		Instant peak		0.5 ppm	-
10.	Carbon monoxide / carbon dioxide	One Hour	10 mg/m^3	4.0 mg/m^3	10 mg/m^3
11.	Ozone	24-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 consists of **four** representative monitoring locations. Information for the report is presented based on air monitoring completed for 24-hour weighted average per locale. For the purpose of the baseline investigation, monitoring of air pollutants was achieved on the 28th day of May 2024 and thereafter the results were compared against the guidelines and standards while attention given to relevant referencing sites of similar nature.
Ambient air quality data were obtained from a validated and approved air quality monitoring program.

4.1. Baseline Study Area;

4.1.1. Sensitive Receptors

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

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

The proposed site neighbors' farmlands to the East, North East and South West, residential homes to the North and South West and River Marwa to the West. The residential homes are considered as sensitive receptors.

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

4.1.2. Existing Atmospheric Environment

The proposed site lies in the the coastal plain and characterized by soils ranging from sandy to loamy and their complexes. The neighborhood depicts mixed land use including residential areas and farmlands. The main source of existing air pollution is diffuse and fugitive emissions of dust particles and gaseous emissions from the mobile sources. The anthropogenic emission sources directly associated with the proposed project will be the main concern of the appraisal framework and will be emitted from various sources including; mobile sources (cars and heavy goods vehicles that will be accessing the site to offload materials during construction, source emissions (generator), other related fugitive and diffuse sources. However, exposure locations will also be influenced by non-related sources including domestic heating around the residential facility.

The emissions concentrations reported herein, will be a combination of the total emissions from the sources and the distance to the receptor which influences the concentrations of pollutants in the air and impacts air quality. As such, the most common ambient atmospheric emission source causing poor air

quality within close proximity to sensitive receptors and the site in general will be diffuse and fugitive emissions as the dominant emission sources.

4.1.3. Monitoring Locations

Baseline atmospheric quality monitoring locations were selected based on the existing facility that could or have the potential to influence the proposed project atmospheric environment. The monitoring locations at the proposed project site were determined at the four project boundaries to the East (PB-1), West (PB-2), North (PB-3) and South (PB-4).

Table 3: Description of the measurement locations

Measurement Sites	Receivers	Description of monitoring Locations	Dates of sampling
East Project Boundary 1 (EPB-1) 4°24'48" S 39°14'23" E	Farmlands	The proposed site lies in the the coastal plain and characterized by soils ranging from sandy to loamy and their complexes. The neighborhood depicts mixed land use including residential areas and farmlands.	28TH May 2024.
West Project Boundary 2 (WPB-2) 4°24'48" S 39°14'23" E	River Marwa & Residential homes.		28TH May 2024.
North Project Boundary 3 (NPB-3) 4°24'48" S 39°14'23" E	Residential homes and farmlands		28TH May 2024.
South Project Boundary 4 (SPB-4) 4°24'48" S 39°14'23" E	Farmlands		28TH May 2024.

4.2. Baseline Air Quality Assessment process

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

Figure 1: National Baseline Assessment Process

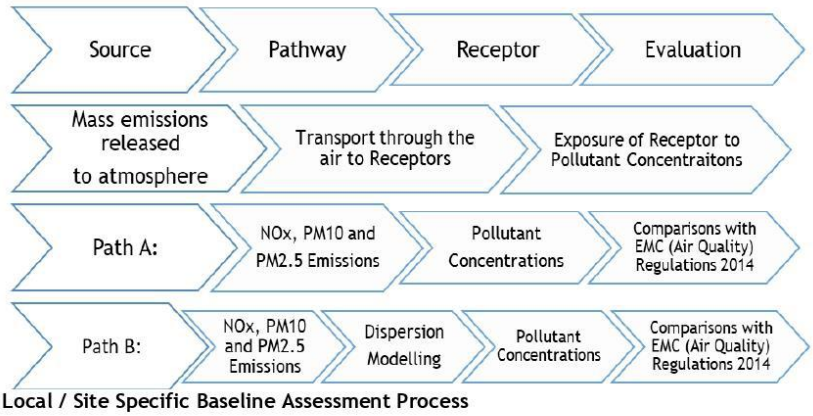
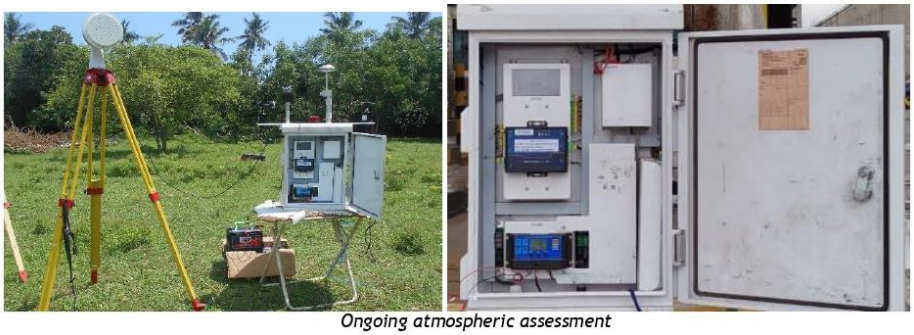


Figure 2: Local / Site Specific Baseline Assessment Process

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

4.3. Assessment Criteria for gaseous and particulate parameters

Sampling of gases was done using a 24-hour AQM-09 is a device which can monitor the air quality via the value of O_3, SO_2, NO_2, CO, $PM_{2.5}$, PM_{10}, etc. The target value is converted into voltage signal by operational amplifier circuit, and then filtered through high-precision AD data acquisition system. Finally, the gas concentration is calculated by CPU. Particulates mainly use laser scattering method to produce different scattering light according to different particle diameters under laser scattering conditions. The scattered light intensity is collected by a response device, and the particle 4 concentration is obtained after amplification, filtering and AD acquisition. The obtained gas concentration and particulate matter concentration can be displayed on LCD screen in real time, and can also be transmitted to cloud platform or environmental protection platform through GPRS, 4G LTE and other network signals, so as to realize the monitoring of regional environmental quality. The gas meters were mounted at about 1 - 2 M above the ground surface. The results and sampling duration information were used to calculate the gaseous concentrations.



Ongoing atmospheric assessment

4.3.1. Carbon monoxide (CO)

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

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

$$I1 = I0\ e\text{-}alc$$

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

4.3.2. Nitrogen dioxide (NO2)

Nitric oxide (NO) in the sample air stream was reacted with ozone (O_3) in an evacuated chamber to produce activated NO_2:

$$NO + O_3 \rightarrow NO_2 + O_2 \rightarrow NO_2 + O_2 + hv$$

The intensity of the chemiluminescent radiation (hv) produced is measured using a photomultiplier tube (PMT) or photodiode detector. The detector output voltage is proportional to the NO concentration. The ambient air sample is divided into two streams; in one, ambient NO_2 is reduced to NO using a molybdenum catalyst before reaction. The molybdenum converter should be at least 95 per cent efficient at converting NO_2 to NO. This gas stream gives total NOx. The second stream measures NO directly by not passing through the molybdenum converter.

Separate measurements are made of total oxides of nitrogen NOx (= NO + NO_2) and NO. The ambient NO_2 concentration is calculated from the difference (NO_2= NOx - NO). This is an important point to remember because the contaminant of interest (NO_2), is actually measured by inference rather than directly, and the efficiency of the molybdenum converter should be checked on a regular basis.

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

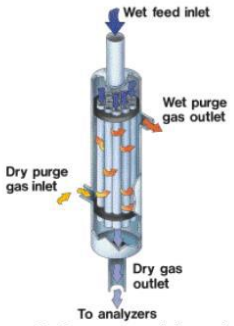


Figure 3: Permapure drier unit

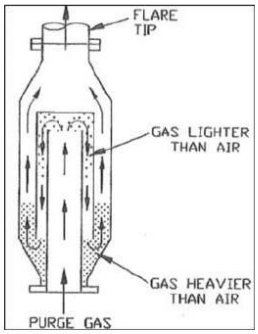


Figure 4: Air purge gas

4.3.3. Sulphur dioxide (SO2)

SO_2 monitoring instruments are predominantly molecular UV fluorescence analyzers. This is the recommended SO_2 monitoring method. UV fluorescence systems operate on the principle that an ambient air sample stream exposed to UV light excites SO_2 molecules in the sample to higher, but unstable, excited states. These excited states decay, giving rise to the emission of secondary (fluorescent) radiation:

$$SO_2 + hv \rightarrow SO_2 \rightarrow SO_2 + hv \text{ (fluorescence)}.$$

The fluorescent radiation is detected by a PMT, causing an output voltage proportional to the SO_2 concentration. A permeable membrane 'kicker' is used to remove interfering hydrocarbons (aromatic hydrocarbons also fluoresce) before reaction. Ambient air is drawn through the system via a pump unit, and the analyzer continuously displays current SO_2 concentrations.

4.3.4. Ozone (O_3)

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

4.3.5. Total Volatile Organic Compounds (TVOC)

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

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

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

where: I—light intensity transmitted by the medium with the gas, I_0—intensity of light incident on the medium, C—concentration, a, α—absorption coefficients, and L—optical path length, gas concentration.

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

4.4. Tools Equipment and materials used

Below is the equipment used during air monitoring survey:

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

4.5. Monitoring Frequency

Monitoring of air quality test parameters was done for 24 hours in the study location. Once operations are underway, monitoring of air quality parameters should be tested at 3 months' interval.

4.6. Assumptions

The 24-hour exposure levels of data collection for PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO_2, O_3 and TVOC data collected is considered sufficient to understand the state of atmospheric air quality environment before implementation of the proposed Kwale CAIP.

4.7. Data Validity and Acceptability

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

Elements of this procedure account for:

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

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 °C
East Project Boundary 1 (EPB-1)	11	19	<0.001	0.016	0.010	0.035	0.038	<0.01	70	31
West Project Boundary 2 (WPB-2)	13	20	<0.001	0.014	0.008	0.032	0.036	<0.01	69	31
North Project Boundary 3 (NPB-3)	15	22	<0.001	0.018	0.011	0.039	0.037	<0.01	69	32
South Project Boundary 4 (SPB-4)	12	18	<0.001	0.017	0.009	0.030	0.035	<0.01	69	32

(Source: Site monitoring in May 2024).

5.1.2. Gaseous parameters

Table 5: Average results for gaseous parameters

Monitoring Locations	*NO_x*		*SO_2*		*CO*		*Ozone*		*TVOC*		*REMARKS*
	Conc. (ppm)	EMC AQR guide 2014 (ppm)	Conc. (ppm)	EMC AQR guide 2014 (ppm)	Conc. (mg/m³)	EMC AQR guide 2014 (mg/m³)	Conc. (ppm)	EMC AQR guide 2014 (ppm)	Conc. (µg/m³)	EMC AQR guide 2014 (ppm)	
EPB-1	0.045	0.4	0.016	0.048	<0.001	2	0.038	1.25	<0.01	600	Complies
WPB-2	0.040	0.4	0.014	0.048	<0.001	2	0.036	1.25	<0.01	600	Complies
NPB-3	0.050	0.4	0.018	0.048	<0.001	2	0.037	1.25	<0.01	600	Complies
SPB-4	0.039	0.4	0.017	0.048	<0.001	2	0.035	1.25	<0.01	600	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
EPB-1	24 hour	19	100	Complies
WPB-2	24 hour	20	100	Complies
NPB-3	24 hour	22	100	Complies
SPB-4	24 hour	18	100	Complies

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
EPB-1	24 hour	11	-	No 24-Hr guideline for residential, rural and other areas
WPB-2	24 hour	13	-	No 24-Hr guideline for residential, rural and other areas
NPB-3	24 hour	15	-	No 24-Hr guideline for residential, rural and other areas
SPB-4	24 hour	12	-	No 24-Hr guideline for residential, rural and other areas

5.1.5. Environmental parameters

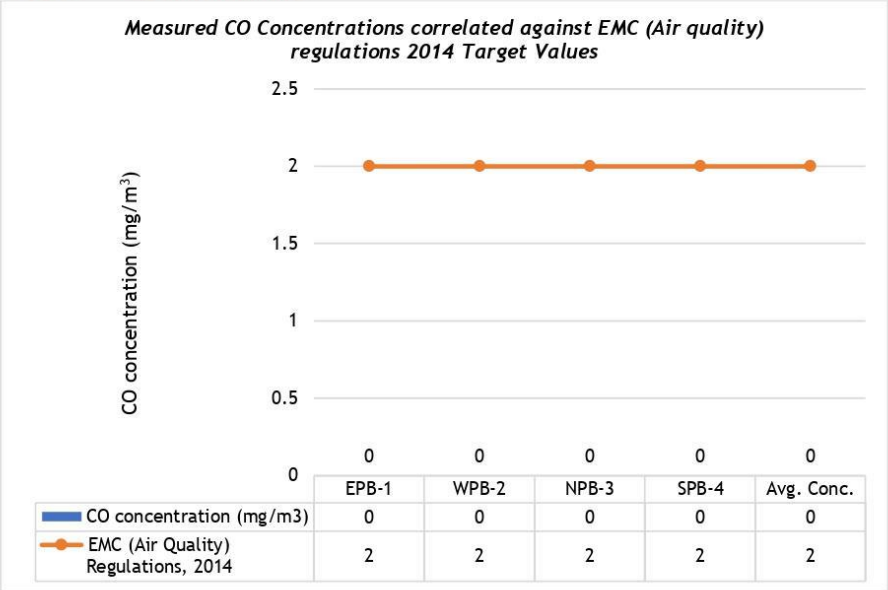
Table 8: Results for Environmental parameters

Monitoring Locations	Environmental parameters				*Remarks*
	Air temps °C	Pressure hPa	Humidity %	Wind Speed km/hr	
EPB-1	31	1009.7	70	9 km/hr North east wind	Ambient conditions present
WPB-2	31	1009.7	69	8 km/hr North east wind	Ambient conditions present
NPB-3	32	1009.7	69	9 km/hr North east wind	Ambient conditions present
SPB-4	32	1009.7	69	9 km/hr North east wind	
AVERAGES	31.5	1009.7	69.25	8.75 km/hr North east wind	Ambient conditions present

5.2. Discussions of air quality survey results

Air quality survey was completed for 24-hr exposure levels as the preferred time weighted averages in order to measure and quantify the air pollutant levels so as to determine the current existing conditions. Results of the gaseous concentrations and particulate parameters were thereafter correlated against the Environmental Management Coordination (Air quality) regulations of 2014 as follows:

5.2.1. Carbon Monoxide



The above combined graph was drawn from statistical analysis for 24-hr monitoring per location of atmospheric Carbon monoxide environment as per the requirement of TOR.

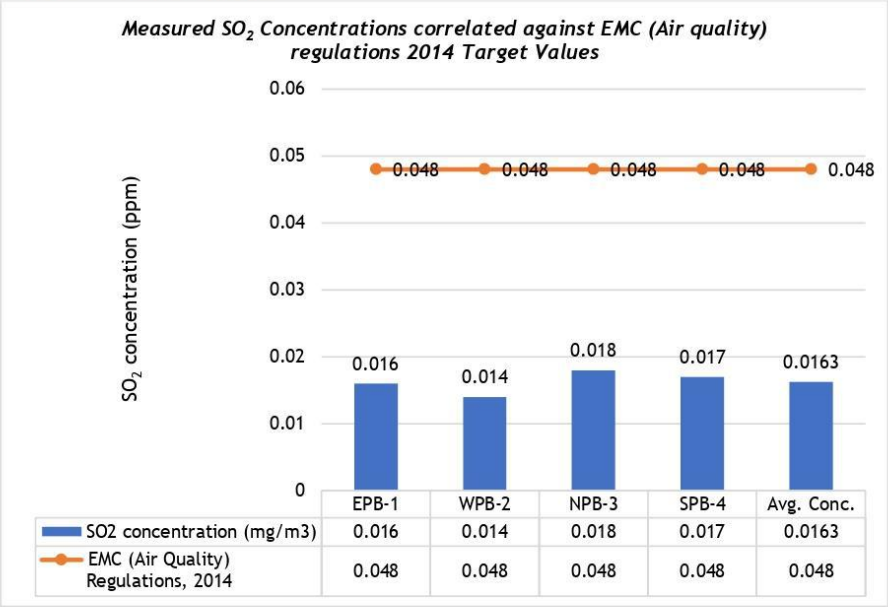
CO average concentration across the monitoring locations for the TWA of 24-hour were below the detection limit (0.001 mg/m^3) of the testing equipment. There was no 8-hour peak exceedance of the AAQTL of 2.0 mg/m^3 thus the frequency of exceedance was zero.

All CO concentrations recorded in the sites BEFORE IMPLEMENTATION OF Kwale CAIP COMPLIED with the EMC (Air quality) regulations 2014 of 2.0 mg/m^3.

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

From the above combined graph results, the levels of CO emitted from the proposed site operations does not negatively influence the Environment, health and safety of the recipients / receivers.

5.2.2. Sulfur dioxide



The above combined graph was drawn from statistical analysis for 24-hr monitoring per location of atmospheric sulfur dioxide environment as per the requirement of TOR.

From the above graph, the maximum 24-hour SO_2 average concentration extended to levels 0.018 ppm at NPB-3 while the minimum 24-hour SO_2 average concentration extended to levels of 0.014 ppm at WPB-2. The average SO_2 concentration at the study area extended to levels of 0.0163 ppm. There was no peak exceedance of the AAQTL of 0.048 ppm thus the frequency of exceedance was zero.

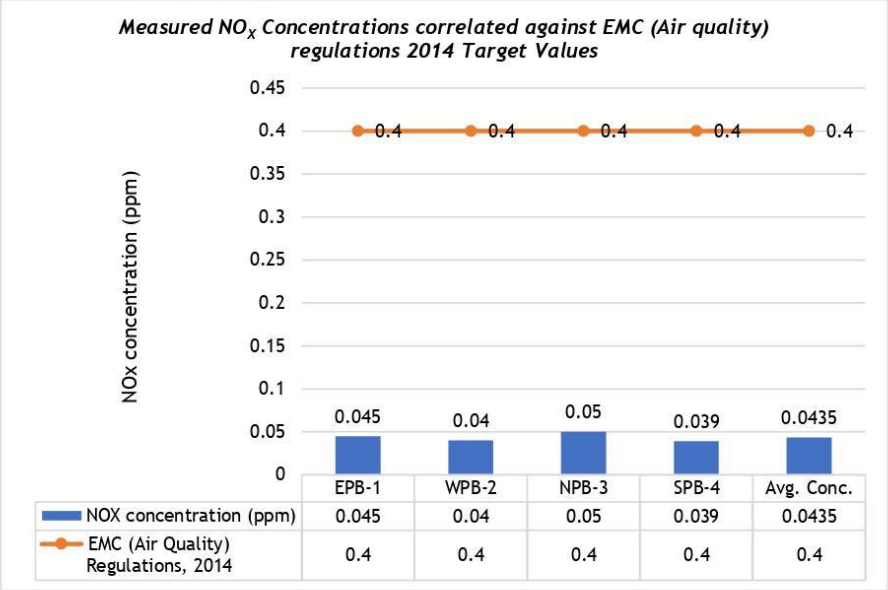
The sulfur dioxide concentrations recorded across all survey locations had concentrations levels below the ambient sulfur dioxide levels of 0.02ppm.

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

Low concentration levels of sulfur dioxide recorded before implementation of the proposed Kwale CAIP did not pose any Environmental, Health, Safety and compliance concerns.

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

5.2.3. Nitrogen oxides



The above combined graph was drawn from statistical analysis for 24-hr monitoring per location of atmospheric nitrogen oxides (NO2+NO) environment as per the requirement of TOR.

From the above graph, the maximum 24-hour NO_X concentration extended to levels of 0.05 ppm at NPB-3 while the minimum 24-hour NO_X concentration extended to levels of 0.039 ppm at SPB-4 area. The average NO_X concentration at the study area extended to levels of 0.0435 ppm. There was no peak exceedance of the AAQTL of 0.4 ppm thus the frequency of exceedance was zero.

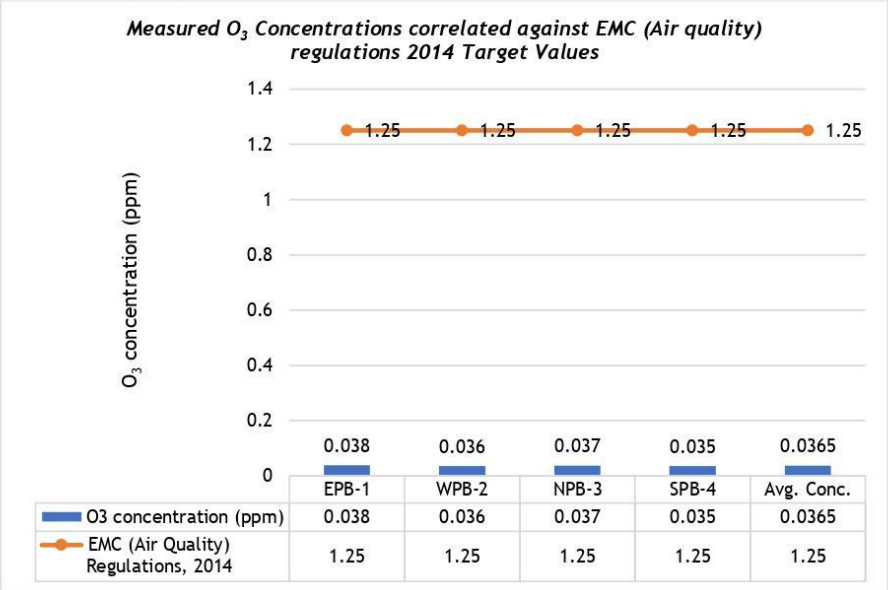
The concentration levels of all recorded nitrogen oxide gas within the 24-hour survey were all below the ambient levels (0.05ppm). The uniform distribution of the Nitrogen oxide concentration reveals that no outlier source influenced the NO_X concentration.

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

The very low NO_x concentration levels did not pose any Environmental, Health, Safety and compliance concerns to the receiving recipients.

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

5.2.4. Ozone



	EPB-1	WPB-2	NPB-3	SPB-4	Avg. Conc.
O3 concentration (ppm)	0.038	0.036	0.037	0.035	0.0365
EMC (Air Quality) Regulations, 2014	1.25	1.25	1.25	1.25	1.25

The statistical analysis for 24-hr monitoring of ozone as outlined in the TOR was completed at four boundary monitoring locations.

From the above graph, the maximum 24-hour ozone concentration extended to levels of 0.038 ppm at EPB-1 while the minimum 24-hour ozone concentration extended to levels of 0.035 ppm at the SPB-4. The average O_3 concentration at the study area extended to levels of 0.0365 ppm. There was no exceedance of the 24-hour AAQTL of 1.25 ppm thus the frequency of exceedance was zero.

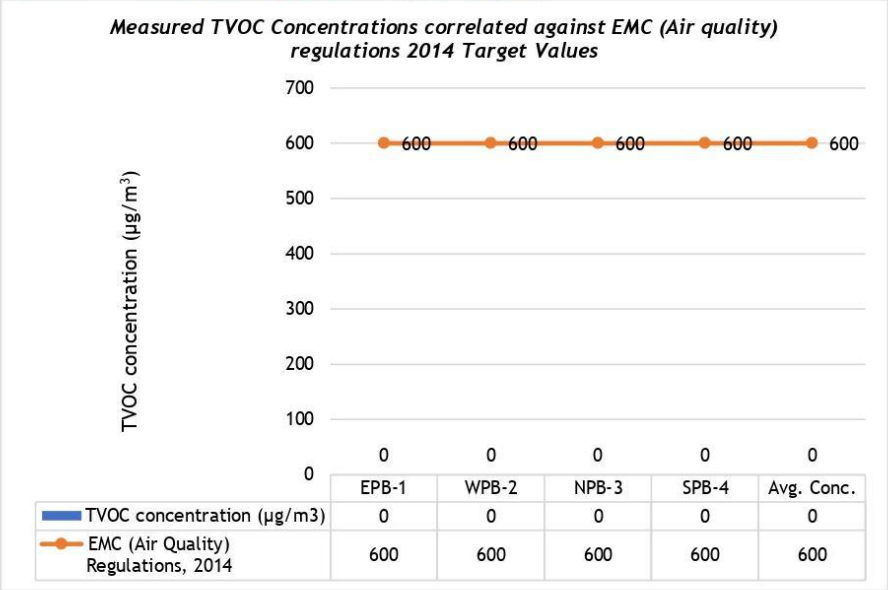
All ozone concentrations recorded in the project sites complied with the EMC (Air quality) regulations.

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

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

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

5.2.5. Total Volatile Organic Compounds (CH_4)



The statistical analysis for 24-hr monitoring of TVOC as outlined in the TOR was completed at each of the three monitoring locations.

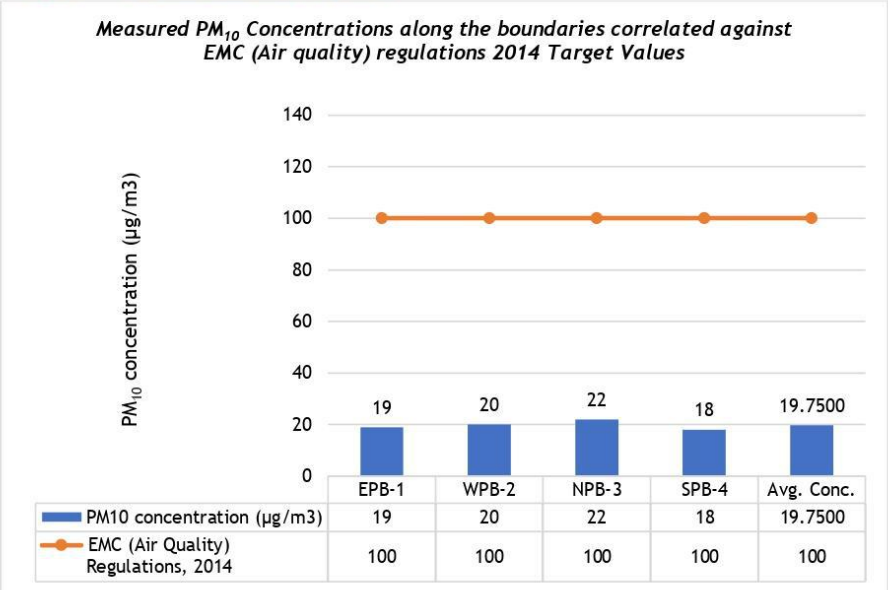
The average TVOC concentration across the monitoring locations for the TWA of 24-hour were below the detection limit (0.001 µg/m^3) of the testing equipment. There was no 24-hour peak exceedance of the AAQTL of 600 µg/m^3 thus the frequency of exceedance was zero.

All TVOC concentrations recorded in the proposed project site before implementation of Kwale CAIP COMPLIED with the EMC (Air quality) regulations 2014 of 600 µg/m^3.

The concentration values of TVOC recorded were considered to be within the typical range of emissions for such neighborhood.

The very low TVOC concentration levels do not pose any notable Environmental, Health, Safety and compliance concerns to the sensitive receptors.

5.2.6. Particulate matter (PM_{10})



The statistical analysis for the combined 24-hr monitoring of Particulate matter <10 ug/m^3 as outlined in the TOR was completed.

From the above graph, the maximum 24-hour PM_{10} concentration across NPB-3 section extended to levels of 22.0 ug/m^3 while the minimum 24-hour PM_{10} concentration along the SPB-4 section extended to levels of 18.0 ug/m^3. The overall average PM_{10} concentrations of the project area over the 24-hour assessment extended to levels of 19.75 ug/m^3. The uniform distribution of the Nitrogen oxide concentration reveals that no outlier sources influenced the PM_{10} concentration.

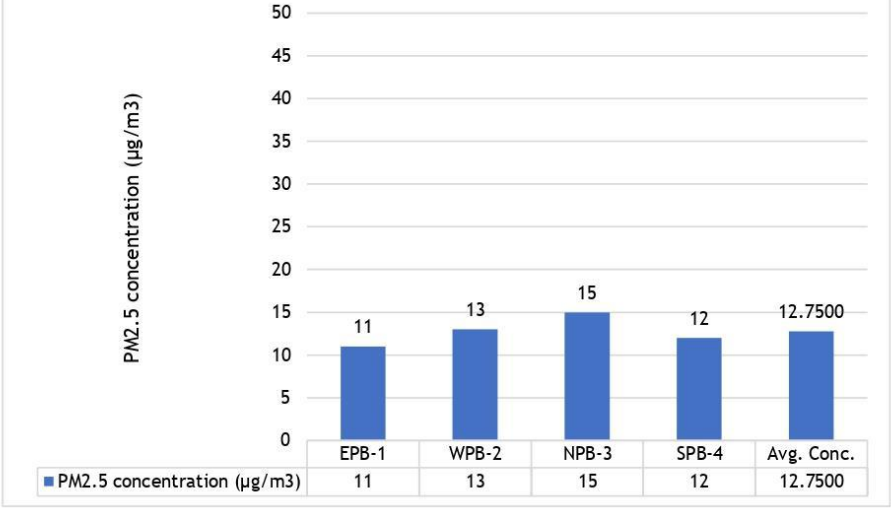
There was no peak exceedance of the AAQTL of 100 ug/m^3 thus the frequency of exceedance was zero. The results for the PM_X) concentrations measured below the air quality guidelines limits. The concentration of PM_{10} at the survey locations were 100.00% in compliance of the EMC (Air quality) regulations 2014 maximum limits.

Unlike the individual gaseous pollutants, which are single, well-defined substances, particles (PM_{10}) in the atmosphere are composed of a wide range of materials arising from a variety of sources. Concentrations of PM_{10} comprise: primary particles, arising from combustion sources (mainly motor vehicles emissions, which in the proposed site contribute -70%); secondary particles, mainly sulphate and nitrate formed by chemical reactions in the atmosphere; and coarse particles, suspended soils and dusts, biological particles and particles from construction work and marram roads. The relative contribution of each source type varies from day to day, depending on meteorological conditions and quantities of emissions from mobile and static sources.

From the above combined graph results, the levels of PM_{10} released through existing proposed site operations does not pose Environment, health, safety and compliance concerns before implementation of the proposed Kwale CAIP.

5.2.7. Particulate matter ($PM_{2.5}$)

Measured $PM_{2.5}$ Concentrations along the two boundaries and Proposed Project Area in May 2024.



The statistical analysis for the 24-hr monitoring of particulate matter $PM_{2.5}$ as outlined in the TOR was completed at four survey locations.

From the above graph, the peak 24-hour $PM_{2.5}$ concentration extended to levels of 15 µg/Nm^3 at NPB-3. Similarly, the minimum 24-hour $PM_{2.5}$ concentration extended to levels of 11 µg/Nm^3 at EPB-1 section.

There are No 24-Hour guideline for residential, rural and other areas given under the EMC (Air quality) regulations 2014 for comparison of results. No comparisons were made against the regulation. However, the concentration values of $PM_{2.5}$ recorded seems to be within the typical range of emissions for such neighborhood.

The main sources of atmospheric particulate matter were primarily the burning of fuel from automobile movements.

The fine particle fraction ($PM_{2.5}$) is composed predominantly of primary and secondary particles. Particles in the range from $PM_{2.5}$ - PM_{10} generally consist of coarse particles.

From the above combined graph results, the levels of $PM_{2.5}$ released through existing proposed site operations does not pose any Environment, health, safety and compliance concerns to the recipients / receivers before implementation of the proposed CAIP.

5.3. FIELD NOTES AND OBSERVATIONS:

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

5.3.1. Sensitive receptors

The proposed site neighbors' farmlands to the East, North East and South West, residential homes to the North and South West and River Marwa to the West. The residential homes are considered as sensitive receptors.

5.3.2. Potential Pollution causes;

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

Exhaust gases:

The survey location is accessible to motor vehicles and motor cycles that utilize diesel and petrol. Vehicle and motorcycle exhausts contain a number of pollutants including carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NOx), sulphur and PM_{10}.

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

Vehicular movement;

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

Significant atmospheric dust arose from the mechanical disturbance of granular soils materials exposed to the air from motor vehicle / cycle movement. Pulverization and abrasion of surface materials by application of vehicular mechanical forces generate substantial amount of dust.

5.4. Air Quality Survey Conclusions

Baseline Atmospheric Environment Monitoring was conducted to characterize the existing environment before implementation (DO MINIMUM) of the proposed Kwale CAIP. The conclusions below were drawn from the exercise conducted on the 28th May 2024.

Gaseous Parameters:

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

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

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

The findings of the gaseous monitoring program indicate that the air quality at the proposed Kwale CAIP is generally good before commissioning of the project. All pollutants measured are at levels that do not pose Environmental, Health, Safety and compliance concern.

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

Meteorological Parameters:

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

Particulate Matter (PM_{10} and $PM_{2.5}$):

Particulate parameters concentrations (PM_{10} and $PM_{2.5}$) were measured and quantified across the survey stations.

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

$PM_{2.5}$ and PM_{10} concentration levels recorded were within the typical range of emissions for similar neighborhood.

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

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

5.5. Recommendations

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

6. REFERENCES

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

APPENDIX A: EQUIPMENT CALIBRATION CERTIFICATES

Calibrate report

Product	Air Quality Monitor System	**Model**	AQM-09
Quantity	**1pcs**	**Cali date**	**May. 31, 2023**
Product No.	OC202305315000061		
Appearance	☑Clean ☑Non corrosive ☑No damage		
Gas type	NO2:ppb; SO_2:ppb; CO:ppm; O3:ppb; H2S:ppm VOC:ppm; NO:ppb; PM2.5:ug/m³; PM10:ug/m³; TSP: ug/m³ Noise:dB; Wind veloci: m/s; Wind direct:° Temperature and humidity: ℃/%RH		
Accuracy	±3%F.S		
resolution	0.1ppm 1ppb 1ug/m³		
Response time	≤30S		
Survey range	NO2:0-2000ppb; SO_2:0-2000ppb; CO:0-200ppm O3:0-2000ppb; H2S:0-100ppm; VOC:0-50ppm NO:0-2000ppb; PM2.5:0-1000ug/m³; PM10:0-1000ug/m³ Noise:030-130dB; TSP:0-1000ug/m³ Windveloci:0-30m/s; Winddirect:0-360° Temperature: -20-50℃; Humidity:0%-100%RH		
Signal output mode	4G LTE		
Power supply voltage	AC 240V/50Hz		
Power dissipation	≤ 30W		
Working temperature and humidity range	-20℃-50℃ / 0%RH-100%RH		
Testing condition indoor	Temperature: 25℃ Humidity: 60%RH		
Calibration gas	CO SO2 O3 NO2 H2S C4H8 NO		
Cali gas test	1.CO: Cali gas concentration: 100 ppm; Inspect concentration: 99.7 ppm 2.SO_2: Cali gas concentration: 1200 ppb; Inspect concentration: 1198 ppb 3.O3: Cali gas concentration: 1600 ppb; Inspect concentration: 1589 ppb 4.NO2: Cali gas concentration: 1000ppb; Inspect concentration: 1000 ppb 5.NO: Cali gas concentration: 1000ppb; Inspect concentration: 998 ppb 6.H2S: Cali gas concentration: 50 ppm; Inspect concentration: 49.8 ppm 7.C4H8: Cali gas concentration: 11.5 ppm; Inspect concentration: 11.5 ppm 8.PM2.5:Measured value: 35 ug/m³; PM10:Measured value: 37 ug/m³ TSP:Measured value: 42 ug/m³; Noise: Measured value: 46.5 dB 9.Wind veloci:Measured value: 1.4 m/s; Wind direct:Measured value: 317 ° 10.Temperature: Measured value: 24.4 ℃; Humidity:Measured value: 65 %RH		
Test result	**Qualified**		
Remark			

Quality judgment: Tester: xiu tai chen

Company: Henan Oceanus Import & Export Co., Ltd. OQC : chang Yang

Date:May.31, 2023 Auditor: yan hui wang

APPENDIX B: LABORATORY DESIGNATION CERTIFICATES

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

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

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

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

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

RE: LABORATORY DESIGNATION BY NEMA.

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

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

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

DAVID ONGARE
For: DIRECTOR GENERAL

Our Environment, Our Life, Our Responsibility

ISO 9001:2015 Certified

AMBIENT ACOUSTIC LEVELS TEST REPORT.

ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT ACOUSTIC EMISSIONS LEVELS MONITORING OF THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY, KWALE COUNTY.

PROJECT INFORMATION:

PREPARED FOR:
COUNTY GOVERNMENT OF KWALE
DEPARTMENT OF TRADE AND ENTERPRISE DEVELOPMENT
P.O BOX 4-80403, KWALE, KENYA.

CLIENT ADDRESS:

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

TESTING CONSULTANTS:

DOCUMENT ID: 50124-0056 B
TEST DATES: MAY 28TH 2024
(FINAL) REPORT ISSUED: JUNE 04TH, 2024

DOCUMENT INFORMATION:

DOCUMENT REVIEW PAGE

This Technical report titled ENVIRONMENTAL BASELINE STUDY REPORT FOR AMBIENT ACOUSTIC EMISSIONS LEVELS MONITORING OF THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY, KWALE COUNTY, was authored by Lahvens Limited in accordance to the EMC (Excessive Noise and Vibration Regulations) (control) 2009, Legal Notice 61.

REVISION HISTORY

03	04.06.2024	Issuance of Final Report
02	31-05-2024	Re-submission to close the given comments and approvals
01	28-05-2024	1st draft issue of the soft copy submitted for review
REV	DATE	DESCRIPTION

Accepted by			
Reviewed & Approved by	LOVANS ROBERT SPOO - LABORATORY DIRECTOR. N.E.R. NO.: 7165		04.06.2024
Prepared by	VINCENT AGIN - FIELD ATTENDANT		04.06.2024
	VALENTINE AGUTU - FIELD ATTENDANT		04.06.2024
PROJECT:	Name:		Date:

DOCUMENT & PROJECT PARTICULARS

DOCUMENT REF: 50124-0056 B	CLASSIFICATION: A - UNCLASSIFIED (OPEN REPORT)	CONTRACT NO. AS PER EECL TOR.	REVISION: 00 FINAL

TEST FIRM CONTACT PERSON: LOVANS SPOO: (254 - 728716948)	PROJECT: THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK (CAIP)	NUMBER OF PAGES: 31

AUTHOR(S): VINCENT OKUMU, VALENTINE AGUTU	QUALITY CONTROLLER: LOVANS ROBERT SPOO

ABSTRACT (ENGLISH TITTLE):
County Government of Kwale through Envasses Environmental Consultants contracted Lahvens Limited to form part of the Project's Environmental Team (ET). LAHVENS Limited was commissioned to provide consulting services of environmental baseline Acoustic emissions level assessment before implementation of the of the proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County..

KEY WORDS:
EBS Acoustic Emissions Level Monitoring and Consultant Reporting.

ABSTRACT (in ENGLISH)	PUBLICATION TYPE: Digital document (pdf)

CGK: ESIA Study Report for Kwale County Aggregation and Industrial Park Page 119

REVIEW AND CERTIFICATION FROM THE TESTING CONSULTANTS:

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

Team Leader: VALENTINE ODUOR

Signature:

Date: 04.06.2024

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

Reviewer: LOVANS ROBERT SPOO

Title: LABORATORY DIRECTOR

Signature:

Date: 04.06.2024

CERTIFICATION FROM THE LEGAL ENTITY OF THE TESTING FACILITY:

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

Signature

07/06/2024
Date

OMAR SAID
Name Printed

MR
Tittle

Kwale County
Company Name

Company stamp

Prepared by: Envasses Environmental Consultants Limited **June 2024**

EXECUTIVE SUMMARY

Lahvens Limited, a NEMA designated laboratory, carried out the baseline ambient Acoustic environment survey at the proposed PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY, KWALE COUNTY on the 28th May 2024. Acoustic Environment survey was conducted to determine the EXISTING (Do minimum) noise pollution around the proposed project for Environmental, Health, Safety and compliance purposes.

The Ministry of Investment, Trade and Industry intends to construct County Aggregation and Industrial Parks (CAIPs) in all the 47 counties in Kenya. The main objective of the CAIPs is to grow manufacturing and investments through Agro-Industries and enhance productivity of agriculture sector in a sustainable manner hence creating inclusive decent jobs, increase farmers' income; increase foreign exchange, provide platform where farmers, processors, exporters, research in Kenya connect through Commodity Exchange (KOMEX) and Warehouse Receipting. Consequently, County Government of Kwale has received financial and technical support from the National Government to finance the construction of CAIP on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County at Latitude $4^0$24'48" S and Longitude $39^0$14'23".

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

Acoustic Environment Monitoring was conducted to determine the extent of pollution around the proposed Kwale CAIP with regards to Environmental, Health, Safety and compliance purposes before its implementation. The results will thereafter be used to assess compliance through comparisons against the Environmental Management Coordination (excessive noise and vibration controls) regulations 2009. A report on the findings will then be prepared and published. Noise environment remains a valued component in this environmental assessment because of their fundamental significance to the well-being of humans and wildlife.

This report identifies baseline information relating to acoustic emissions levels environment within study area in Kwale county on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga. The baseline provides the 'do minimum' (without the proposed COUNTY AGGREGATION AND INDUSTRIAL PARK) scenario taking account of the proposed changes to the land use.

The baseline acoustic emissions report considers the total emission of key acoustic parameters associated with COUNTY AGGREGATION AND INDUSTRIAL PARK activities. These are Noise equivalent levels (LAeq), maximum noise levels recorded (Lmax) and minimum noise recorded (Lmin). The current concentrations of these pollutants are at risk of exceeding their respective Limit Values when the project commissions. The estimates of the existing concentrations will be measured and compared to any relevant existing

information and when the project commences, will be used as the background data. Relevant available information related to the pre-development ambient acoustic emissions level in the environment was looked into while identifying the major existing acoustic emission sources in the environment and the existing sensitive pollution areas in the environment.

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

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

A baseline noise survey consisting of an operator attended noise measurements (OANM) was performed on the proposed site in Kwale County. Lahvens Limited operated four mobile stations along the project boundary walls (4) as part of its noise levels monitoring networks on the 28th May 2024.

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

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

Field Observations:

Sensitive Receptors;

The geographical scope of the baseline assessment is currently defined as the proposed KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK boundaries and environs, including potentially high risk zones along the routes of any existing surface access. The proposed site neighbors' farmlands to the East, North East and South West, residential homes to the North and South West and River Marwa to the West. The residential homes are considered as sensitive receptors.

Close proximity of the emission source to the 'sensitive receptor' causes acoustic pollution because there is less opportunity for dispersion of emissions between the source and receptor resulting in greater noise emissions. Noise / Acoustic levels is evaluated by comparing emissions against the EMC (Excessive Noise

and Vibration Regulations) (control) 2009 Legal Notice 61, first schedule of the Noise Exposure Standards Limit values set at locations where exposure harm to human health and ecosystems is thought to occur

Existing Acoustic Environment;

The proposed site lies in the coastal plain and characterized by soils ranging from sandy to loamy and their complexes. The neighborhood depicts mixed land use including residential areas and farmlands. The main source of existing noise pollution are the mobile sources such as transport noise emissions (motor vehicles & motorcycle emissions) and environmental noise. The acoustic emission sources directly associated with the proposed project will be the main concern of the appraisal framework and will be emitted from various sources including; construction equipment, mobile sources (cars and heavy goods vehicles that will be accessing the site to offload materials during construction, source emissions (generators) and environmental noise.

RESULTS AND CONCLUSIONS:

Noise measurements was initiated to obtain and quantify the prevailing and existing ambient acoustic levels before implementation of the COUNTY AGGREGATION AND INDUSTRIAL PARK. The obtained acoustic results were thereafter correlated against the Environmental Management Coordination (Excessive noise and vibration regulations) 2009 to ascertain compliance.

The highest diurnal noise emissions recorded at East Project Boundary 1 (EPB-1) extended to levels of 49.6 dBA while the lowest diurnal noise emission recorded at the South Project Boundary 4 (SPB-4) extended to levels of 46.7dBA. The average Leq noise levels in the proposed COUNTY AGGREGATION AND INDUSTRIAL PARK averaged 47.80 dBA. The average noise levels along all the survey locations complies with the EMC noise and vibrations regulations of 2009.

The average diurnal noise equivalent levels (Leq) along all the four survey locations complied with the EMC noise and vibration regulations 2009 before commencement of the KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK facility.

Diurnal noise Leq averages were rated as insignificant having scored <75 units based on parameters and score criteria; therefore, the proposed Kwale COUNTY AGGREGATION AND INDUSTRIAL PARK facilities was characterized as noise insignificant area before its implementation.

From the results of determination of significance, there is no threat to the noise receivers (residential homes, farmlands and the River Marwa habitat) of the noise emissions before implementation of the COUNTY AGGREGATION AND INDUSTRIAL PARK.

Ambient conditions existed at the time of the diurnal survey.

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

The proposed project site was marked with non project related activities during the measurements.

The levels of noise recorded from existing operations does not pose any Environmental, Health, Safety and compliance concerns before implementation of the COUNTY AGGREGATION AND INDUSTRIAL PARK facility.

TABLE OF CONTENTS

DOCUMENT REVIEW PAGE 2
DOCUMENT & PROJECT PARTICULARS 2
REVIEW AND CERTIFICATION FROM THE TESTING CONSULTANTS: 3
CERTIFICATION FROM THE LEGAL ENTITY OF THE TESTING FACILITY: 3
EXECUTIVE SUMMARY 4
TABLE OF CONTENTS 7
DEFINITIONS. 9
1. INTRODUCTION 10
1.1. Project Summary and objectives: 10
1.2. Project Description 10
1.3. Purpose of this report 11
1.4. Appraisal Framework Requirements 11
1.5. Scope of work 12
1.6. Terms of Reference 12
1.7. EBS Justification 12
2. ACOUSTIC EMISSIONS OVERVIEW AND NETWORKS 13
3. ACOUSTIC LEGISLATIVE AND POLICY FRAMEWORK 16
4. ACOUSTIC SURVEY METHODOLOGY 17
4.1. Baseline Study Area; 17
4.1.1. Sensitive Receptors 17
4.1.2. Existing Acoustic Environment 17
4.1.3. Monitoring Locations 17
4.2. Equipment Placement 18
4.3. Acoustic analysis 19
4.3.1. Parameters and score criteria 19
4.3.2. Procedure of significance evaluation 19
4.4. Tools and Equipment 20
4.5. Assumptions 20
4.6. Data Validity and Acceptability 20
4.7. Monitoring Frequency 20
5. RESULTS PRESENTATION, DISCUSSIONS AND CONCLUSION. 21

5.1. PRESENTATION OF RESULTS 21
5.1.1. Summary of singular noise measurements 21
5.2. Summary of average diurnal noise equivalents (Leq) 22
5.2.1. Tabular presentation of test of L_{eq} noise equivalents. 22
5.2.2. Tabular presentation of test of significance 22
5.3. DISCUSSIONS OF RESULTS 23
5.3.1. Presentation of singular noise results 23
5.3.2. Correlation of average noise monitoring results against the noise regulations 23
5.3.3. Determination of significance 24
5.4. CONCLUSION. 24
6. REFERENCES 25

LIST OF TABLES

Table 1: List of acronyms 9
Table 2: EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. 16
Table 3: Description of the measurement locations 18
Table 4: Parameters and score criteria 20
Table 5: Results for Diurnal singular noise measurements 21
Table 6: Summary results for diurnal noise equivalents 22
Table 7:Determination of diurnal noise significance of results 22

DEFINITIONS.

Table 1: List of acronyms

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

1. INTRODUCTION

1.1. Project Summary and objectives:

Lahvens Limited, a NEMA designated laboratory, carried out the baseline ambient Acoustic environment survey at the proposed PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY, KWALE COUNTY on the 28th May 2024. Acoustic Environment survey was conducted to determine the EXISTING (Do minimum) noise pollution around the proposed project for Environmental, Health, Safety and compliance purposes.

The Ministry of Investment, Trade and Industry intends to construct County Aggregation and Industrial Parks (CAIPs) in all the 47 counties in Kenya. The main objective of the CAIPs is to grow manufacturing and investments through Agro-Industries and enhance productivity of agriculture sector in a sustainable manner hence creating inclusive decent jobs, increase farmers' income; increase foreign exchange, provide platform where farmers, processors, exporters, research in Kenya connect through Commodity Exchange (KOMEX) and Warehouse Receipting. Consequently, County Government of Kwale has received financial and technical support from the National Government to finance the construction of CAIP on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County at Latitude $4^0$24'48" S and Longitude $39^0$14'23".

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

Acoustic Environment Monitoring was conducted to determine the extent of pollution around the proposed Kwale CAIP with regards to Environmental, Health, Safety and compliance purposes before its implementation. The results will thereafter be used to assess compliance through comparisons against the Environmental Management Coordination (excessive noise and vibration controls) regulations 2009. A report on the findings will then be prepared and published.

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

1.2. Project Description

The proposed CAIP on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County at Latitude $4^0$24'48" S and Longitude $39^0$14'23". The proposed site neighbors' farmlands to the East, North East and South West, residential homes to the North and South West and River Marwa to the West.
The proposed project will involve the construction and operation of Kwale County Aggregation and Industrial Park (CAIP). It will comprise of double volume warehouses featuring aggregation and cold storage areas as wells as auxiliary facilities which include office, ablution blocks, water supply and parking among others.

1.3. Purpose of this report

This report identifies baseline information relating to acoustic emissions levels environment within study area in Kwale county on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga. The baseline provides the 'do minimum' (without the proposed COUNTY AGGREGATION AND INDUSTRIAL PARK) scenario taking account of the proposed changes to the land use.

1.4. Appraisal Framework Requirements

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

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

Section 3 of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009, General Prohibitions states as follows;
(1) Except as otherwise provided in these Regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.
(2). In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered; (a) time of the day; (b) proximity to residential area; (c) whether the noise is recurrent, intermittent or constant; (d) the level and intensity of the noise; (e) whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
(f) whether the noise can be controlled without much effort or expense to the person making the noise.
(3). Any person who contravenes the provisions of this Regulation commits an offence.

Section 5 of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009, on Permissible noise levels states as follows;
"No person shall make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

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

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

1.5. Scope of work

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

1.6. Terms of Reference

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

The scope of work was outlined as follows:

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

1.7. EBS Justification

Acoustic Environmental Baseline Study is a significant component of monitoring programs for successful development activities. This Environmental Baseline Study is designed to characterize the acoustic environment at the proposed project site prior to commencement of construction of the proposed COUNTY AGGREGATION AND INDUSTRIAL PARK. EBS will provide a benchmark and reference against which to compare the acoustic conditions influenced by the construction and operation of the Kwale CAIP. 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.

2. ACOUSTIC EMISSIONS OVERVIEW AND NETWORKS

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

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

It is therefore fundamental to note that ambient noise levels are essential to human health and ecosystems. The repercussions of construction noise are extensive and encompass both the workers and the surrounding environment. Construction noise can disrupt the peace of residential neighborhoods, affecting the quality of life for residents. This disruption can lead to complaints and strained relationships between the construction project and the community.
Acoustic environment has been selected as a valued component because of their fundamental significance to the well-being of human health and fauna health.

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

Construction Related Noise Generators could include the following: -

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

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

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

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

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

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

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

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

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

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

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

LAeq - It is common practice to measure noise levels using the A-weighting setting built into all sound level meters. In which case the term is properly known as LAeq and the results should say so - for example LAeq = 73 dB or Leq = 73 dB.
Leq noise levels are logarithmic (dB) values and cannot be added directly. A doubling of sound level results in a measured increase of 3 dB, four identical sources in a room would increase the noise level by 6 dB and so on. This works both ways, say 10 similar machines in a room produce 100 dBA then removing one machine completely will only reduce the overall noise level to 0.5 dBA, you would need to silence or remove 50% of the machines to achieve a 3 dB reduction.

Other Parameters

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

3. ACOUSTIC LEGISLATIVE AND POLICY FRAMEWORK

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

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

Noise Exposure Standards (First Schedule)

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

ZONE		*Sound Level Limits dB (A)* 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 on the proposed site in Kwale County. Lahvens Limited operated four mobile stations along the project boundary walls (4) as part of its noise levels monitoring networks on the 28th May 2024.

4.1. Baseline Study Area;

4.1.1. Sensitive Receptors

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

The proposed site neighbors' farmlands to the East, North East and South West, residential homes to the North and South West and River Marwa to the West. The residential homes are considered as sensitive receptors.

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

4.1.2. Existing Acoustic Environment

The proposed site lies in the coastal plain and characterized by soils ranging from sandy to loamy and their complexes. The neighborhood depicts mixed land use including residential areas and farmlands. The main source of existing noise pollution are the mobile sources such as transport noise emissions (motor vehicles & motorcycle emissions) and environmental noise. The acoustic emission sources directly associated with the proposed project will be the main concern of the appraisal framework and will be emitted from various sources including; construction equipment, mobile sources (cars and heavy goods vehicles that will be accessing the site to offload materials during construction, source emissions (generators) and environmental noise.

The emissions concentrations reported herein, will be a combination of the emissions from the sources and the distance to the receptors which influence the levels of noise emissions and quality of life.

4.1.3. Monitoring Locations

Baseline acoustic emissions were selected based on the existing facility that could or have the potential to influence the proposed project acoustic environment. The monitoring locations at the proposed project site were determined at the four project boundaries to the East (PB-1), West (PB-2), North (PB-3) and South (PB-4).

Table 3: Description of the measurement locations

Measurement Sites	Receivers	Description of monitoring Locations	Dates of sampling
East Project Boundary 1 (EPB-1) 4°24'48" S 39°14'23" E	Farmlands	The proposed site lies in the the coastal plain and characterized by soils ranging from sandy to loamy and their complexes. The neighborhood depicts mixed land use including residential areas and farmlands.	28TH May 2024.
West Project Boundary 2 (WPB-2) 4°24'48" S 39°14'23" E	River Marwa & Residential homes.		28TH May 2024.
North Project Boundary 3 (NPB-3) 4°24'48" S 39°14'23" E	Residential homes and farmlands		28TH May 2024.
South Project Boundary 4 (SPB-4) 4°24'48" S 39°14'23" E	Farmlands		28TH May 2024.

4.2. Equipment Placement

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

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

Furthermore, as each individual measurement was being taken, the nature of the noise climate in the area was assessed and recorded. This comprised an auditory observation by the surveyor, as well as identifying those noise incidents which influenced the sound level meter readings during the measurement period.

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

4.3. Acoustic analysis

4.3.1. Parameters and score criteria

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

4.3.2. Procedure of significance evaluation

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

Table 4: Parameters and score criteria

A-Quantity 1-5	B-Occurrence 1-6	C-Impact 1-6	D-Detection 1-5	E-Controls 1-5	F-Legislation 1and10
5-High	6-Continuous	6-Fatal to human life	5-More than 24 hours	5-Absence or no effective controls	10-Not meeting 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.	---	---	---

4.4. Tools and Equipment

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

4.5. Assumptions

The long term (24-hr per site) noise emissions survey and data collection for L_{eq}, L_{max} and L_{min} is considered sufficient to understand background acoustic conditions at each location.

4.6. Data Validity and Acceptability

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

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

4.7. Monitoring Frequency

Monitoring of acoustic emissions levels was done for 24 hr / survey location. Once CAIP operations will be underway, monitoring of acoustic emissions parameters should be done at 3 months' interval.

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 May 2024.				Day time	
Locations	Leq	Lmax	Lmin	Leq	
East Project Boundary 1 (EPB-1)	49.6	68.2	35.7	55	The prevailing weather was sunny at the time of acoustic survey. Wind speed averaged about 9 km/hr North East wind. Measurements are taken to quantify prevailing ambient acoustic levels. Leq noise levels complied with the EMC 2009 noise permissible levels. No site related activities were ongoing during measurements. Environmental noise including Wind breeze and fugitive noise from motorcycles were the likely sources of noise emissions. Ambient conditions were extant at the time of the survey.
West Project Boundary 2 (WPB-2)	47.8	66.4	37.4	55	The prevailing weather was sunny at the time of acoustic survey. Wind speed averaged about 8 km/hr North East wind. Measurements are taken to quantify prevailing ambient acoustic levels. Leq noise levels complied with the EMC 2009 noise permissible levels. No site related activities were ongoing during measurements. Environmental noise including Wind breeze and fugitive noise from motorcycles were the likely sources of noise emissions. Ambient conditions were extant at the time of the survey.
North Project Boundary 3 (NPB-3)	47.1	69.1	38.3	55	The prevailing weather was sunny at the time of acoustic survey. Wind speed averaged about 9 km/hr North East wind. Measurements are taken to quantify prevailing ambient acoustic levels. Leq noise levels complied with the EMC 2009 noise permissible levels. No site related activities were ongoing during measurements. Environmental noise including Wind breeze and traffic noise were the likely sources of noise emissions. Ambient conditions were extant at the time of the survey.
South Project Boundary 4 (SPB-4)	46.7	67.9	38.5		The prevailing weather was sunny at the time of acoustic survey. Wind speed averaged about 9 km/hr North East wind. Measurements are taken to quantify prevailing ambient acoustic levels. Leq noise levels complied with the EMC 2009 noise permissible levels. No site related activities were ongoing during measurements. Environmental noise including Wind breeze and traffic noise were the likely sources of noise emissions. Ambient conditions were extant at the time of the survey.

5.2. Summary of average diurnal noise equivalents (Leq)

5.2.1. Tabular presentation of test of L_{eq} noise equivalents.

Table 6: Summary results for diurnal noise equivalents

Monitoring locations	Diurnal LAeq average results	Maximum noise level permitted (Leq) in dB (A) Day (0601-2000) hrs	Comments
EPB-1	49.6	55	Complies
WPB-2	47.8	55	Complies
NPB-3	47.1	55	Complies
SPB-4	46.7	55	Complies

5.2.2. Tabular presentation of test of significance

Table 7:Determination of diurnal noise significance of results

MEASUREMENT SITE	ASPECT	CONDITION/A	IMPACT	QUANTITY A	OCCURRENCE	IMPACTS	DETECTION	CONTROL	LEGISLATION	TOTAL A*B*C*D	REMARKS SIG / INSIG
EPB-1	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG
WPB-2	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG
NPB-3	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG
SPB-4	NOISE	N/A	Hearing impairment	3	6	1	1	3	1	54	INSIG

5.3. DISCUSSIONS OF RESULTS

Noise measurements was initiated to obtain and quantify the prevailing and existing ambient acoustic levels before implementation of the KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK. The obtained acoustic results were thereafter correlated against the Environmental Management Coordination (Excessive noise and vibration regulations) 2009 to ascertain compliance.

5.3.1. Presentation of singular noise results

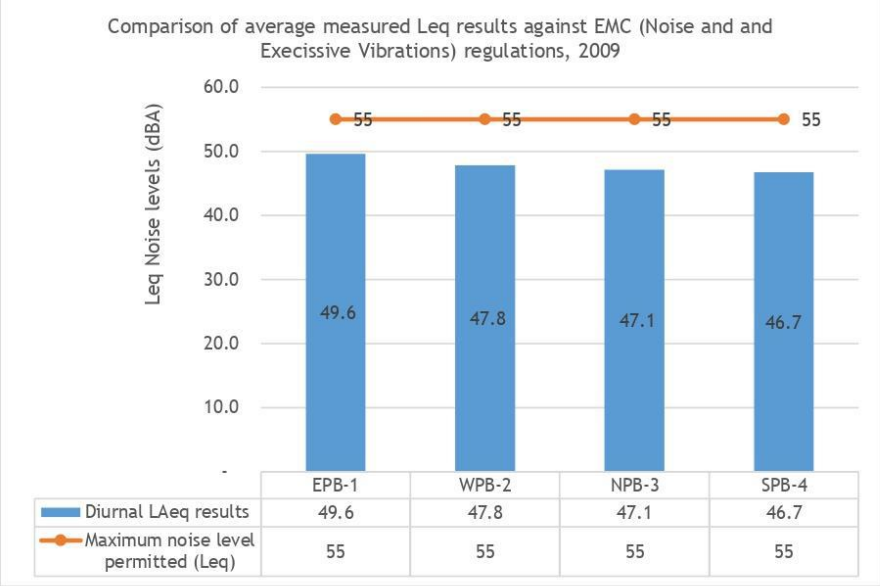
Diurnal noise results

The highest diurnal noise emissions recorded at East Project Boundary 1 (EPB-1) extended to levels of 49.6 dBA while the lowest diurnal noise emission recorded at the South Project Boundary 4 (SPB-4) extended to levels of 46.7dBA. The average Leq noise levels in the proposed COUNTY AGGREGATION AND INDUSTRIAL PARK averaged 47.80 dBA. The average noise levels along all the survey locations complies with the EMC noise and vibrations regulations of 2009.

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

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

a. **Diurnal noise results**



- The average diurnal noise equivalent levels (Leq) along all the four survey locations complied with the EMC noise and vibration regulations 2009 before commencement of the KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK facility.

5.3.3. Determination of significance

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

- Diurnal noise Leq averages were rated as insignificant having scored <75 units based on parameters and score criteria; therefore, the proposed Kwale COUNTY AGGREGATION AND INDUSTRIAL PARK facilities was characterized as noise insignificant area before its implementation.
- From the results of determination of significance, there is no threat to the noise receivers (residential homes, farmlands and the River Marwa habitat) of the noise emissions before implementation of the COUNTY AGGREGATION AND INDUSTRIAL PARK.

5.4. CONCLUSION.

This ambient noise measurement report documented the current noise levels and meteorological conditions for the proposed COUNTY AGGREGATION AND INDUSTRIAL PARK as follows:

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

6. REFERENCES

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

LIST OF APPENDICES:

APPENDIX A:
EQUIPMENT CALIBRATION CERTIFICATES

APPENDIX B:
LABORATORY DESIGNATION CERTIFICATES

APPENDIX A: EQUIPMENT CALIBRATION CERTIFICATES

SONIC QUALITY INSPECTORS LTD

SQI

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

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

Page 1 of 2 pages

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

1.0 REFERENCE STANDARD AND EQUIPMENT USED

The sound level meter was calibrated according to Kenya Standard KS OIML 58: 1998 Fluke SM-70 sound level meter standard s/no. **S4564D4** was used in the calibration of the Sound Level Meter.

2.0 CALIBRATION PROCEDURE

Procedure number SQI/TCP/023 (measurement procedure for the calibration of Sound Level Meters) was followed in the calibration of the Sound Level Meter.

3.0 TRACEABILITY

This calibration certificate documents traceability of calibration standards used which are traceable to the National Standard Institute KEBS, to realize units of measurement according to the International System of Units (SI).

4.0 This certificate is valid until **6th January, 2025.**

Calibrated by: J.Kilo *Date:* **06-01-2024**

Checked by: *Date:* 6/1/2024

Signed: *Date:* 6/1/2024

TECHNICAL MANAGER

Calibration certificate without signature and official SQI stamp is invalid. This certificate has been issued without any alteration. This Certificate is only valid for the instrument calibrated/tested and for the period indicated there in.

BRITISH SAFETY COUNCIL

KENAS

ilac-MRA

CERTIFICATE No: SQI/LAHVENS/24/001
Page 2 of 2 pages

5.0 CALIBRATION RESULTS

STANDARD VALUE IN dB	UUT READING IN dB	CORRECTION IN dB
30-80dB		
35.5	35.2	0.3
45.8	45.4	0.4
56.4	55.9	0.5
71.0	70.3	0.7
79.3	79.5	-0.2
50-100 dB		
51.1	51.3	-0.2
60.4	60.8	-0.4
70.2	70.6	-0.4
80.2	80.9	-0.7
91.1	91.4	-0.3
95.6	96.6	-1.0
80-130 dB		
81.5	81.4	0.1
91.2	90.3	0.9
102.2	101.2	1.0
113.2	112.3	0.9
126.5	125.6	0.9

Comments: The absolute tolerance and uncertainty combined satisfied the MPE of the instrument under calibration

5.1 UNCERTAINTIES

The Uncertainty of the calibration results for the given range of sound level measurements is ± 1.5%dB.

The reported expanded uncertainty is stated as expanded uncertainty of measurement multiplied by coverage factor K= 2, providing a confidence level of approximately 95%.

----------o--0--o----------

BRITISH SAFETY COUNCIL
MEMBERSHIP NO.50432711-00206

KENAS

ilac-MRA

APPENDIX B: LABORATORY DESIGNATION CERTIFICATES

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

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

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

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

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

RE: LABORATORY DESIGNATION BY NEMA.

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

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

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

DAVID ONGARE
For: DIRECTOR GENERAL

Our Environment, Our Life, Our Responsibility

ISO 9001:2015 Certified

Annexure 7: Acknowledged meeting invitation letters

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

24th May 2024

To:
The Office of the Chief,
Ministry of Interior and National Administration,
Dzombo location, Kwale.

Dear Sir/Madam,

RE: INVITATION TO A KICK-OFF MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park (CAIP).

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility.

The purpose of this letter is to invite you to a kick-off meeting that will be held on **30th May 2024** starting at **10.00am** at the **proposed project site** and request your office to kindly mobilize the local community and/or representatives to participate in the meeting as well.

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

24 MAY 2024

Cc:
Assistant Chief: Malamba sub-location

GLADYS MURABU
0702471184
Received

Chief
MOHAMED MWATENG
0720 357594
Received

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

24th May 2024

To:
County Department of Trade and Enterprise Development,
County Government of Kwale,
P.O. Box 4-80403,
Kwale, Kenya.

Dear Sir/Madam,

RE: INVITATION TO A KICK-OFF MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park (CAIP).

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility.

The purpose of this letter is to invite you to a kick-off meeting that will be held on **30th May 2024** starting at **10.00am** at the **proposed project site**.

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

24 MAY 2024

RECEIVED 24/05/24
TRADE DPT.

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

24th May 2024

To:
Village Administrator - Mwanyamala
Dzombo location, Kwale

Dear Sir/Madam,

RE: INVITATION TO A KICK-OFF MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park (CAIP).

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility.

The purpose of this letter is to invite you to a kick-off meeting that will be held on **30th May 2024** starting at **10.00am** at the **proposed project site.**

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

24 MAY 2024

Received 24/5/2024
Amina Swaleh
VCM
0722 831402

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

24th May 2024

To:
Village Administrator - Pandini
Dzombo location, Kwale

Received 24/5/24

Dear Sir/Madam,

RE: INVITATION TO A KICK-OFF MEETING ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park (CAIP).

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility.

The purpose of this letter is to invite you to a kick-off meeting that will be held on **30th May 2024** starting at **10.00am** at the **proposed project site**.

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

Tel:0722 347 155
24 MAY 2024

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

30th May 2024

To:
The Office of the Chief,
Ministry of Interior and National Administration,
Dzombo Location, Kwale.

Dear Sir/Madam,

RE: INVITATION TO A SECOND STAKEHOLDER MEETING TO REVIEW THE DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County.

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility. In this regard, the firm of experts carried out a kick off meeting on 30th May 2024.

The purpose of this letter is to invite you to the second stakeholder meeting to review the draft ESIA study report and request your office to kindly mobilize the local community and/or representatives to participate in the meeting as well. The meeting will be held on **6th June 2024** starting at **10:00am** at the **proposed project site.**

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

ENVASSES ENVIRONMENTAL CONSULTANTS LTD
Tel:0722 347 155
30 MAY 2024
Email: info@envasses.org
P.O. Box 2013-80100, MOMBASA

Cc:
Assistant Chief: Malamba sub-location
Assistant Chief: Mrima sub-location

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

30th May 2024

To:
County Department of Trade and Enterprise Development,
County Government of Kwale,
P.O. Box 4-80403,
Kwale, Kenya.

Dear Sir/Madam,

RE: INVITATION TO A SECOND STAKEHOLDER MEETING TO REVIEW THE DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County.

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility. In this regard, the firm of experts carried out a kick off meeting on 30th May 2024.

The purpose of this letter is to invite you to the second stakeholder meeting to review the draft ESIA study report that will be held on **6th June 2024** starting at **10:00am** at the **proposed project site.**

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

ENVASSES ENVIRONMENTAL CONSULTANTS LTD
Tel:0722 347 155
30 MAY 2024
P.O. Box 2013-80100, MOMBASA

Received
30/05/24
KEVIN BONGO - MARKETS OFFICER
TRADE DPT.
CGK

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

30th May 2024

To:
Village Administrator - Mwananyamala
Dzombo location, Kwale

Dear Sir/Madam,

RE: INVITATION TO A SECOND STAKEHOLDER MEETING TO REVIEW THE DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County.

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility. In this regard, the firm of experts carried out a kick off meeting on 30th May 2024.

The purpose of this letter is to invite you to the second stakeholder meeting to review the draft ESIA study report that will be held on **6th June 2024** starting at **10:00am** at the **proposed project site**.

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

ENVASSES ENVIRONMENTAL CONSULTANTS LTD. Tel:0722 347 155 30 MAY 2024 info@envasses.org BOX 2013-80100 MOMBASA

Received 30/5/2024
Amini Suld - V/MS
0722831482

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

30th May 2024

To:

VILLAGE ADMINISTRATOR - GANDINI
MZOMBO LOCATION - KWALE COUNTY

Dear Sir/Madam,

RE: INVITATION TO A SECOND STAKEHOLDER MEETING TO REVIEW THE DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County.

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility. In this regard, the firm of experts carried out a kick off meeting on 30th May 2024.

The purpose of this letter is to invite you to the second stakeholder meeting to review the draft ESIA study report that will be held on **6th June 2024** starting at **10:00am** at the **proposed project site.**

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

ENVASSES ENVIRONMENTAL CONSULTANTS LTD
Tel: 0722 347 155
30 MAY 2024
P.O. Box 2013-80100, MOMBASA
Email: info@envasses.org

Received
Village Admin
Gandini 30/5/24

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

30th May 2024

To:
The Office of the Chief,
Ministry of Interior and National Administration,
Dzombo Location, Kwale.

Dear Sir/Madam,

RE: INVITATION TO A THIRD STAKEHOLDER MEETING TO VALIDATE THE DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County.

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility. In this regard, the firm of experts carried out a kick off meeting on 30th May 2024 and a second stakeholder meeting to review the draft ESIA study report on 6th June 2024.

The purpose of this letter is to invite you to the third stakeholder meeting to validate the draft ESIA study report and request your office to kindly mobilize the local community and/or representatives to participate in the meeting as well. The meeting will be held on **7th June 2024** starting at **10:00am** at the **proposed project site**.

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

ENVASSES ENVIRONMENTAL CONSULTANTS LTD. Tel:0722 347 155 30 MAY 2024 Email: info@envasses.org P.O. Box 2013-80100, MOMBASA

Mohamed Hassan
0720 357 ...

Cc:
Assistant Chief: Malamba sub-location
Assistant Chief: Mrima sub-location

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

30th May 2024

To:
County Department of Trade and Enterprise Development,
County Government of Kwale,
P.O. Box 4-80403,
Kwale, Kenya.

Dear Sir/Madam,

RE: INVITATION TO A THIRD STAKEHOLDER MEETING TO VALIDATE THE DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County.

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility. In this regard, the firm of experts carried out a kick off meeting on 30th May 2024 and a second stakeholder meeting to review the draft ESIA study report on 6th June 2024.

The purpose of this letter is to invite you to the third stakeholder meeting to validate the draft ESIA study report that will be held on **7th June 2024** starting at **10:00am** at the **proposed project site.**

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

ENVASSES ENVIRONMENTAL CONSULTANTS LTD. Tel:0722 347 155 30 MAY 2024 P.O. Box 2013-80100, MOMBASA

RECEIVED 30/05/24 TRADE DPT.

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

30th May 2024

To:
Village Administrator - Mwananyamala
Dzombo Location, Kwale

Dear Sir/Madam,

RE: INVITATION TO A THIRD STAKEHOLDER MEETING TO VALIDATE THE DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County.

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility. In this regard, the firm of experts carried out a kick off meeting on 30th May 2024 and a second stakeholder meeting to review the draft ESIA study report on 6th June 2024.

The purpose of this letter is to invite you to the third stakeholder meeting to validate the draft ESIA study report that will be held on **7th June 2024** starting at **10:00am** at the **proposed project site.**

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

ENVASSES ENVIRONMENTAL CONSULTANTS LTD. Tel:0722 347 155 30 MAY 2024 P.O. Box 2013-80100, MOMBASA

Received 30/5/2024
Amini Swaleh - V/Adm
0722831402

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Ralli House Building, Nyerere Avenue, P.O. Box 2013-80100, Mombasa
Tel: +254722347155; Email: info@envasses.org; website www.envasses.org

30th May 2024

To:

VILLAGE ADMINISTRATOR - KAMDINI

NZOMBO LOCATION - KWALE COUNTY

Dear Sir/Madam,

RE: INVITATION TO A THIRD STAKEHOLDER MEETING TO VALIDATE THE DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANANYAMALA/557 IN LUNGA-LUNGA SUB-COUNTY.

The above subject refers.

We have been contracted by the County Government of Kwale of P.O. Box 4 - 80403, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County.

The Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, under Regulation 17 (2b), requires public participation in the preparation of the EIA study report. The objective of the requirement is to obtain comments/views of the stakeholders including neighbors who are likely to be impacted by the proposed facility. In this regard, the firm of experts carried out a kick off meeting on 30th May 2024 and a second stakeholder meeting to review the draft ESIA study report on 6th June 2024.

The purpose of this letter is to invite you to the third stakeholder meeting to validate the draft ESIA study report that will be held on **7th June 2024** starting at **10:00am** at the **proposed project site**.

We look forward to your participation.

Yours Sincerely,

Mr. Simon Nzuki
Chief Executive Officer
Envasses Environmental Consultants Limited

ENVASSES ENVIRONMENTAL CONSULTANTS LTD
Tel:0722 347 155
30 MAY 2024
P.O. Box 2013-80100, MOMBASA

ADMIN
Kamdini village unit
Received 30/5/24

Annexure 8: Stakeholder engagement meetings programmes

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County

Task: Kick-off Stakeholder Consultation Meeting

Date: 30th May 2024

Venue: Project Site

Programme

Time	Activity	Facilitator
9:30am	Arrival and registration of participants	Envasses Environmental Consultants Limited
10:00am	Prayer and introductions	Envasses Environmental Consultants Limited
10:15am	Opening remarks 1. Area Chief – Dzombo Location 2. County Government of Kwale	Envasses Environmental Consultants Limited
10:30am	Overview of the Proposed Project	County Government of Kwale
11:00am	Presentation on the ESIA study process	Envasses Environmental Consultants Limited
11:45am	Plenary discussions	Envasses Environmental Consultants Limited
12:45pm	Way forward and AOB	Envasses Environmental Consultants Limited
1:00pm	**Prayer and departure**	

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County

Task: Stakeholder Meeting to review draft ESIA Study Report

Date: 6th June 2024

Venue: Project Site

Programme

Time	Activity	Facilitator
9:30am	Arrival and registration of participants	Envasses Environmental Consultants Limited
10:00am	Prayer and introductions	Envasses Environmental Consultants Limited
10:15am	Opening remarks 1. Area Chief – Dzombo Location 2. County Government of Kwale	Envasses Environmental Consultants Limited
10:30am	Presentation of the Draft ESIA Study Report	Envasses Environmental Consultants Limited
11:30am	Plenary discussions	Envasses Environmental Consultants Limited
12:30pm	Way forward and AOB	Envasses Environmental Consultants Limited
1:00pm	**Prayer and departure**	

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County

Task: Stakeholder Meeting to validate final Draft ESIA Study Report

Date: 7th June 2024

Venue: Project Site

Programme

Time	Activity	Facilitator
9:30am	Arrival and registration of participants	Envasses Environmental Consultants Limited
10:00am	Prayer and introductions	Envasses Environmental Consultants Limited
10:15am	Opening remarks 1. Area Chief – Dzombo Location 2. County Government of Kwale	Envasses Environmental Consultants Limited
10:30am	Review of comments on Draft ESIA Study Report	Envasses Environmental Consultants Limited
11:00am	Presentation on final draft ESIA Study Report	Envasses Environmental Consultants Limited
11:30am	Plenary discussions	Envasses Environmental Consultants Limited
12:00pm	Validation of final draft ESIA Study Report	Envasses Environmental Consultants Limited
12:30pm	Way forward and AOB	Envasses Environmental Consultants Limited
1:00pm	**Prayer and departure**	

Annexure 9: Proceedings of the first public participation meeting

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANYAMALA/557 IN LUNGA LUNGA SUB COUNTY.

Proceedings of the Kick-off Stakeholder Meeting held at the proposed project site in Nguluku B area, Kwale County

30th May 2024

Proponent	Firm of Experts
County Department of Trade & Enterprise Development, County Government of Kwale, P.O. Box 4 – 80403, Kwale, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya. Tel:+254 722 347 155 Email: info@envasses.org

1. Introduction

The County Government of Kwale (CGK) proposes to construct a County Aggregation and Industrial Park (CAIP) in Nguluku B, Kwale County. The primary objective of the project is to promote investment, create employment opportunities, and boost the export of agricultural products. The CAIP will consist of warehouses featuring storage rooms, cold rooms, and value addition sections. Pursuant to Section 58 of the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya, the County Government of Kwale has contracted Envasses Environmental Consultants Limited to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed project.

Pursuant to Regulation 17 of the Environmental Management and Coordination (Impact Assessment and Audit) Regulation, 2003, the consultants in collaboration with CGK organized and held a stakeholders Kick-off meeting on 30th May 2024 at the project site in Nguluku B, Kwale County (Figure 1). The objective of the meeting was to sensitize stakeholders on the proposed project and seek their comments on the proposal. Eighty-eight (88) participants including representatives from the County Government of Kwale, local community and the consultants (Appendix 1) attended the meeting. The meeting commenced at 11:30 a.m. with a word of prayer from Mr. Rashid Mwagao, a resident of Nguluku Maro.

2. Opening remarks

Mr. Amini Suya, the Village Administrator, Mwanyamala area, welcomed the participants and facilitated introductions. In his opening remarks, Mr. Suya highlighted the potential benefits of the proposed CAIP project to the local community. He emphasized that the project would boost the local economy and improve infrastructure in the area. Mr. Suya encouraged the participants to provide their views, concerns, and suggestions regarding the project, so that they can be incorporated throughout its implementation. Following Mr. Suya's introduction, Mr. Samuel Mvurya, the Ward Administrator, addressed the participants. He reiterated that the proposed CAIP project would promote investment and create employment opportunities in the area. Mr. Mvurya echoed the importance of the participants' input and urged them to provide their views and comments to enhance the implementation of the project.

Figure 1: Stakeholders following deliberations during the Kick-off stakeholder meeting

3. Presentation on the ESIA Study process

Mr Omar Said from Envasses Environmental Consultants Limited gave an overview of the ESIA Study Process citing the legal basis of the meeting as per regulation 17(2b) of the Environmental Management and Coordination (Impact Assessment and Audit) Regulation,2003 where public participation in the ESIA process is mandatory. Further, he noted that the ESIA study report process will be guided by the requirements of Sec. 58 of the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya. He noted that the ESIA Study report will provide a detailed description of the proposed project, baseline environmental and Social conditions of the project area, identify and analyze the anticipated impacts during construction, operation and possible decommissioning phase of the project, describe the relevant policy, legal and institutional frameworks and develop Environmental and Social Management and Monitoring plans to address the environmental and social risks of the proposed CAIP.

He further informed the participants that the kick-off stakeholder meeting is among the mandatory three engagements with the community which will be held to obtain views and comments on the project to inform NEMA's decision making. He further added that once the ESIA Study Report is submitted to NEMA, the proponent will publicize it further on Kenya Gazette, newspapers with a wider nation-wide circulation and local radio as required by EMCA. He informed the meeting that the additional publicity of the project will enhance stakeholder engagement in the ESIA study process.

4. Description of the proposed project

Ms. Heidi Mumia from the County Government of Kwale thanked the participants for attending the Kick-off Stakeholder Meeting. She informed the meeting that the proposed project is a collaborative effort between the National Government and the County Government of Kwale. She added that the objective of the project is to promote investment, create employment opportunities, and boost the export of locally grown agricultural products. Ms Mumia mentioned that the CAIP will comprise of value addition facilities, cold storage, and warehousing for handling agricultural products such as tomatoes, green grams, cashew nuts, cassava, and chili peppers. She added that the products will be collected, sorted, graded, cleaned and packaged for exporting. Ms. Heidi Mumia mentioned that in addition to the CAIP, the county anticipates that the investment will have economic ripple effects such as supportive establishments by the private sector, and hence transform the area into an industrial zone.

5. Plenary discussions

Mr. Gilbert Kombo thanked the County Government of Kwale for initiating the development and the consultant for convening the stakeholder meeting. He noted that the project has significant potential to enhance development in the area including improved infrastructure and livelihoods. However, he raised concerns regarding the feasibility and successful implementation of the project, citing past instances where ultimately industries established within Kwale County had unfortunately collapsed soon after commissioning. In response, Ms. Heidi Mumia from the County Government of Kwale acknowledged that the project has a diverse group of stakeholders who will leverage on their potential and partnerships to ensure its sustainability. She mentioned that the stakeholders have carefully selected products that are easily accessible and readily available in the local market.

Mr Paul Nzombo stated that the facility will be beneficial to the community, but also raised concerns about the potential air pollution that may occur during its operational phase. In response to these concerns, Mr. Omar Said noted that the consultants will undertake ambient air monitoring to assess the future impacts of the facility on the environment and provide a baseline for

comparative purposes. The Environmental and Social Impact Assessment (ESIA) study report will also provide mitigation measures to minimize the potential negative impacts at project's operational phase. He added that the proponent will be required to conduct annual audits to ensure the facility complies with relevant regulations and standards.

Mr. Jeremiah Kyove had concerns about the improper waste disposal practices during the operational phase of the CAIP. He highlighted that the residents heavily rely on the seasonal Marro stream, which connects to other water resources, and that improper waste disposal could lead to water pollution, posing significant health and safety risks to the community. In response, Mr. Omar mentioned that the proponent is required to adhere to sustainable waste management practices by engaging a NEMA-licensed waste contractor to dispose off solid waste at designated landfills. Additionally, he noted that effluent from the facility should be managed through appropriate systems such as biodigesters or septic tanks. Further effluent monitoring should be undertaken quarterly to ensure compliance with the Environmental Management and Coordination (Water Quality) Regulations, 2006.

Mr. Chrispus Kioko thanked the consultants for organizing the stakeholder meeting. He highlighted the challenges faced by farmers in cultivating cashew nuts, noting that they have not been yielding satisfactory results. He requested the county officials to offer training to farmers and provide viable cashew nut seedlings.

Mr. Dena Samuel Ngunyinyi emphasized the importance of ensuring that the County Aggregation and Industrial Park (CAIP) facility will process agricultural products from the area and empower farmers to ensure sustainable supply. Mr. Chao Mwagao seconded the views of Mr Ngunyinyi, emphasizing the need for greater clarity on the specific products that will be processed at the County Aggregation and Industrial Park (CAIP) facility. He noted that some community members are concerned that the facility might process minerals, which could lead to confusion and misperceptions about the project's objectives. In response, Ms. Heidi noted the CAIP will rejuvenate the agricultural sector through the processing of a variety of products, including tomatoes, green grams, cashew nuts, cassava, and chili peppers.

Mr. Jeremiah Kyove mentioned that CAIP would generate job opportunities and emphasized the importance of prioritizing the community for employment opportunities.

6. Way forward

Mr Omar Said stated that the views and issues raised by the stakeholders will be incorporated in the ESIA Study report. Additionally, he mentioned that a second stakeholder meeting will be held at the project site on 6th June 2024 at 10:00 a.m. to review the draft ESIA Study Report.

Page 5

7. Closure of the meeting

There being no other business, the meeting ended at 1:35 pm with a word of prayer from Mr. Chao Mwagao.

Signature: _____ Date: 30/05/2024

Ms Sabina Mwandisha
Envasses Environmental Consultants Limited
Meeting Secretary

Signed on behalf of the local community by:

Signature: _____ Date: 30/05/2024

Mr. Samuel Mvurya
Ward Administrator-Dzombo Ward

WARD ADMINISTRATOR
DZOMBO
LUNGA LUNGA SUB-COUNTY
Date:.....Sign.....

Appendix 1: Attendance list

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County

Task: Kick-off Stakeholder Consultation Meeting

Date: 30th May 2024

Venue: Project site

List of participants, contact details and signatures

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
1.	Abdala Bakari	Village Elder Nguluku B	0701201148	[signature]
2.	Omar Lumunba	Contractor - Azaa	0790379850	[signature]
3.	Jackson Mulinge	Village Admin (CGK)	0723734985	[signature]
4.	Samuel Mwurya	CGK Ag. Ward Admin	0719327132	[signature]
5.	Amini Suya	CGK - Village Admin	0722831402	[signature]

Page 6

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
6.	HUSSEIN CHUPHI	MARKET OFFICER LUNGA	0723945867	
7.	DAVID MUSYOKI	NGULUKU MARO	0745570385	
8.	RASHID MWAGAO	NGULUKU MARO	0724141041	
9.	Swaleh Tumbwe	Nguluku Maro	0713927377	
10.	GILBERT KOMBO BENA	P.M.C SECRETARY	0746197888	
11.	KASSIM M. TAMBWE	P.M.C CHAIRMAN	0704072058	
12.	JOHN Munyoki JOSEPH	member	0710440902	
13.	IBRAHIM MUTUKU	nguluku MKAO	0718366924	
14.	JEREMIAH KIJOVE	NGULUKU MARO	0725862999	
15.	BERNARD MUSYOKI	Nguluku MARO	0701257924	
16.	MARIAM CHIPHUKU	P. M. C member	0705889663	
17.	LOICE Kijove	P. M. C. V. Secretary	0723733843	
18.	Mejumaa Suleimain	MKAZI nguluku	0762 21474	
19.	AMANI MWINYI	Investment officer	0725459754	
20.	KEVIN BONGO	MARKETS OFFICER - CGK	0710586054	
21.	SULEIMAN ALI	CONTRACTOR ASSISTANT	0725205868	

Page 8

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
22.	SAUMU UCHI KHAMISI	AZAA CONSTRASTION	0705-4723 66	[signature]
23.	SIASA OMARI GAO	NGULUKU	0725929662	[signature]
24.	Mtinda Jemes	Ngukuku	0715312454	[signature]
25.	JOHN M NGUTA	Nguluku	0719306681	[signature]
26.	Wambua Nzyoka	NGuluku	0	[signature]
27.	BENARD MWLIU	NGuluku	0712331876	[signature]
28.	Waweru gitau	maro	0790078096	[signature]
29.	NDENA NZIOKA	Maaro	0791564503	[signature]
30.	JOHN MUEMA	NGULUKU	0706484519	[signature]
31.	DORCAS WAMBUA	NGuluku	0757268672	[signature]
32.	JUSTUS Kyalo	NGuluku	0745783058	[signature]
33.	Sunan kalunda	nguluku	0708446689	[signature]
34.	Mwero giyosi	Maro	0790434865	[signature]
35.	MWALUNGO NYAYA	NGuluku	0706105469	[signature]
36.	PATRICK MUTHOKA	NGuluku	0705062098	[signature]
37.	KIOKO Kiminda	VAMVANI	0745152484	[signature]

Page 9

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
38.	Samuel [illegible]	maaro	0705967701	
39.	SIOSI NGOME	NGULUKU MKESZI	0706441072	
40.	Gabriel Karimu	Nguluku	0705581598-	
41.	Andrew Mwamu	Maro/Nguluku	0719712038	
42.	MOI MICHAEL	MARO	0112134597	
43.	Omari Ali Gao	Nguluku Mkanzo	07-	
44.	MUERU JABU	MARO		
45.	John Nambua	maro		
46.	Mary G Michael	Maro	0114678225	
47.	Monica Musyoki	maro	0112461694	
48.	KASSIMU HASSANI	MARO	0791320078	
49.	SAMUEL NGUNYINYI	Nguluku B	0729419403	
50.	NYOKA N'GOME	NGULUKU B	0702674250	
51.	HELENA MZILANI	NGULUKU B	0799856102	
52.	JULIAS PAULO	NGULUKU B	0796907274	
53.	BIASHA HAJI	NGULUKU B		

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
54.	mose matsui	MARO		
55.	KABIBI Johan Katana	MARO	0113699469	
56.	JOHN MUSYIKI NDIKU	NGULUKU B	0719272703	
57.	Chirongo Mwamwee	Vanvani	0713832310	
58.	Ngala mnyapara	Ngaluku	0723932280	Ngala
59.	NGALO Mwandoje	NGULUKU B	0735117933	
60.	Mnazi Kengo	maro	–	
61.	MOSES NZIOKI	MARO MLIMANI	0722548190	
62.	Ndongoi Nyawa	Guluku B	0742139462	
63.	Joto Mnazi	Maro	0718521033	
64.	Mwendo Musyoka	maro	–	
65.	Robert Kimani mwilu	maro	0704932025	Robert
66.	Mangale ngome	nguluku		
67.	Nwanzui Kitili	NGULUKU B	0742908857	
68.	SHEHi MNAZi		0743131741	SHEHi
69.	SAMMY MUTINDA	VAMBANI	0713102295	

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
70.	JULO MAUNI	MARO	0792257828	
71.	MICHAEL MAKAU	NGULUKU B	0799690146	
72.	SULEIMAN NDONGOI	NGULUKU B	0790724002	
73.	TSUMA NGANYAWA	NGULUKU B	0740371710	
74.	CHRISPUS KIOKO	NGULUKU B	0710560470	
75.	Samson Kiniti	NGULUKU B	0705423457	
76.	Mwanasho Bakari	Maro	0	
77.	Nyamvula Mwero	Maro		
78.	Mwaka Matsui	Maro	0741191 5920	
79.	Luvuno Mnazi	Maro		
80.	HEDI MUMIA	COUNTY GOVT OF KWALE	0722460399	
81.	SALIM makau ndoto	Maro	0729775938	
82.	Paul Ngʼeu	VAMVANI	0701966235	
83.	mwatela Kamaraza	Changwani	0746564618	
84.	mwanaa hamisi mazui	Maro	0700637789	mHm.
85.	mboyu nyoha.	Maro	–	

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
86.	Sabina Mwandsha	Envasses Environmental Consultants	0705290418	
87.	Omar Said	Envasses Environmental Consultants	0710678401	
88.	James Wanderi	Envasses Environmental Consultants	0721862497	
89.				
90.				
91.				
92.				
93.				
94.				
95.				
96.				
97.				
98.				
99.				
100				
101				

Annexure 10: Proceedings of the second public participation meeting

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANYAMALA/557 IN LUNGA LUNGA SUB COUNTY.

Proceedings of Stakeholder Meeting to review Draft ESIA Study Report held at the proposed project site in Nguluku B area, Kwale County

6th June 2024

Proponent	Firm of Experts
County Department of Trade & Enterprise Development, County Government of Kwale, P.O. Box 4 – 80403, Kwale, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya. Tel:+254 722 347 155 Email: info@envasses.org

1. Meeting Agenda

The stakeholder meeting to review the draft ESIA Study Report for the County Aggregation and Industrial Park (CAIP) was held on 6th June 2024 at the proposed project site and the agenda was as follows;

1. Prayer and Introductions
2. Opening remarks by the County Government of Kwale
3. Presentation on the draft ESIA Study Report
4. Plenary discussions
5. Way forward and AOB

2. Prayers and Introductions

The meeting started at 11:30 am with a word of prayer from Mr. Rashid Mwagao, a resident of Nguluku Maro and thereafter followed by introductions. A total of 53 participants, including representatives from the County Government of Kwale (CGK), consultants, and local community members, attended the meeting.

Figure 1: Stakeholders following deliberations during the meeting to review the CAIP draft ESIA Study Report (Source: Second Stakeholder meeting, June 2024)

3. Opening Remarks by the County Government of Kwale

Mr Jackson Mulinge, the Gandini Village Administrator thanked the participants for attending the meeting and emphasized the importance of active participation during the discussions. He highlighted that the primary objective of the meeting is to review the CAIP draft Environmental and Social Impact Assessment Study Report prepared by the consultants. Mr. Jackson encouraged the participants to provide their comments and input to the draft report to ensure its effective contribution to the sustainability of the project throughout its lifecycle.

4. Presentation of the draft ESIA Study Report for the Proposed CAIP

Mr Omar Said from Envasses Environmental Consultants Limited thanked the participants for attending the meeting and informed them that it was held pursuant to Regulation 17 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya. He proceeded to give a detailed presentation of the draft Environmental and Social Impact Assessment (ESIA) Study Report for the proposed project as follows;

1. Background Information
2. ESIA Approach and Methodology
3. Policy, Legal and Institutional Frameworks
4. Project description
5. Baseline studies and findings
6. Anticipated positive and negative environmental and social impacts of CAIP
7. Stakeholder consultations and key issues
8. Environmental and Social Management Plans (ESMPs)
9. Environmental and Monitoring Plans
10. Conclusions and Recommendations

Mr Omar informed the participants that the key issues raised by the stakeholders during the Kick-off meeting held at the project site on 30th May 2024 were already incorporated in the Draft ESIA study report.

5. Plenary discussions

Mr Kassim Tambwe thanked the consultants for addressing fire risks and emergency preparedness in their report. He requested further clarification on the fire assembly point during the operation phase of the facility. In response, Mr. Amani Mwingi from the County Government of Kwale explained that the facility will have a dedicated fire assembly point.

Mr. Gilbert Kombo raised concerns about noise pollution during the construction phase. He inquired about the allocated working hours, noting that construction at night could potentially disturb neighbors. In response Mr Omar noted that the ESIA study report has recommended limiting working hours to daytime from 8:00 AM to 5:00 PM to mitigate potential noise pollution and disturbance to neighbors at night during the construction phase.

Mr Andrea Nyamare informed the participants that the proposed project will significantly enhance agricultural production. However, he emphasized the importance of mobilizing and educating farmers, stating that farmers require proper education on the correct farming techniques to ensure optimal results. In response, Mr Omar Said responded that the request for capacity building targeting farmers will be included in the ESIA Study Report for consideration by the County Government of Kwale.

Mr. Kasim Tambwe inquired whether the local community can be provided with a copy of the final ESIA study report. In response, Mr. Omar Said informed him that once the report is finalized, a copy will be shared with the village administrator through the County Government. In addition, he noted that final ESIA Study will be available at Kwale County NEMA offices and their website.

6. Way forward

Mr Omar Said thanked the participants for their participation during the meeting and informed them that their comments on the draft ESIA study report will be taken into account. He further informed the meeting that a validation meeting on the final report will be held on 7th June 2024 at 10:00am on the project site.

7. Closure of the meeting

There being no other business, the meeting ended at 1:04 pm with a word of prayer from Mr. Rashid Mwagao.

Signature: _____ Date: 6/06/2024

Ms Sabina Mwandisha
Envasses Environmental Consultants Limited
Meeting Secretary

ENVASSES ENVIRONMENTAL CONSULTANTS LTD
Tel:0722 347 155
06 JUN 2024
P.O. BOX 2013-80100, MOMBASA

Signed on behalf of the local community by:

Signature: _____ Date: 6/06/2024

Mr. Samuel Mvurya
Ward Administrator-Dzombo Ward

WARD ADMINISTRATOR
DZOMBO
LUNGA LUNGA SUB-COUNTY
Date:.....Sign.....

Appendix 1: Attendance list

ENVASSES ENVIRONMENTAL CONSULTANTS LIMITED

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County

Task: Stakeholder Meeting to review draft ESIA Study Report

Date: 6th June 2024

Venue: Project site

List of participants, contact details and signatures

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
1.	HUSSEIN CHUPHI	MARKET OFFICER L/LUNGA	0723945867	[signature]
2.	Abdalla Bakari	VILLAGE ELDER NGULUKUB	0701201145	[signature]
3.	Aman Mwinyi	Investment Officer	0725459754	[signature]
4.	JACKSON MULINGE	CGK – V/ADMIN	0723734985	[signature]
5.	SAMMY MULI MUTUKU	MAKO	0714656247	[signature]

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
6.	Swaleh M. Tambwe	Ngwaku	0713927377	
7.	RASHID MWAGAO	NGULUKU	0724141041	
8.	MOSES NZIOKI	MARO MLIMANI - V/E	0727548190	
9.	KASSIM TAMBWE	CHRM PROJECT	0704072088	
10.	GILBERT KOMBO	PNC - SECRETARY	0746197888	
11.	Hamisi M. Mwagao	Nguluku	0742045940	
12.	Paul K. Ndambo	Member.	0727548698	
13.	CHRISPUS KIOKO	NGULUKU B	0710560170	
14.	Kioko Kiminda	VANYANI	0745152486	
15.	Paul Muia	Mkongwe	0700487587	
16.	Mutinda Kioko	Nguluku A	0718765802	
17.	Loice Kyove	PNC V. Secretary	0723733843	
18.	ISAAC KYALO	NGURUKU	0724 089 600	
19.	Mohamed O Chiyamba	Nguluku	0700181614	
20.	MWAYAVA NDUNGO	NGULUKU	0799 8776	
21.	SAMUEL NGUNYINYI	NGULUKU B	0729419403	

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
22.	DAVIS MUTHOKA	NGuLuku	0705062098	
23.	MUTINDA JEMS	NGULUKU	0715317454	
24.	MWERO TSIYOSI	NGULUKU	0790434865	
25.	Samson mutuku	NGuLuku	0745423457	
26.	Andrew Mawu	Nguluku/Mwa	[illegible]	
27.	Chirongo Mulamale	Vanuani	0713832310	
28.	Gabriel kaviku	Nguluku	0705581598	
29.	Lucka Mangi Mutuku	Vambani	0708362459	
30.	HELENA MWIIU	Nguluki	0799856102	
31.	OSCAR LUMUMBA	CONTRACTOR - AZAA	0790379850	
32.	JAMES W GITAU	ENVASSES	0721862497	
33.	Siosi ngome	nguluku	0706441072	
34.	Ndongoi nyanje	nguluku B		
35.	Ali NYAONG	nguluku B	0726859684	
36.	KAMANZA KAGINYA	NGULUKU	0712114790	
37.	YAKOBO TSUMA	NGuluku	0734347562.	

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
38.	MWAMZUI KITILI	NGULUKU B	0757120758	MK.
39.	MUTUA WAMBUA	NGULUKU	0795102121	[illegible]
40.	JOTO MNAZI SHEI	MGT MAGO	0718521083	J.M.S.
41.	BAKARI KENGO	MAZO	0793586211	B.K.
42.	William Ndenge	Mavo	0795488634	Ndenge
43.	Mwajoto Mnazi Shehi	Mavo	0727483786	mangoto
44.	Legma Suleiman	Mavo	07	M
45.	Munyoki Mondolo	Mangawani	0718961199	[illegible]
46.	Omari Ali Gao	Nguluku	0716500296	[illegible]
47.	HEID MUMIA	County Investment Officer	0724602399	[illegible]
48.	Kelvin Bongo	C.M.O	0710586059	[illegible]
49.	Chaka Nyae Mwachalo	Mavo	0704541809	[illegible]
50.	Omar Said	Envasses	0768984157	[illegible]
51.	James Wandeni	Envasses	0721862497	[illegible]
52.	Sabina Mwandisha	Envasses	0705290418	[illegible]
53.	SAMUEL Mvurya	Ward admin - CGK	0719327132	[illegible]

Annexure 11: Proceedings of the third public participation meeting

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE PROPOSED KWALE COUNTY AGGREGATION AND INDUSTRIAL PARK ON PLOT L.R. NO. KWALE/MWANYAMALA/557 IN LUNGA LUNGA SUB COUNTY.

Proceedings of Stakeholder Meeting to Validate Final Draft ESIA Study Report held at the proposed project site in Nguluku B area, Kwale County

7th June 2024

Proponent	Firm of Experts
County Department of Trade & Enterprise Development, County Government of Kwale, P.O. Box 4 – 80403, Kwale, Kenya.	Envasses Environmental Consultants Limited, P.O. Box 2013-80100, Mombasa, Kenya. Tel:+254 722 347 155 Email: info@envasses.org

1. Meeting Agenda

The stakeholder meeting to validate the ESIA Study Report was held at the proposed project site in Nguluku B area, Kwale County and the agenda was as follows;

1. Prayer and Introductions
2. Opening remarks
3. Review of comments on draft ESIA Study Report
4. Presentation of final draft ESIA Study Report
5. Plenary discussions
6. Validation of final draft ESIA Study Report
7. Way Forward
8. Closing Remarks

2. Prayer and Introductions

The meeting began at 11.00am with a word of prayer from Mr. Ali Gao and thereafter introductions. The meeting was attended by 38 participants drawn from the Ministry of Interior and National Administration, County Government of Kwale, local community and Envasses Environmental Consultants Limited (Figure 1 and Annexure 1).

Figure 1: Participants following deliberations during the stakeholder meeting to validate the final draft ESIA Study Report

3. Opening remarks

Mr. Amini Suya, the Village Administrator, Mwanyamala area, thanked the participants for attending the meeting. He stated that the objective of the meeting was to validate the ESIA Study Report and urged the participants to be attentive and seek clarification where necessary. He then welcomed Mr. Amani Mwinyi from the County Government of Kwale to give his opening remarks.

Mr. Amani highlighted the potential benefits of the proposed County Aggregation and Industrial Park (CAIP) project to the local community. He emphasized that the project would boost the local economy and improve infrastructure in the area. He encouraged the participants to review the draft final report and ensure that the comments made during the second stakeholder meetings were included. He also encouraged them to provide any additional input they may have with respect to the report for action by the consultant.

4. Review of comments on draft ESIA Study Report

Mr. Omar Said from Envasses Environmental Consultants Limited gave a brief summary of the issues raised and responses provided during the stakeholder meeting to review the draft ESIA Study Report (Table 1).

Table 1: Summary of issues raised and responses provided during stakeholder meeting to review draft ESIA Study Report

Issues raised	Responses provided
Clarification on fire assembly point	A fire assembly point is designated location where staff and visitors will gather in the event of fire.
Noise pollution at construction phase	The ESIA study report has recommended limiting working hours to daytime from 8:00 AM to 5:00 PM to mitigate potential noise pollution and disturbance to neighbors.
Enhancement of agricultural production	Training farmers on modern and sustainable agricultural practices
Availability of final ESIA study report for the community members	The report will be accessible through the County Government, at the NEMA offices and website (www.nema.go.ke).

5. Presentation of final draft ESIA Study Report

Mr. Omar presented the final draft ESIA Study Report incorporating the stakeholders' views, comments and concerns regarding the proposed CAIP.

6. Plenary discussions

Mr. Ali Gao pointed out that the proponent should landscape undeveloped sections of the proposed project site at operational phase of the CAIP. He further inquired about where environmental incidents such as improper waste management should be reported once they occur. In response, Mr. Omar stated that the incidents should be reported to the County Government of Kwale as they are responsible for management of the CAIP.

7. Validation of final ESIA Study Report

In the absence of further comments on the ESIA Study Report, all the participants validated the final draft ESIA Study Report.

8. Way forward

Mr. Omar stated that the proceedings of the meeting will be prepared and the additional comment on landscaping incorporated in the final ESIA Study Report. In addition, he informed the participants that the Study Report will be advertised for a period of thirty (30) days in Kenya Gazette, newspapers with a wider nation-wide circulation and local radio inviting the public to submit oral and written comments to NEMA.

9. Closing remarks and prayers

Mr. Mohamed Mwatepwe, the Area Chief – Dzombo location, thanked the proponent for initiating the project and noted that it will enhance development in the area. He urged the County Government to collaborate with the community to ensure successful implementation of the project and realize its intended benefits.

There being no other business, the meeting ended at 12.00 pm with a word of prayer from Mr. Ali Gao.

Signature: _____ Date: 7/06/2024

Ms Sabina Mwandisha
Envasses Environmental Consultants Limited
Meeting Secretary

ENVASSES ENVIRONMENTAL CONSULTANTS LTD
Tel:0722 347 155
07 JUN 2024
Email: info@envassas.org
P.O. Box 2013-80100, MOMBASA

Signed on behalf of the local community by:

Signature: _____ Date: 7/6/24

Mr. Mohamed Mwatepwe
Area Chief – Dzombo Location

DZOMBO LOCATION

Appendix 1: Attendance list

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Kwale County Aggregation and Industrial Park on Plot L.R. No. Kwale/Mwananyamala/557 in Lunga-Lunga Sub-County

Task: Stakeholder Meeting to validate ESIA Study Report

Date: 7th June 2024

Venue: Project site

List of participants, contact details and signatures

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
1.	Abdallah Bakari	Village elder - Ngulukú B	0701201146	[signature]
2.	Amiri Suya	V/ADM Mwangamala	0722 831402	[signature]
3.	RASHID MWAGAO	NGULUKU MARO	0724141041	[signature]
4.	Swaleh M. Tambwe	Nguluku	0713927399	[signature]
5.	KASSIM M. TAMBWE	CHAIRMAN PROJECT	0704072088	[signature]

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
6.	GILBERT KOMBO BEWA	PMC- SECRETARY	0746197888	
7.	Hamisi M. Mwagao	Ngululu	0742045940	
8.	MOSES M. NZIOKI	Maro Mlimani VE	0727548190	
9.	JOHN M NGUTA	Mgululu	0719306687	
10.	CHRISPUS Kioko	NGULULU B	0710860470	
11.	ANNA KIMINDU	Moro	0743442646	A.M.
12.	LOICE Kyove	PMC. V. Secretary	0723783843	
13.	MUNEE MZEMDU	VANVANI	0714351367	
14.	Omari Ali Gao	Ngululu B.	0716500296	
15.	KIOKO Kimindu	VYAMVANI	0745152484	
16.	MWAYAYA NDUNGO	NGULULU	0799687776	
17.	Samson Mutuku	Ngululu	0745423457	
18.	Gabriel Kaviku	Ngululu	0704581598	
19.	ISAAC KYALO	"	0729089600	
20.	LUCKY MAINGI MUTUKU	VANVANI	0708362459	
21.	Amani Mwilwi	Investment officer	0725459754	

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
22.	Mohamed Mwatsahu	Asst. Chief-Dzombo	0720357594	[illegible]
23.	PETER MUNYOKI	VAMVANI	0729259766	[illegible]
24.	PRICILLAH NDUNGE MBAATI	VAMVANI	0711518470	[illegible]
25.	GRACE NYANTE	MARO	0726160723	
26.	MERCY GUDUHO	MARO	–	MG
27.	MUKAMBE Mbongo	MARO	–	no
28.	EUNICE Chondo	MARO	0790619972	EC.
29.	SIDSE Mgome	maro.	0706400072	S.A.
30.	SAUMU KHAMISI	AZAA CONTRACTOR	0705-472366	[illegible]
31.	HEIDI MUMIA	County Investment office	0724602399	[illegible]
32.	Hussein Chaphi	Market Superintendent	0723945867	[illegible]
33.	Kelvin Bongo	C.M.O	0710586059	[illegible]
34.	Jackson Mulinge	CGK-V/ADMIN	0723734985	[illegible]
35.	Omar Said	ENVASSES	0706754101	[illegible]
36.	Sabina Nthandisha	ENVASSES	0705290418	[illegible]
37.	James Wanderi	ENVASSES	0721862497	[illegible]

NO.	NAME	AFFILIATION	TELEPHONE NO/EMAIL	SIGNATURE
38.	SAMUEL MWUPAYA	CGK as Ward Admin	0714327132	
39.				
40.				
41.				
42.				
43.				
44.				
45.				
46.				
47.				
48.				
49.				
50.				
51.				
52.				
53.				

Annexure 12: NEMA practicing license for the firm, Envasses Environmental Consultants Limited

EAE 23060347

FORM 7 (r.15(2))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/20222

Application Reference No: NEMA/EIA/EL/26823

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: **12/18/2023** Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

Annexure 13: NEMA practicing license for Team Leader, Mr. Simon Nzuki

FORM 7

EAE 23060245

(r.15(2))

nema

Mazingira Yetu | Uhai Wetu | Wajibu Wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/20271

Application Reference No: NEMA/EIA/EL/26824

M/S **Simon Kioko Nzuki**
(individual or firm) of address
Po Box 2013 - 80100 Nairobi

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: **1/5/2024** Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

Annexure 14: NEMA practicing license for Environmental Expert, Ms. Jane Gitau

EAE 23060348

FORM 7 (r.15(2))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/20221

Application Reference No: NEMA/EIA/EL/26825

M/S **Jane Mukami Gitau**
(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 **2015**

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

Issued Date: 12/18/2023 Expiry Date: 12/31/2024

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified