

ENVIRONMENTAL SOCIAL IMPACT ASSESSMENT PROJECT REPORT

THE PROPOSED LIMESTONE MINING QUARRY AND CONSTRUCTION OF CLINKER PROCESSING PLANT AT MAGANDIA AREA, NG'OMBENI SUB- LOCATION, WAA LOCATION, MATUGA SUB-COUNTY, KWALE COUNTY, KENYA



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CERTIFICATION

This Environmental and Social Impact Assessment (ESIA) Study report was carried out by a team of consultants from Earth Resources Exploration Ltd (see table 1 below) to assess the scope of the proposed Mining of Limestone, Quarry Operations, and Construction of Clinker Processing Plant at Magandia -Denyenye Area, Ng’ombeni Sub- Location, Waa Location, Matuga Sub-County, Kwale County, Kenya. This ESIA study report provides an accurate and truthful representation of findings established during the study and has been prepared in accordance with the Environmental (Impact Assessment and Audit) Regulations 2003, revised 2019 and International Environmental Safety Guidelines. It fulfills the requirements of section 147 (part 2) of the Environmental Management and Coordination Act (EMCA) 1999, Rev. 2019.

Table 1: List of Environmental Experts

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Mr. Michael Barasa (NEMA Lead Expert Reg.1525)	MSc. Environmental science Bsc. Ecology and Natural resource management	15 Years	Earth Resources Exploration Ltd, (Environment Department)
Others: Snr Geologists Assist. Geologists And Field Assistants	Msc and Bsc.Geology JORC Compliant	24 years	Earth Resources Exploration Ltd, (Geological Department)

SUBMISSION OF DOCUMENTATION

I **Barasa Michael Kisiangani**, hereby submit this Environmental and Social Impact Assessment Study Report for the proposed Limestone Mining, Mineral Transportation and Clinker Processing Plant at Magandia Area, Ng'ombeni Sub- Location, Waa Location, Matuga Sub-County, Kwale County, Kenya. To my knowledge all information contained in this report is accurate and a truthful representation of all findings as relating to the proposed project.

Signed at Nairobi on 28th Day of May, **2021**.

Signature: 

Designation: **NEMA EIA/Audit Lead Expert REG. No.1525**


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SUBMISSION OF DOCUMENTATION

I Ms **MIRIAM ANZAZI NGOLO** on behalf of Bamburi Cement Ltd, hereby submit this Environmental and Social Impact Assessment Study Report for proposed Limestone Mining and Clinker Processing Plant development at Magandia Area, Ng'ombeni Sub- Location, Waa Location, Matuga Sub-County, Kwale County, Kenya. To my knowledge all information contained in this report is accurate and a truthful representation of all findings as relating to the proposed project.

Signed at Nairobi on this **10TH** Day of **JUNE, 2021**.

Signature: 

PROJECT PROPONENT:

ACRONYMS

4WD	Four Wheel Drive
ACC	Acting County Commissioner
ADR	Alternative Dispute Resolution
AIDS	Acquired Immunodeficiency Syndrome
ALPs	Alternative livelihoods Plans
AQG	Air Quality Guidelines
BCL	Bamburi Cement Limited
BMUs	Beach Management units
CaCO ₃	Calcium Carbonate
CDAs	Community Development Agreements
CEO	Chief Executive Officer
CGK	County Government of Kwale
CIDP	County Integrated Development Plan
CIDP	County Integrated Development Plan
CITES	Convention on the International Trade of Endangered Species
CMK	Cortec Mining Kenya
CO	Carbon monoxide
CSR	Corporate Social Responsibility
dBa	Decibels
EA	Environmental Audits
ECD	Early Childhood Development
EEZ	Exclusive Economic Zones
EHS	Environment health and safety
EMC	Environmental Management and Coordination
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ERC	Energy Regulatory Commission
EREL	EARTH RESOURCES EXPLORATION LIMITED
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Safeguards
ETSPs	Employment, Training and Succession Plans
EU	European Funded
<i>FGD</i>	Focused Group Discussions
FGDs	Focused Group Discussions
GIS	Geo Information System
GLA	Government Lands Act
GOK	Government of Kenya
GPS	Geographical Positioning Systems
<i>GSU</i>	General Service Unit
H ₂ S	Hydrogen Sulphide

HH	Household
HIV	Human Immunodeficiency Virus
ILO	International Labour Organization
KCAA	Kenya Civil Aviation Authority
KES	Kenya Shillings
KETRACO	Kenya Electricity Transmission Company Limited
KFS	Kenya Forest Services
KMD	Kenya Meteorological Department
KMD	Kilometers
KPLC	Kenya Power and Lighting Company
KV	Kilo Volt
KWS	Kenya Wildlife Service
KWSCo	Kwale Water and Sewerage Company
LCA	Life Cycle Assessment
Lpcd	Litres Per Capita/Day
LPG	Liquefied Petroleum Gas
LRTI	Lower Respiratory Tract Infection
LTA	Land Titles Act
m asl	Meters Above Sea Level
MCP	Mine closure plans
mg/m	Miligram Per Cubic Meter
MSDS	<i>Material Safety Data Sheets</i>
Mt	Metric Tons
MWh	megawatts hours
NEAP	National Environmental Action Plan
NEMA	National Environment Management Authority
NGO	Non Governmental Organizations
NMK	National Museums of Kenya
NO ₂	Nitrogen dioxides
NPEP	National Poverty Eradication Plan
OMC	Online Mining Cadastre
OSHA	Occupational Safety and Health Act
PAPs	Project Affected Persons
PAW	Pacific Wildcat Resources Corps
pH	Power of Hydrogen
PIC	Prior Informed Consent
PID	Preliminary Index Diagrams
PLHIV	People Living with HIV
PM	Particulate Matter
PPE	Personal Protective equipment
PPM	Parts Per Million
RDA	Registration of Documents Act
RLA	Registered Land Act

RPM	Respirable Particulate Matter
RTA	Registration of Titles Act
SDG	Sustainable Development Goals
SHE	Safety Health and Environment
SO ₂	Sulphur dioxides
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infections
t/y	Tons per Year
TB	Tuberculosis
TDS	Total Dissolved Solvents
TUM	Technical University of Mombasa
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
URTI	Upper Respiratory Tract Infection
UTI	Urinary Tract Infection
VOC	Volatile Organic Compound
WHO	World Health Organization
WMO	World Meteorological Organization
WRA	Water Resources Authority
WRA	Water Resources Authority
WSSD	World Summit for the Sustainable Development
WWF	World Wide Fund for nature

ACKNOWLEDGEMENT

Earth Resources Exploration Limited (EREL) appreciates all the individuals and organizations that were consulted and for their support towards the successful completion of this project study report. The task of gathering data and field work visits for the project study report was much eased by field lead experts, Enumerators, and more importantly, the Kwale County Government and the County Commissioners Office.

The final report is the result of a collaborative process which drew on the effort, knowledge, and patience of the various experts, and Earth Resources Project Field assistants, Chiefs and location Community. Others that have not been named here, their efforts are earnestly recognized.

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EXECUTIVE SUMMARY

Environmental and Social impact assessments

Mineral resources are the most precious assets of the nation which need to be protected and subjected to sustainable use with the aim of satisfying short term need for mineral materials and the long-term goals of social and economic development. A means of such protection within the Mining Value Chain of any nation is by integration of safeguard processes such as the enforcement of Environmental and Social Impact Assessments (ESIAs) before commencing prospecting and exploration, as well as before the actual mining takes place. In Kenya, the requirement for an EIA license is obligated by section 58 of the Environmental Management and Coordination Act (EMCA) 1999 amendment 2019, which stipulates that a proponent must seek an EIA license “notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya...”. The requirement for an EIA license applies to all projects listed in the Second Schedule to the Act. Among the listed activities is an activity out of character with its surrounding, any structure of a scale not in keeping with its surrounding or major changes in land use.

The purpose of the Environmental Impact Assessment is to identify potential positive and negative environmental impacts associated with the proposed project and provide recommendations on how to take advantage of the positive impacts on one hand and how to mitigate the negative environmental impacts on the other.

The project proponent (Bamburi Cement Limited) appointed the Earth Resources EIA experts to conduct an environmental impact assessment for the proposed project and prepare a project report for submission to National Environment Management Authority (NEMA). This is in line with section 58 of the Environmental Management and Coordination Act 1999 amendment 2019 and its subsidiary legislation, Environmental (Impact Assessment and Audit) regulations, 2003 contained in the Kenya gazette supplement No. 56, legislative supplement No. 31 Legal notice No. 101 of 13th June, 2003.

Project Background

Bamburi Cement Ltd owns 1,500 acres piece of land at Magandia area, in Ng'ombeni Sub Location, Waa Location, Matuga Sub-County since 1950s. The land currently has planted exotic trees that forms a well demarcated block of forest inter-spaced with cleared access paths/roads. The land also is endowed with natural resources such as carbonaceous rocks known as Limestone. It's against this background that the company has designed Clinker manufacturing plant occupying the land near the Likoni-/Lunga-Lunga highway while the rest of the land will be used for Limestone Mining in order to scale up Bamburi business strategy and establish a 5000 Ton Capacity per Day Clinker Plant whose lifespan will last the next 50 Years. Limestone Mineral is the main raw material for Cement Processing and other materials include Bauxite, Shale, Copperslug, Iron Ore etc. Currently, the land remains unused and with vegetation consisting random bushes, planted forest, old housing structures, temporary General Service Unit Police Camp. Other structure are a dairy farm tenant (Mianji dairy Farm) and an existing own Bamburi Site office block. Bamburi Cement currently holds the prospecting rights in the project location as

per application PL/2018/0099, has been undertaking prospecting activities since 2017-2018 and now the company is in advance stages of applying for Mining License to the Ministry of Mining as per set out guidelines, hence the purpose of this Environmental and Social Impact Assessment.

This report covers aspects of the proposed limestone minerals Mining, transportation aspect of the project and development of a Clinker plant within the project area. Legal Notice No. 31, The Environmental management and Coordination Act (No. 8 of 1999), Amendment of the second Schedule, Mining projects such as the one under this study are classified as High-Risk Projects under Part 3, which references “Mining and Other Related Activities (such as the proposed Shale Mining Project), thus demands adequate due diligence.

Methodology

The process identified both negative and positive impacts from the project, and subsequently developed an Environmental and Social Management Plan (ESMP) that would mitigate the possible impacts on the environment. The study approach included Environmental Screening, Spatial Mapping, Environmental Scoping, Desk studies, Field Assessment and baseline survey, Public Consultations using integrated approach described in the report and documentation of the streams of findings. Streams of findings include data from the household consultations, other consultative meetings and discussions, GIS data, laboratory and in-situ Air, Water and Noise Sample data, observation sheets, check lists, random informant survey, lead stakeholder institutions visits, desktop, regulatory reviews, literature reviews, etc.

Geology: What is Limestone and its relative uses?

Limestone is a common type of carbonate sedimentary rock typical in the coastal region of Kenya. It is composed mostly of the minerals calcite and aragonite, which are different crystal forms of calcium carbonate. Limestone forms when these minerals precipitate out of water containing dissolved calcium.

Limestone has numerous uses: as a building material, an essential component of concrete (Portland cement), as aggregate for the base of roads, as white pigment or filler in products such as toothpaste or paints, as a chemical feedstock for the production of lime, as a soil conditioner, and as a popular decorative addition to rock gardens. Limestone formations contain about 30% of the world's petroleum reservoirs. Limestone also contains properties that assist fossil materials to remain preserved for millions of years, thus can be used as a preservative for historical studies and new discoveries and once this is discovered, the site is abandoned for the state to determine its next course of use (cultural heritage laws present regulations which cover for this use).

Limestone occurs along the entire Kenyan immediate coastal strip, and at the study area it is more prominent between the Likoni road and Lungalunga Border post, sections between the ocean shores and the highway. This also includes sections between Ng’ombeni and Kitivo Sub-locations.

Project Cost

The proposed mining and transportation project development phase, is valued at an estimated cost of ***Five Hundred and Thirty Sixty Million (KES. 536Million) Kenya Shillings.***

Summary of Findings for Baseline Survey and Environmental Impacts for the Proposed Project

- A total of 1,261 No. household members were subjected to household survey using 260 No. HHs questionnaires in 12 villages within Ngombeni, Waa Locations.
- Household baseline survey was carried out in between 31st March 2021 and 3rd April 2021 within Ng'ombeni Location where the in tangent community to the proposed site were located. The entire target site is owned by the proponent Bamburi Cement Limited, thus there was no need for land acquisition interventions. A small section of Kitivo Sub-location from Waa location was include to cover for a mineral transport corridor extending from the target project area. This additional section details only Mineral transport aspect.
- About 260 households, a mixed scope of institutions (governmental, private and individual) were interviewed in total. The interviewed community mostly covered Ng'omeni location ans Kitivo sub-location of Waa location.

Matuga-Kundutsi Baseline Findings:

1. **Household size:** The mean population of the individual sampled households was 4.8 persons per household (46% female and 54% male)
2. **Travel distances and accessibility:** Mean distances to major facilities - trading centres (2.37Km), -health dispensaries (2.59Km), primary schools (1.74Km) and to water sources (0.83Km) respectively.
3. **Water Accessibility:** Main water source is Well/spring (25.8%), Communal piped water (20.4%), Stream/river (6.9%), Borehole 60%, rain water (18.5%) and 1.5% from other sources.
 - The few water pipe outlets whose source is from Kwale Water Supply in the study area are centrally shared between villages at strategic points. Average distance to water points in the study area is 0.83 Kilometers.
 - Most of the community (80%) spent less than 30 minutes to acquire their household water. About 15% spent about 31 to 60 minutes to go, get the water and return home. 1.9% spent more than 1 hour, 1.5% more than 2 hours and 1.2% spent over 4 hours. Water access fluctuates with seasons, dry and wet period.
4. **Per Capita Consumption of drinking water:** The per capita consumption of water within the surveyed households was at a mean of about 24.7 litres per person per day.
 - The mean minimum recommended World Health Organization (WHO) per capita water consumption for domestic use is determined according to drinking (3-4 Litres Per Capita/Day Lpcd), food preparation and clean-up, (2-3 Lpcd), Personal hygiene (6-7 Lpcd), and laundry (4-6 Lpcd), or about placed at 17.5 litres per person per day (Reed et. Al. 2005).
 - Therefore, each individual (out of 1260 No.. Individuals in 260 households) is above below target by about 7.12 litres of the WHO recommended minimal standard value.
 - However, this was not a water scarce season, and also, some individuals consumed way above the normal average while some consumed way below the normal average. Those who consumed way below the normal average should be considered for interventions.

5. **Water Treatment:** Only the piped water supply is pre-treated by the Water Service Provider Company before delivery to clients.
6. **Sanitation:** In Kwale County the main type of toilet facility is the pit latrine. In 2018 the latrine coverage in the County was 55%, which was below the national target of 90%.
 - During the survey, it was determined that the major toilet designs options distributed among the households were usage of bush and pit latrines at about 20.4% and 58.3% respectively. Flush toilets were at about 17%. Most (66%) are privately owned.
7. **Solid Waste Handling:** Most of the residents (about 64%) get rid of their waste by burning while 10% discard their waste into the open. 23% have open dumpsites. 3% said they throw their waste into water ways to be transported down stream. Some residents practice more than one method of waste handling.
8. **Housing Construction materials sources:** Most households are constructed by stones and corrugated iron at 74.6% and 76.5% respectively. Only 4.2% were constructed with by bricks and 22.7% by mud, 21.9 with thatched rafts and 19.6 with timber.
9. **Health Care:** The County has a total of five (5) government hospitals, ten (10) health centres and ninety (90) dispensaries located in Msambweni, Matuga, Lunga-Lunga and Kinango Sub-Counties.
 - The doctor and nurse population ratio stands at 1:76,741 and 1: 3,133 respectively. In addition, the county has a total of thirty-six (36) private health facilities and nine (9) health facilities owned by faith-based organizations.
10. **Alternative Medical treatment:** There are many varieties of forest medicinal products used and sold by local community trades from the local forests.
11. **Mining and Industries:** Kwale County has a huge potential for mineral exploitation. Clay and Shale soils, limestone, silica are among these resourceful materials
12. **Form of Employment:** Those below 18 years were about 33.2% of the general population. This population, including the spoilt entries which could not be included in the analysis was about 36.9% of the total household population.
 - 41.1% were considered unemployed. 12.12% were self employed, 9.2% were paid employees, and 0.6% were employers. From this ratio, a few were students or were engaged in forms of learning institutions.
13. **Sources of Income:** Most of the households rely on kitchen gardens. Those that have larger farms take excess harvests to the local markets.
 - 13% depend on farming, 12% on trading, 5% on Livestock, 1% on artisan mining, 1% on fishing and 68% from other sources. Livestock raring was ranked at 5%.
14. **Household Income levels:** 16.8% of the households earned less than 1,999Kshs ad 12.9% earned between 2000 and 3,999Kshs a month. Another 16.4% earned about 4,000 to 7,999Kshs. The cohort levels gradually drop with increased value earned. 13.7% earned between 8,000 and 12,999Kshs, 12.5% earned 13,000 to 17,999Kshs and 9.8% earned 18,000 to 22,999Kshs.
 - Higher earners were fewer in population as observed. 6.3% earned between 23,000 and 26,999Kshs, 6.6% earned 27,000Kshs to 30,999Kshs ad 4.4% earned between 40,000 and 50,999Kshs. Only 0.8% of the population earned above 60,000Kshs.
 - In some instances, monthly income is dependable on seasonal variation of markets and products.
15. **Air Quality & Water Quality tests:** Recently done at the Bamburi cement facility at Denyenye. All parameters were found to be compliant (See appendix 16)

Perceived positive Impacts on Project Area Households: 66% thought that the project would impact their lives positively or negatively. Mostly (60% of entire respondents) valued the project for employment benefits, cheap cost of cement, increased economy and others. Specifically, the project anticipated to improve Businesses, livelihoods, Infrastructure and Local and County Economy.

Perceived project impacts on Current respondents living in daily Community Operations: In general, the main factors which contributed to negative impacts were Environmental pollution, reduced graze-lands, health issues, nepotism and tribalism playing out and loss of community livelihood. The community highlighted that they looking forward for employment and so the project should first assure the community that they would not be sidelined. A few didn't see themselves benefiting from the project, thus he does not support the initiative

All of the 260 No household population responded to this question. 21.9% said that the project should prioritize dealing with air pollution. 15% thought that the project should consider community involvement in the project cycle in terms of negotiations and CSR projects. 12.3% thought that health delivery should be considered while 11.2% thought that safety and health issues should be factored during the project implementation and operation of the project. 6.2% thought that environmental pollution should be a key consideration. Others are detailed in the report. Among outlier responses were: Involve the community in decision making processes, during negotiations and public consultations; involve the community while processing improvement of livelihood projects and Personal Protective equipment (PPE) to be encouraged among those living near the area

Feedback from Statutory Institutions Expert's Consultation

The public consultation also covered interactions and discussion with officers in key government ministries and departments at both national and county level who are the custodian of information and key stakeholders for the project. Each of the stakeholders interviewed had their generalized views on how the proposed project would relate with their respective operations and how they would coordinate within the projects value chain.(See details under Public participation) The following section presents general views abstracted from the consultations held.

- a. County development and Social Services
- b. Kenya Forest Services Ecosystem Conservator
- c. Kenya Wildlife Services
- d. Coast Regional - Mines and Geology
- e. Asst Chief Ng'ombeni Sub-Location
- f. Deputy County Commissioner Office (Acting ACC)
- g. Public Health Department
- h. Youth and Gender Services (National Office)
- i. County Roads and Public Works Department
- j. County Lands Office

- k. Chief County Finance Office
- l. Kwale Water Services Company

Private and Public Institutions Assessments (Formal and Informal)

The survey considered institutions and institution categories which bear a direct or indirect relationship with the proposed project.

- m. Bamburi Cement Liaison Officer (Ng'ombeni, Denyenye Site office)
- n. G4S Officer in Charge, Kwale Bamburi Facilities
- o. Bodaboda Youth representatives (Chairman and Assistant)
- p. General Service Unit Police-Site Manager Inspeckta
- q. Kwale Eye Clinic
- r. Smoky Hill Quarry Limited
- s. Chairman Ng'ombeni location
- t. World Wide Fund for nature (WWF), South Coast Region
- u. Transporters Service Operators (Potential Service providers)
- v. Fuel Service Station Operators
- w. Coast Calcium Limited (Mining Company)
- x. Miyanji Dairy CEO
- a. Mianji Dairy Farm Workers
- b. Timbwani Beach Management Unit and fishermen, traders
- c. Denyenye Beach management Unit and fishermen , traders
- d. Women Firewood Collectors Community (Magandia)

Community meeting held with Local admin and community representatives

A meeting was set to hold discussions with the project area chiefs and assistant chiefs on the 2nd of April 2021. The meeting was attended by 9 no institutional representatives. The meeting was set by the Matuga Location area chef Mr Athman H Macheso and was attended by the Waa Chief, Ng'ombeni assistant chiefs, Bamburi cement Liaison officer and the EREL team. The meeting was held at the Ng'ombeni chief's office.

Summary of Concerns and related responses

- The proposed clinker plant will be among other development projects in Matuga Sub County that is likely to transform and foster development in the area. Others include learning institutions such as Waa Ng'ombeni Polytechnic, Matuga Youth Polytechnic, Kwale National Polytechnic. There are also upcoming projects such as proposed campus for Jomo Kenyatta University of Agriculture and Technology, a Wholesale Market (EU Funded) coming up at Kombani Junction, Blue economy Kwale marine Institute, Water Front Park, Open recreation beach area at Ukunda.
- Need to involve both National and County Governments officers including Ward administrators and village elders in the project sensitization framework.
- Community benefits in extractive industry shall be safeguarded as per Mining Act, for example: - CDAs and Bamburi CSR good practices.
- Local community expressed concerns on the possible environmental risks as a result of the proposed project, such as emission of dust, noise, increased traffic and others which may impact the environment. The ESIA aims at identifying and mitigating all environmental, social, safety and health issues.

Summary of the Meeting with the Ng'ombeni and Waa Location Community Representatives

Objective: The main objective of the discussions was to engage the group in order to sensitize on the proposed project, discuss the key concerns raised by the group.

Outcome/ feedback from the local community discussions

- Economic benefit the community is by far outweighs the negative impacts/fears if any.
- The local community will constitute part of employees in accordance to the Mining Act 2016 and shall be based on technical skills required by the company operations.
- Leaders (administrative, political and civil society) in the area to assist the local community to come up with a Community Development Agreement (CDA).
- Stakeholder's engagement should be continuous, inclusive with representatives such as chiefs, MCAs, Parliamentary representatives, the government, vulnerable community members, women, youths etc.

Summary of Consultative meeting with Key Technical/ Management staff from Bamburi Cement

The Bamburi Cement Limited company representatives met for the discussions to help consultant understand company practices, plans, and lessons to inform better operations of proposed new plant and limestone quarry activities. The key staffs were: **1).** The Environment Health and Safety representative, **2).** The company Geologist/Quarry manager, **3).** The Plant Manager and the **4).** Package of Information from the Indigo Project Manager and director strategy. The following key points came out of discussions;

Summary from Bamburi cement Visit

- The upcoming clinker plant at Denyenye will be fully contemporary and this will be a major technological improvement to the existing plant at Bamburi, Mombasa.
- The Lafarge ecosystem group dealing with rehabilitation plays a major role and is responsible for ecosystem balancing and restoration of Quarry environments. Once the quarry process is done, the ecosystem team takes up the process scientifically.
- Illegal miners from neighboring properties have died due to attempts of carrying out directional mining into Bamburi cement farm, causing fatal underground collapses
- BCL site is advised to develop a higher water consumption cap for the sake of the community
- The major environmental, social, safety and health impacts from the plant include: Dust and particulate emission, Fatigue, Material spillage, Complaints from the public and statutory offices, infrequent failed filters.
- Technology improvements on the proposed plant will involve plant upgrade to match contemporary global standards
- Recommendations for dust control include: Paving of roads, use of water boozers (sprinklers), Tree planting along perimeter and within the mining facility where permissible, Road diversions across the perimeter instead of along perimeters, Strategic placement of the plant to prevent wind path dust from settling in habitable areas.
- In addition to compliance to the Local Content statutory requirements through adherence to CDA regulations, Bamburi cement will influence a number of CSR projects which will be beneficial to the community.
- From the community survey, County Planning Documents, Statutory and private institution respondents it is evident that the county local community suffers majorly from lack of employment. Bamburi cement will play a major role in creating direct as well as indirect employment.

- The type of mining conducted by Bamburi cement is open-cast mining (uncovering, removing the mineral and then covering).
- Machinery and materials include a variety of mining machines, drilling machines, excavators and trucks.
- After the above (mining) process, is the material preparation process
- Waste from the process include scrapes, oil, containers, filters, spares, paint, oils, etc
- Environmental impacts realized from the mining process include vibrations, truck and machinery (equipment) noise.
- Quarry staffing includes outsourced and in-house staffs.

Overall summary of Positive Impacts associated with the proposed Clinker & Quarry project

- Employment creation
- New business environment for rental and food vending business
- New revenue for the County and National Government
- Acquisition of new skills required at quarry and clinker plant and this will trigger start of new courses in existing institutions and new education institutions will emerge
- Access to more firewood for local communities, women and youths due to phase based tree felling to pave way for the Quarry and Clinker Plant
- Infrastructural development due to development opportunities created by CSR and CDA supported by Bamburi Cement (road, health, water, security)
- Improved security due to foreseen increased lighting , improved security patrols and utilization of fallow land and forests in the area
- Attraction of new developments in the area
- Increased value of land due to the clinker plant and related demand for housing
- Improved standards of living among locals, workers and neighboring community
- Reduced conflict due to busy environment
- Reduction in drug abuse and use of alcoholic drinks/powers or puffs since local youths who have been idle will have reason to remain sober due to potential employment opportunities
- Improved equity and inclusivity since Bamburi will give employment opportunities for both men, women and youths in employment cadre/age

Overall summary of negative project Impacts (including fears) as perceived by the local community/experts opinion

- Increased traffic hence associated safety and health impacts, road degradations
- Air pollution (dust,noise,vibrations) leading to infertility of land and health issues due to clinker and Quarry operations exacerbated by Wind storms from blowing winds from Ocean.
- Social and Cultural erosion due to visitors seeking employment opportunities
- Potential impacts on fishery and marine activities along the beach
- Urbanization around Denyenye and Ngombeni may overstretch the existing social amenities
- Land access and resource based conflicts, for example; Bodaboda youth operators access to the beach, artisanal Quarry miners seeking building stones from limestone, encroachment.
- Human-Wildlife conflicts (project construction, quarry operations may trigger migration of snakes and aquatic animals when vibrations emanate from the lower parts of the facility).
- Clearance of vegetation cover leading to reduction of planted Forest cover-Preparation Stage

- Increased solid waste discharge into environment (plastics, papers, hazard materials)
- Interference with water quality, water pollution as a result of Quarry activities and continuous exploratory drilling into aquifers
- Increased demand of sanitation and housing settlements could lower quality of living
- Contamination of soils with oils, petroleum chemicals and foul effluent
- Alteration of Natural habitats (flora , fauna and aquatic environments)
- Risk of breaking quarry cliffs and banks where deep excavations exist.
- Power–Outages during relocation of existing powerlines
- Storm water discharge points as it flows into the nearest channel connecting the ocean.
- Traffic accidents during quarry operations and clinker operations, especially at the road Junctions linking the highway to the interior where the resources are found.
- Work Place Health and Safety related issues related to operations of the clinker and related traffic within and around the project area
- Risks of fire during operations of electric and fuel motor engines
- Visual impacts of the clinker plant mixing/load/off-loading activities, its emissions and related Quarry operations
- Extrusive Lighting from the facility should be well beamed to avoid intrusions of neighboring facilities or points of interest
- Spread of Diseases due to high population activities

Overall summary of proposed mitigation measures

Potential Impact	Proposed Mitigation
Terrestrial Habitat Alteration	<ul style="list-style-type: none"> • Ecological & biodiversity studies of target areas with an objective of establishing statistics. • Use human labour as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion. • Undertake selective (or periodic-limited) clearance by clearing demarcated areas for Mine Operation, Offices and for Extraction of Limestone Mineral. • The demarcated section for limestone mining should be exhausted before opening a new section, and should also be rehabilitated as the newly demarcated section is extracted. • Create buffer zone with vegetation.
Aquatic habitat alteration	<ul style="list-style-type: none"> • Minimizing clearing and disruption to riparian vegetation.
Interference with Wildlife	<ul style="list-style-type: none"> • Conduct internal studies of the ecology and biodiversity of target areas with an objective of establishing species statistics and their conservation status. • Avoid unnecessary harming of fauna species. Relocate where necessary and if harmful, liaise with the Kenya Wildlife Service (KWS) for assistance.
Soil erosion	<ul style="list-style-type: none"> • Soils excavated from the project area should be used for re-filling and should not be left exposed to wind or water for long periods. Stabilization may be done using rapid grasses. • The contractor should avoid steep terrain during the transportation of material by using alternative routes or use light vehicles where appropriate. • Vegetation should be minimally disturbed during the Mining phase to reduce soil erosion. • Re-plant degraded areas with local species common in the area to complement natural vegetation regeneration to improve ground cover. • The project should monitor for potential fugitive mechanical or hydrology aided migration as a result of operation of the project or maintenance of roads
Noise Emissions	<ul style="list-style-type: none"> • Noise reduction technologies - silencers/mufflers and provision of hearing protection devices for workers using equipment such as power saws (for vegetation clearing) and compressors. • Implement an excessive Noise management programme to worker who are exposed to

Potential Impact	Proposed Mitigation
	<p>Noise.</p> <ul style="list-style-type: none"> • Install contemporary equipment that will assure noise reduction as per manufactures lowest declared limits. • Carry out periodic medical examination to worker exposed to Noise. • Monitor and record noise performance to establish operation norms and mitigate outlier situations, as the Noise regulation Parameters are being observed.
Air Pollution (dust, fuel emissions)	<ul style="list-style-type: none"> • Transport vessels should be well maintained to minimize exhaust fume emissions. Old malfunctioning vehicles should be prohibited from BCL business • Transporting of minerals in tippers should be under tarpaulin covers to eliminate windblown fugitive dust from the load • Speed limits for vehicles should be observed • Wetting of work areas and selected road sections should be a responsibility of BCL and the contractor associated with the transportation of the material • Provision of dust masks for use when working in dusty conditions
Water Pollution	<ul style="list-style-type: none"> • Location of the mines should be at a safe distance from Community Water-point Facilities and should bear adequate barriers to prevent hydraulic migration. • The depth of the mines should be controlled as per the hydrological report limits provided in this report. • Construction of a borehole on or near the facility should be subjected to a separate Environmental Impact Assessment (EIA) report with an additional objective of clarifying measures in place to prevent contamination of the fresh ground water aquifer located below saline waters. • Stock piling of mining equipment and spares for unnecessarily long periods and unprotected from weather should be avoided. • Water points near the proposed facilities should be monitored periodically and whenever necessary.
Management of Solid waste	<ul style="list-style-type: none"> • A NEMA certified Contractor must dispose solid wastes away from the site to an approved disposal site. • The project engineer should ensure that the contractor disposes any remaining solid wastes such as metals, paper, plastics, etc. away from the site to an approved disposal site. • Segregation of waste must be practiced.
Management of Hazardous substances	<ul style="list-style-type: none"> • Any substance declared as hazardous on site must be handled as per its accompanying Material Safety Data Sheet (MSDS) which should be familiar to each and every user • Remedial equipment for potential spillages must be stored on site and at all times, a user familiar with relevant remedial measures should be in place • Inspect and audit the facility on use and safety as well as functionality of all emergency equipment particularly those associated with relevant hazardous materials in place • Use of designated areas for repair and maintenance of vehicles (e.g. local licensed garages) and powered machinery to avoid fuel and lubricant spills at the site. • Segregating waste and assigning appropriately licensed waste handlers. • During decommissioning, a site audit should emphasize on identifying related footprints and conducting remedial measures.
Physical Hazards	<ul style="list-style-type: none"> • Appropriate hand and foot protection (PPE) during clearing of vegetation. • Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa while maintaining a balance with productivity. • Training of workers on how to identify and report on dangerous vibrations of the equipment. • Accident sites should be immediately attended to, secured and associated incident Investigations must accompany the same with an objective of learning the causation and prevention of repeat. (enforcement of Incident Investigation Procedures) • Regular audits and Community involvement should be triggered with an objective of fostering safety and health signals, learning form the same and mitigating community based safety and

Potential Impact	Proposed Mitigation
	health concerns emanating from the mining, mineral transportation and Clinker plant installation and operation.
Risk of fire	<ul style="list-style-type: none"> • Carry out routine thinning, slashing, and other maintenance activities, within and adjacent to Rights-of-way in order to minimize the risk of fire. • Install appropriate classes of fire extinguishers at strategic positions of the facility • Each assigned heavy vehicle to have at least 5kgs of fire extinguisher • A trained fire marshal to be employed on site at all times • Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow firefighting access. • Deploy use of PPEs
Spread of Diseases	<ul style="list-style-type: none"> • All communicable diseases should be acknowledged and control measures put in place. • Rules should be put in place to highlight means through which diseases can be triggered by virtue of setting up the mines and preventive measures communicated to avoid such. • Provide counseling and testing for HIV/AIDS to incoming exploration personnel. • Strengthen advocacy through awareness training in HIV/AIDS and other STDs; encourage the use of preventive measures like condoms. • Avail condom dispensers to staff.
Visual impact	<ul style="list-style-type: none"> • Extensive public consultation during the planning of project • Tree planting and erection of buffers • Limited speed of vehicles • The design of the plant itself should be appealing to the eye • Pollution control measures from fugitive dust and stack emissions should be developed • Extrusive Lighting from the facility should be well beamed to avoid intrusions of neighboring facilities or points of interest
Alteration of Settlement	<ul style="list-style-type: none"> • Settlements must be well observed and planned to avoid emerging shanty structures on the roadside. • Logistic approaches should be applied to respond to informal settlements triggered by the presence of the industry in order to safeguard the aesthetics of the surrounding environment.

Operational Phase of Quarry and Clinkerline

Potential Impact/Aspect	Proposed Mitigation
Terrestrial habitat alteration	<ul style="list-style-type: none"> • Maintenance of ecological records • The selective removal of tall-growing tree species and the encouragement of low growing grasses and shrubs in project site. • Removal of alien invasive plant species, • Cultivating native plant species; • Avoiding clearing in riparian areas; • Vegetation management should not eradicate all vegetation • Protection of important wildlife
Alteration of aquatic habitat	<ul style="list-style-type: none"> • Establish a monitoring formulae for marine performance with an objective of scoping for community feedback, visual indications of coastal forest health and water quality, clinker Plant and mines storm water flow characteristics, vibration levels and develop response measures for associated negative impacts
Wildlife Species	<ul style="list-style-type: none"> • Conduct internal studies of the ecology and biodiversity of target areas with an objective of establishing species statistics and their conservation status. • Avoid unnecessary harming of fauna species. Relocate where necessary and if harmful, liaise with the Kenya Wildlife Service (KWS) for assistance.

Potential Impact/Aspect	Proposed Mitigation
Noise, Dust and Vibrations	<ul style="list-style-type: none"> • Use of correct PPEs such as ear muffs, dust coats, gloves, masks for the operators • Periodic Workers Medical examination • Avoid working in hanging areas with high potential for soil collapsing • Public awareness • Erection of security tapes
Air Pollution	<ul style="list-style-type: none"> • Stack emission should be limited as per the requisite industrial standards and limits provided in the air Quality regulations 2014, and international standards where applicable. Good industrial practice should be considered in the design • BCL should develop a periodic monitoring program to scope for pollution impact feedback from the community and from scientific measurements. Necessary adjustments should be carried out to mitigate negative impacts
Soil Erosion	<ul style="list-style-type: none"> • Back-filling of excavated soils • Use of liners to cover the shale materials soils to avoid wind blowing away • Ensure proper drainage around the working environment
Siltation on the road	<ul style="list-style-type: none"> • Avoid spillages on the road during transportation of shale • Cover with liner to avoid wind effect while in motion • Establish mini weirs on trenches draining the mining sites and de-silt appropriately
Spread of COVID-19 Disease	<ul style="list-style-type: none"> • Use of PPE, Sanitizers, Water and Soap all time as per MOH guidelines • Avoid congestion • Ensure all staff o visitors are tested against COVID or have undergone medical check ups • Avoid Public gathering and adhered to social distancing
Groundwater levels interference in boreholes and water wells	<ul style="list-style-type: none"> • Avoid groundwater contamination • Back-filling on all excavations • The depth of the mines should be controlled as per the hydrological report limits provided in this report. • Construction of a borehole on or near the facility should be subjected to a separate Environmental Impact Assessment (EIA) report with an additional objective of clarifying measures in place to prevent contamination of the fresh ground water aquifer located below saline waters. • Stock piling of mining equipment and spares for unnecessarily long periods and unprotected from weather should be avoided. • Water points near the proposed facilities should be monitored periodically and whenever necessary.
Solid waste from vehicles and machines	<ul style="list-style-type: none"> • Proper waste management • Use of sanitary dust bins color coded • Proper storage and Waste Disposal
Risk of Fire	<ul style="list-style-type: none"> • Install appropriate classes of fire extinguishers at strategic positions of the facility • Each assigned heavy vehicle to have at least 5kgs of fire extinguisher • A trained fire marshal to be employed on site at all times • Controlled burning of vegetation, fire suppression equipment requirements, and typically must be monitored • Appropriate hand and foot protection (PPE) during clearing of vegetation.

Environmental and social management and monitoring plans

The Environmental and social management and monitoring plans address specific concerns and mitigation measures encountered during the Mine setup, Mineral Extraction, operation of the clinker plant, Transportation of minerals and camp Operation, as well as decommissioning phases of the proposed project. To ensure that the negative environmental impacts can be mitigated effectively a stringent management and monitoring plan has been prepared. The ESIA proposes to

utilize the Safety Health and Environment (SHE) department taking the responsibility of ensuring environmental and social issues are achieved in regard to the proposed project. SHE department shall take the responsibility of conducting annual audits to ensure the project complies with the set regulations and the proposed Environmental and social management and monitoring plans.

Conclusion

It is quite evident from this study that the operation of the proposed Mining of Limestone, its transportation, setting up and operating of the Clinker plant project will bring positive effects in the study area including creation of employment, availability of social amenities, and increase in revenue among others. However, although the project will come with various positive impacts, negative impacts will also be experienced hence the need to assess them and put in place appropriate mitigation measures. The negative impacts of this project have been mitigated as shown above and will thus be ameliorated to manageable levels.

The consultant wishes to document the following based on the above conclusion: -

- i. The negative impacts that will arise during the project cycle will be mitigated.
- ii. The impacts that will be adverse will be temporary and can be managed to acceptable levels during implementation of the recommendation of the mitigation measures for the project.

Recommendations

It is our recommendation that the project be allowed to go on, through NEMA licensing provided the following recommendation have been made: -

- i. Mitigation measures outlined in this report should be adhered to and the Environmental Management Plan (EMP) implemented to the letter. The implementation of this EMP the entire life cycle of the proposed project (i.e. construction, operation and de-commissioning) is considered to be key in achieving the appropriate environmental management standards as detailed for this project.
- ii. Should undertake environmental audits (EA) of the project every 12 months after completion of the project to confirm the efficiency and adequacy of ESMP.
- iii. Land Rehabilitation plan to be adhered to during and after mining phase.
- iv. Separate reports for facilities such as bore holes, incinerators, Boilers and power converter stations (if any) should be carried out and submitted separately as per the relevant regulatory requirements of the project. Such facilities bear specific Environmental attributes which require individual licensing and auditing.
- v. NEMA to provide minimum conditions for compliance by the proponent.
- vi. Diligence on the part of the contractor and proper supervision by the Supervising Engineer during the project implementation and decommissioning cycle and the initial operation period is crucial for mitigating impacts.
- vii. A Separate Environmental Impact Assessment reports for facilities such as new bore holes, incinerators, and power converter stations (if any) should be carried out and submitted separately as per the relevant regulatory requirements of the project. Such facilities bear specific Environmental attributes which require individual licensing and auditing.

1. INTRODUCTION

1.1 Background and Rationale for an Environmental Impact Assessment

Bamburi Cement-LafargeHolcim as one of the leading cement companies in the region, in its effort to increase capacity and acquire more industrial minerals, it has commissioned an Environmental and Social Impact Assessment on the proposed clinker plant and limestone quarry activities in Ngombeni, Kwale. In order to understand the people, their environment and the mining cycle mechanism, identify and mitigate impacts. The Company has a Clinkerline in Athi-river Nairobi, Bamburi plant for cement production operations in Mombasa and the proposed Clinkerline Kwale.

Bamburi is in the advanced stages of setting up another Cement plant at its parcel of land located at Magandia area, adjacent to Calcium Quarry and Kwale Eye Clinic along Likoni-Ukunda road, Kwale County. In Cement production, limestone, gypsum, and shale materials form a part of ingredients. The Shale will be brought in from the environment where adequate reserves have been identified in Matuga and Kundutsi Sub locations, Matuga Sub County, Kwale County, which is about 10 kilometers from the Magandia Limestone Mining and Clinker Processing Plant location.

The Shale mining aspect has been covered in a separate Environmental and Social Impact assessment (ESIA) process. The location of the proposed Limestone, Mineral transportation and Clinker project is discussed in the sub-section below. The proposed Bamburi Cement project in Kwale is set to start in about 1 to 2 years from 2021. Environmental and Social Impact Assessment and Baseline Surveys form part of preliminaries required by the ministry of mining before granting Bamburi the mining licenses for Limestone material in Matuga.

The purpose of this Environmental Impact assessment is to identify the potential impacts of the project to the community, involve the community in giving their views about the project and mitigation of the negative impacts of the project as positive ones are amplified. The move is aimed at achieving compliance and efficiency in the mining sector value chain, accountability and practical social responsibility.

The EIA regulation states that mining and other related sector activities falls under environmentally high-risk projects according to Environmental Management and Coordination Act (EMCA 1999) Rev. 2019. Legal Notice No. 31, "The Environmental management and Coordination Act (No. 8 of 1999), Amendment of the second Schedule", states that mining projects such as the one under this study are classified as High-Risk Projects under Part 3, which references "Mining, and Other Related Activities, thus demands adequate due diligence. **Earth Resources Exploration Limited (EREL)** has put together a team of professional experts to carry out EIA of the area and document information which will guide relevant operations.

1.2 Study Area in Kenya: Matuga Sub County

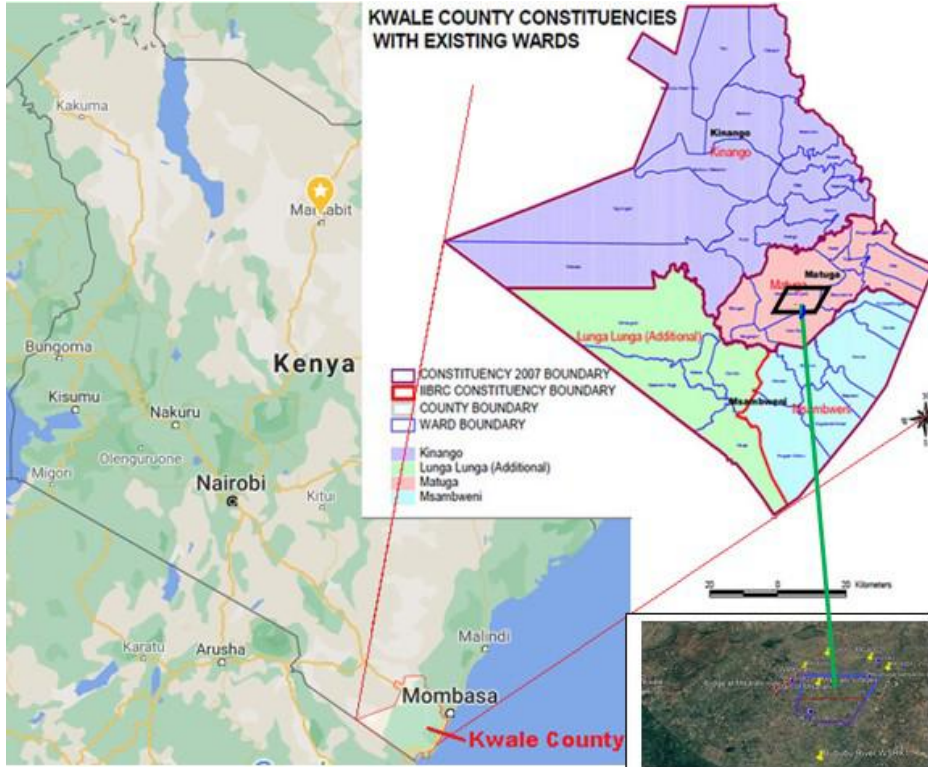


Figure 1: Project study area Outlook in Kwale County

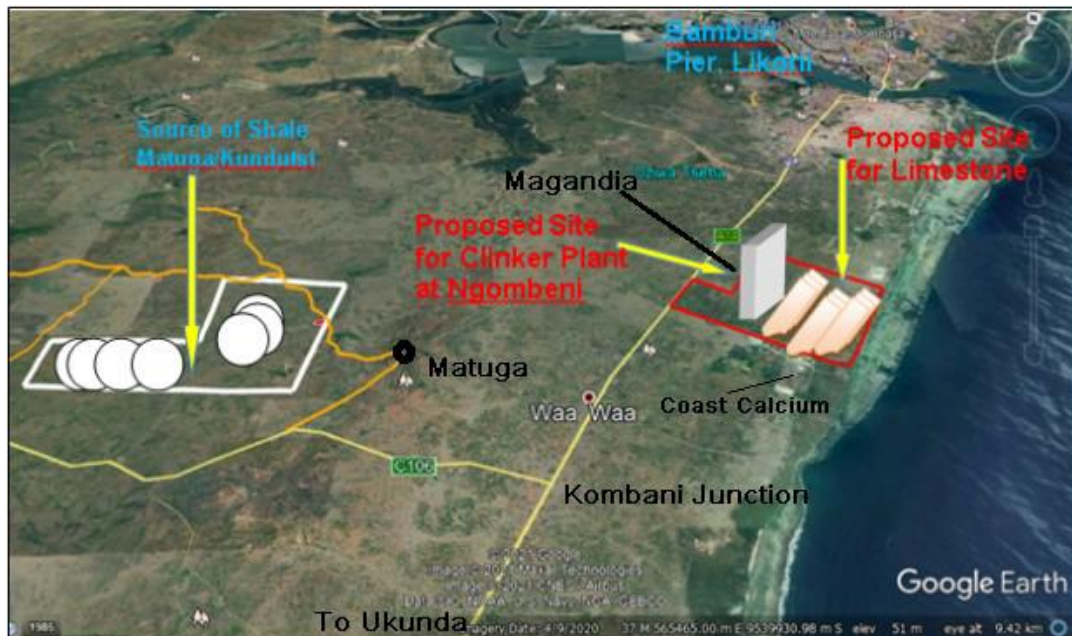


Figure 2: Project study area in Magandia area.

Project Location and description: The Proposed Clinker and Limestone Quarry Mining Project is located at Magandia-Ng'ombeni near Calcium Quarry in the South coast part of Kwale County, approximately 3.5Km from Waa Town and 2Km from Ngombeni. It can also be accessed by the Dongo-Kundu road, 4.6Km from Shika-Adabu. The project site is located at the divide between the Ng'ombeni Sub Location and Kitivo Sub Locations in Waa Location. The project site is located at Magandia area, Ng'ombeni Sub Location between Lunga-lunga road and the Indian Ocean, but adjacent to Kwale Eye Clinic. The nearest settlement is Ng'ombeni villages with estimated 500 people. It is estimated that the project construction period will be 2 years and the current expected life of the mine is 50 years. Total yield of the clinker from the proposed Clinker Production project is estimated at 5000 Tons per Day. With a rawmix /clinker factor of 1.6, the raw mix is 8000Tons/Day. Limestone is 80% of rawmix composition-6400Tons/Day. More specific project area will be discussed under chapter 3.

1.3 ESIA Study

The Kenya Government policy on all new projects of such scales require that Environmental and Social Impact Assessment (ESIA) studies be carried out at the project planning phase in order to ensure that significant impacts on the environment are noted and taken into consideration during the project implementation, operation and decommissioning stages.

Earth Resources and Exploration Limited (EREL), also referred to as the Consultant, has been contracted by the proponent to carry out an Environmental and Social Impact Assessment (ESIA) for the proposed mining, mineral transportation and Clinker Plant Development at the Bamburi cement Magandia plot. The scope of transportation component is further defined in this document under chapter 9. The goal of this assignment is to ensure that any potentially adverse environmental and social impacts can be eliminated or minimized to most feasible extent, and the positive impacts are introduced or enhanced.

The ESIA assignment has been implemented in accordance with the requirements of the Environment Management and Coordination Act (1999) Amendment 2019 of Kenya, and the Environmental Impact Assessment and Audit Regulations of Kenya (2003). The Consultant shall seek to obtain approval of this Project Report from the National Environment Management Authority (NEMA). The Terms of Reference for carrying out the ESIA studies provided detailed information on the scope of the studies and the expected outputs.

1.4 Study Objectives

In particular the EIA team ensured that the objectives of environmental and social impact assessment study are achieved by undertaking the following:

- Develop or comment on the terms of reference for the EIA study as provided for by part 3 of the Environmental (Impact Assessment and Audit) Regulations, 2003.
- Identify and assess potential impacts of the project on the environment.
- Predict likely potential significant adverse changes on the environment as a result of the development.
- Verify compliance with the environmental regulations and industry standards (National and applicable international regulations where necessary).

- Evaluate the impacts of the various alternatives in the project and propose mitigation measures for the significant negative impacts in the environment.
- Generate baseline data for monitoring and evaluation of impacts, including mitigation measures during the project cycle.
- Conducting the necessary ESIA requirements including public participation, Stakeholder consultations etc.
- Highlight environmental issues with a view to guiding policy makers, planners, stakeholders and government agencies to make environmentally and economically sustainable decisions.
- Prepare an Environmental Impact Assessment Study report, also assist the client to follow up and seek license approval of the proposed project by the National Environmental Management Authority to meet design, construction and occupational environmental requirements.
- Liaising with NEMA to obtain a Conditional Approval and thereafter an EIA License for the proposed development in accordance with Environmental Management and Co- ordination Act (EMCA) 2019 or its successor or related statutes.

1.5 Scope of the Study

The issues considered in this study included but not limited to the following:

a) Assessing potential impacts of the project on the natural environment covering-

Biological survey

- Assessing the potential impacts of the development on the recreational and intrinsic value.
- Determining the available and alternative best practices for maintaining the resilience and functions of the ecosystem in achieving balance between development and ecological processes.

Physico-chemical survey

- Determining the current levels of noise within the project site.
- Assess baseline and potential impact on air quality.
- Assess baseline and potential impact on water quality.

b) Assessing potential impacts of the development on the Social-economic conditions within the locality, based on the Limestone Mining, Transportation and Clinker Plant development baseline survey which will entail: -

Social conditions survey

- Carrying out interview survey on the social conditions of local residents including their sources of livelihood, security conditions, health and their education status.
- Assess the potential impacts on cultural amenities such as the Kaya forests or graves of importance if present.

- Potential community members that may be affected adversely by the development through displacements, or pollution from the proposed mines or transportation of minerals.
- Employment Impact including direct and or indirect employment opportunities.
- Public health implications of the new development.
- Security-threats, risk and enhancement.
- Demand and development of infrastructure and social amenities.
- Identify community needs and alignment of priorities for CSR.

Settlement Density Assessment

- Field survey on the distribution of settlements within and around the project area.
- c) Assess the potential impacts of the development on landscape such as;**
- Impacts on opening up or closing up of views, visual impacts.
 - Compatibility of the project with the surrounding area.
 - Amenity open, duo or closed such as recreation possibilities and access road congestion.
- d) Assess the potential impacts of the development on land use such as: -**
- Determine the effect of proposed project on current land uses and the use potentials in the project area.
 - Determine the impact on change on civic shape, scenery, aesthetic modifications
 - Determine the possibility of multiple land uses.
 - Examine the compatibility and complementary of the development with the surroundings land uses.
- e) Assess the potential impacts of the development on water resources**
- Assess the impacts of the development on surface and ground water qualities and availability.
 - Assess the impacts of development on drainage patterns/systems in the project area.
- f) Develop an Environmental and Social Management Plan (ESMP) that would mitigate the possible impacts on the environment.**

1.6 Study Approach

The approach to this exercise was structured such as to cover the requirements under the EMCA 1999, (Revision 2019), the EIA Regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003. It involved largely an understanding of the project background, the preliminary designs and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the project site areas, desktop studies, public consultations with members of the community in the project areas, photography and discussions with the project Proponent.

1.7 Data collection tools and equipment

Several data collection tools were used to document available data during the study these included use of checklists, photography, geographical positioning systems (GPS), questionnaires, note books and computers among others. All data collected were analyzed for production of a Baseline Survey report and subsequently this ESIA report. Samples of the questionnaires used during the study are provided under Annex of this report. The main steps undertaken to meet the objective of the study were as follows:

1.8 The EIA Process

The EIA process is presented under the Environmental Management and Coordination Act (No 8 of 1999) Environment Impact Assessment Guidelines and Administrative Procedures, published in November 2002, while the project categorization is presented under Legal Notice No. 31, The Environmental management and Coordination Act (No. 8 of 1999), Amendment of the second Schedule.

1.8.1 Environmental Screening:

In screening the Consultant set out to confirm whether or not this project falls within a category that requires EIA prior to commencement. In addition, other considerations during the screening process included a preliminary assessment of the environmental sensitivity of the areas along the proposed project; this comprised of a desk study involving the analysis of project maps and proposed line route, as well as literature review of previous studies on the proposed project. It was determined that infrastructure development activities (such as the development of the proposed Limestone mining, transportation of minerals and Clinker Plant Development) are listed under Schedule 2 of EMCA, 1999 (amendment 2019) among projects requiring an EIA study. Under amendment of the second schedule, mining projects of scales such as the one under this study have been classified under “High Risk projects” (Ref: EMCA Second Schedule Amendment). The project proponent therefore commissioned this study in line with the provisions of EMCA, 1999 (Rev 2019).

1.8.2 Environmental Scoping

The project scoping stage which followed the screening stage was applied to narrow down the project potential issues to those that requiring detail analysis. The process involved conducting discussions with the proponent on the project issues and, collection of primary and secondary data. The primary data was collected through the qualitative and quantitative methods of data collection. Qualitative data was collected through field visits/site walks, public and stakeholders consultation while quantitative data was collected through the use of sampled questionnaires. The secondary data was collected through literature review which included study of the following documents:

- Policies, Acts and Regulations;
- County Development Plans;
- Project area topographical and cadastral maps;
- Previous project study documents; and

- Literature materials on project including those on Plant Species, Culture, Power Project Installation and Management among other project parameters.

1.8.3 Desk study

Desktop studies were conducted through review of secondary data to establish the following:

- Legal Policies, Legislative and Institutional Framework governing the proposed project;
- Licenses and permits requirements and conditions;
- Project area baseline information including documented sensitive environmental receptors;
- Types of waste to be generated, proposed management and disposal methods; and
- Potential positive and negative impacts.

The secondary data was obtained by reviewing several literature materials including:

- Policies, Acts and Regulations
- GIS maps
- Current County Development Plan for Kwale County
- Past Mining ESIA studies carried out by EREL in the area
- Project area cadastral and topographical maps
- Biodiversity cover in the area

1.8.4 Field Assessment and baseline survey

Detailed field surveys for this study were undertaken within the proposed project area for the proposed Limestone Mining, Mineral Transportation and Clinker Development project ESIA process carried out between 22nd March 2021 and 5th April 2021.

This involved conducting systematic field traversing to quantify and qualify perceived impacts on:

- Land ownership, usage and conflicts with other Socio-economic issues;
- Vegetation cover of the area;
- Underground and surface waters;
- Waste management; and
- The general environment and its sensitive receptors found within the project area.

The ESIA study experts traversed the whole project area and identified the status of the environment and socio-economic indicators which included the following:

- Baseline data on the bio-physical environment
- Socio-economic and cultural environment;
- Possible Project Affected Persons (PAP)
- The level of project impact on affected persons and the environment;
- The opinion of the stakeholders including the local communities and on the proposed project; and
- The project alternative mineral transportation routes .

1.8.5 Public Consultations

Due to restrictions of the Corona Virus (Covid-19) pandemic, holding a full Public Consultative meeting was not possible. Instead, some community representatives (village elders) were met during two meetings held at the Bamburi cement Facility at Magandia with community representatives and a chiefs and local administration representatives meeting at Ng'ombeni centre, Matuga Sub County. Both meetings were held on the 2nd of April 2021. To complete the public consultation process, the following were also conducted:

- **Key Informant Interviews and Semi-Structured Interviews:** - These interviews were conducted with the County officers, Chiefs, Assistant Chiefs, ward administrators and Village Elders.
- **Stakeholder Meetings:** County level Stakeholders' meeting had been held in February 2020 during the Prospecting and Exploration ESIA application process to sensitize the County Directors and accommodate their professional opinion.
- **Open-ended and Pre-coded questionnaires:** -These questionnaires were administered to target groups in order to obtain their views on the proposed project and its perceived impacts.
- **Focused Group Discussions:** Focused Group Discussions (FGDs) with the with the project stakeholders were held with firewood collectors, two (2) fishing communities, biodiversity managers at the Bamburi cement facility and MiyANJI dairy community. The groups were selected considering specific group interests who were useful to the ESIA process considerations.

The community representatives were sourced from the main target groups including the PAPs within the proposed mining and transportation area and the households surrounding the proposed project area. The general public was also interviewed and this involved reaching communities members with property near the project area through purposive sampling. The names and details of all those interviewed during the consultation are found within the Appendices section (Appendix 5a).

The community representatives meetings were organized by the Chiefs; and transect walks were also done to confirm the information from the discussions and observations were made on physical and environmental conditions. In addition to the consistent briefing of the client, this environmental impact assessment project report was prepared and shared to the same for client review and approval. The contents were then presented for submission to NEMA as required by law.

1.9 Baseline Survey Questionnaire Format

The team developed a comprehensive baseline survey questionnaire in consultation with the project facilitators. The questionnaire is annexed. The survey format consisted of the following components:

Table 2: Characteristics of Household Field Survey Tools

Research Tool	Section	Details
-HH Questionnaire	1. Identification of HHs	Coding, location, Interviewee, Contact,
	2. HH Dynamics	Age, Religion, Sex, Relationship to head, Education, Employment, Income, HH head gender
	3. HH Income	Pay, Income from activities, Affordability
	4. Land tenure	Duration of stay, if owns other land, type of tenure, size of land, approximate value, duration of stay
	5. HH build design	Walls, roof, floor, toilet, design, windows, doors, Type of toilet
	6. Source of construction Material	Local, imports, type
	7. Access to Main Facilities	Trading Centre, health facilities, Schools, Water points,
	8. Water and Sanitation	Cost of water, Water Sources types, Cost of water, Duration to get the water, Purification Method, Waste Management
	9. Source of Energy	Traditional, modern, type, cost, frequency
	10. HH Disease Incidence	Eye, Respiratory, Skin, Intestinal, Headaches, colds, allergies, others
	11. HH Expenditure	Consumables, fees, rent, Agriculture, fuel, savings, housing materials, etc
	12. Livestock Kept	Cattle, Sheep, Goats, Value
	13. Cultural Assessment	Sites of significance near living area
	14. Gender	Chores Allocation, HH ownership, Roles
-Institutional Communication	A project introductory letter was developed and used to access the relevant departmental reps. An open discussion method was applied.	The random discussion guided by general matters was applied to gather key issues affecting the area, as well as available data where possible.
-Environmental & Social Questionnaire	HH Perception on the proposed project	If good/bad/viable/suggestions, other comments/etc.
	HH Economic dynamics	Key economic indicators
-Environmental Observation Sheet	Hydro-setting, landscape, vegetation, Associated impacts,	Baseline and dynamic transformations under anthropogenic or natural impacts
-Towns, Centers and Market observation sheet	Settlement, power distribution, drainage, solid waste, air quality, drinking water quality, noise	

HH Questionnaires are sampled under appendix 2, 3 and 4

2. GENERAL LIMESTONE MINING CYCLE AND THE PROJECT DESCRIPTION

2.1 Limestone and its relative use

Limestone is a common type of carbonate sedimentary rock. It is composed mostly of the minerals calcite and aragonite, which are different crystal forms of calcium carbonate (CaCO_3). Limestone forms when these minerals precipitate out of water containing dissolved calcium. This can take place through both biological and non-biological processes. Limestone often contains fossils, and these provide scientists with information on ancient environments and on the evolution of life.

Limestone has numerous uses, and for the purpose of this report, we focus on it as a building material (cement), an essential component of concrete, and as aggregate for the base of roads. Bamburi Cement intends to produce Clinker which is the raw material for cement production.

Cement is a common material that is often made with Limestone, shale and other minor constituents of minerals. To make cement, crushed limestone and shale are heated to a temperature that is high enough to evaporate off all water and break down the limestone into calcium oxide and carbon dioxide. The carbon dioxide is lost as an emission, but the calcium oxide combined with the heated shale makes a powder that will harden if mixed with water and allowed to dry. Cement is used to make concrete and many other products for the construction industry.



Figure 3: Limestone near the proposed site & Pleistocene coral limestone cliffs (Field 2021)

2.2 The Mineral Cycle

For this survey, it is worth understanding the mining project cycle and what goes into it. There are 12 number basic levels of the mining cycle. These develop according to the phases indicated in Figure below and table. Duration of the cycle is dependent basically on the resource quantity, quality, and ease of reach as well as licensing procedures and social stability where the resource occurs. Due to economic logistics, the mineral title is acquired after confirmation of availability to pave way for Resource Modeling.



Figure 4: The Mineral Cycle as per the Indigo 4 Model (EREL 2021).

Table 3: The Mineral Value cycle

	Project Phase	Sub Titles	Activities
1	Project Identification	Mineral Title	<ul style="list-style-type: none"> Ownership of minerals Mining rights (License) Legal and physical policy Regulation
		Desktop Study	<ul style="list-style-type: none"> Examination of available data about a prospective mineral (Ore) deposit Development of a preliminary mineral case
2	Prospecting/Exploration	Surveys	<ul style="list-style-type: none"> Ground (surveys, trenching) Aerial Seismic
3	Exploration	Samplers	<ul style="list-style-type: none"> Rotary Air Blast Core Drilling
4	Project Evaluation	Appraisal	<ul style="list-style-type: none"> Resource Modelling Mine planning Valuation Scoping Pre-feasibility Bankable Feasibility

	Project Phase	Sub Titles	Activities
5	Mine Development	Infrastructure	• Beneficiation (Ore process system, Logistics)
6	Mineral Exploitation or Extraction	Production	• Open cast or Under ground
7	Mine Closure	Decommissioning	• Dismantling, Disposal, Cleaning
		Rehabilitation	• Restoration • Improvement
			→ Prospecting & Exploration level
			→ Exploitation Level

2.2.1 Prospecting

Prospecting is the process of finding minerals (commercially viable concentrations of minerals) to mine. Project evaluation will inform on decisions to be made by the company, and is purely an economic decision making process. This level requires an ESIA study which will assist in identification of associated hidden environmental and social factors. This report is confined within this level of the Mining cycle.

2.2.2 Surveys

The most common survey methods in the process are Ground surveys (Observation, Trenching), Aerial and Seismic surveys. In this study, satellite imagery, ground observation and sourcing information from random informants apply during the prospecting and Exploration level.

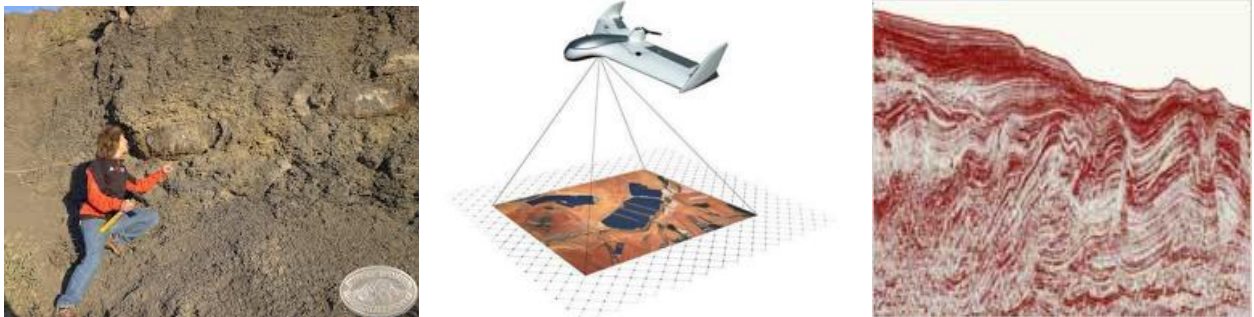


Figure 5: Geologist Survey, Aerial Survey and Seismic Data from seismic exploration.

2.2.3 Exploration

The two most common methods to be applied in limestone prospecting are ripping, pitting and trenching. In this survey, trenching and pitting will be applied. The samples are taken to offsite labs for analysis. With adequate amounts of samples and adequate (positive/economical) project evaluation test results, the process can be transformed to the next level (exploitation/extraction) where a new ESIA will be required for accurate determination. The Extraction process is site specific. The samples collected at the field are taken for lab analysis processes.

2.2.4 Mine Development

The process of constructing a mining facility and the infrastructure to support the facility is known as mine development. Mine development may involve many activities such as:

- The preparation of the mine site by clearing trees and breaking the rock.
- The construction of mining facilities such as head frames, administration buildings or mechanical shops.
- The creation of infrastructure such as power lines and substations, roads or water lines.

Requirements: Before beginning development, certain requirements must be met. These requirements include: Submitting a Notice of Project Status to the State department for Mining, Consulting with all required parties through Environmental and Social Impact assessment processes, Filing a closure plan with accompanying financial assurance and achieving certification and, Acquiring all required permits/approvals from ministries, agencies and government organizations.

2.2.5 Mineral Exploitation/Extraction

Mineral exploitation means the act of extracting a mineral resource from a mine with the aim of producing mineral materials, minerals in their existing form the ground, in order to meet different needs and uses. Mineral exploitation field means a specific part of or total mineral field which is the subject of, and the surface and depth of which is defined in, the decision made to assign the mineral exploitation field or the licence issued for the exploitation of its mineral resources. Mineral extraction is the act of either removal from ground, or crushing and separating ore into valuable substances or waste by any of a variety of techniques. In this case, separation of Limestone materials from unwanted impurities.

2.2.6 Mine Closure

This is the process for ending the operation of a mine. It is commonly embodied in a closure plan developed as part of the operations plans for a particular mine. Robertson and Shaw (2006) articulate four key objectives to be considered when closing a mine from operation:

- Protect public health and safety.
- Alleviate or eliminate environmental damage.
- Achieve a productive use of the land or a return to its original condition or an acceptable alternative.
- To the extent achievable, provide for sustainability of social and economic benefits resulting from mine development and operations.

Orderly mine closure depends on planning for providing the details on design and costs to achieve these key objectives (ICMM 2008).

The design of Mineral Exploitation may consider Mine Closure for Active and Exhausted Mines. It may seem counter-intuitive to consider closure during the development and opening of a new mine. This means closing up exhausted sections while opening up new sections of the mine, with integrated rehabilitation action. There are several advantages to simultaneous rehabilitation which include:

- Controlled extent of land degradation
- Saving money and time
- Improved aesthetics as the mining progresses,
- Reduced environmental pollution, etc.

2.3 Mineral Site Reserves and Transportation

2.3.1 Limestone Mine Site Reserve and Transportation

The mining method will be by ripping across the reserve location. The demarcated Limestone reserve area will be cordoned off and only those involved in the process will be authorized on site. Ripping is a version of continuous mining. The Limestone material is extracted at the rate of production required by the crusher. When using Dozing & ripping and transportation Load method, the hydraulic excavator rips a certain quantity of rock and then loads this in order to clear the ground for the next ripping section. The equipment on site will include but not limited to excavators, backhoes, bulldozers, ripping equipment, loaders, tippers, 4wd vehicles, mobile offices and amenities, etc. Other enhancements will include fuel storage tanks, storage areas, garage section, generators, compressors, drill rigs, water storage facilities, crushers, conveyors, hand tools and dining areas. The excavated material is not on hard ground, thus will be crushed and accumulated on site waiting for collection by 18 tons tippers and transportation to the crusher within the same location. All mining equipment would be diesel powered. The mining area will be secured and tree planting will be done on the edges of the quarry.

The quarry is foreseen to be mined simultaneous two (max) 10m high benches (lower bench 3 to 13m asl and the upper bench over 13m asl) to assist drainage and operational effectiveness. In addition, space has been allocated on the northern dump for a low grade stockpile where material will be stored before being donated to fill up existing abandoned Quarries in Magarini, Ukunda, Likoni and also assist in grading of all-weather marrum roads in Kwale County.

Clinker processing will begin with grinding in the crusher, conveyed via a belt conveyance system to the warehouses and then to the plant. There will be a separate crusher for shale and limestone. Other inputs in the clinker production such as Bauxite (Aluminum Oxide), Coal, Copper slug shall be imported in sealed containers from Tanzania, South Africa, Japan respectively.

According to hydrological report, mining will be done above the underground water level (+3m a.s.l.). From the 1000 acres of 1500 Acres property of land only the area East of the existing 33KV power-line will be mined for limestone.

According to Bamburi cement, the lifetime of the Limestone deposit is 50.4 years at a clinker capacity of 5'000t/y and the following average raw mix composition shall be adopted: Matuga 1 Limestone 81.21%; Divaen Bauxite 1.53%; Iron Fines 0.6%; Matuga Shale 16.66%. The estimated quantity of limestone in the reserve is about 102,917,147 tons. The mine will operate 8am-5pm only. Project power source will be from site generators.

2.3.2 Transportation of Shale from Matuga and Kundutsi Sub Locations to the Plant

As earlier mentioned, the main constituents of Clinker are Limestone and Shale minerals. The limestone will be obtained from within the 1,500acre Bamburi cement facility while the Shale Mineral will be brought in from the neighbouring Kundutsi Sub-Locations. The Shale mining is covered in a separate ESIA process which covered transportation aspect between the mines and Matuga Centre. This was in view of logistics related to Sub Location variations with consideration to proximity to the mines. The rest of the road sections and alternative routes fall within Ng'ombeni Sub-Location where the proposed Clinker and limestone mines are located, and thus the road sections were logically considered under the current ESIA reporting.

The transportation will include heavy vehicles such as tippers and hauling of heavy equipment to and from site, as well as 4WD vehicles frequenting the roads. The associated impacts relate to the inherent risks involved (I.e: noise, dust, etc) and the nature of selected transport corridor (I.e: quality of roads, sharp bends, proximity to populated points, etc.). These are discussed in detail under chapter 7 and 8 while choice of routing is discussed under section 9 of this report.

2.3.3 Predicting and Mitigating Environmental Impacts in Limestone mining

The mining of Limestone Mineral from the proposed area will be a complex undertaking that will require a well-coordinated approach with rigorous application of engineering, environmental, social and other applicable safeguards. A high amount of inputs and outputs of various scopes is anticipated, as well as considerable levels of social issues to be addressed. We have considered multiple approaches of scoping for such diverse aspects and we are still compiling new aspects with every step of development. A Life Cycle Assessment (LCA) is one of the methods which will be adopted for assessing the environmental impacts and sustainability of clinker production.

The figure below illustrates a model Limestone Mining Cycle as expected to operate under Indigo 1 Mining Project which will be located at Ng'ombeni Sub location. According to the figure, the green circle is a continuous process till when the required quantity of 102,917,147 tons of Limestone is extracted from the project location over a period of about 50.4 years. The circle is continuous because new areas will be opened progressively as the mining operation proceeds with time. According to the project design, as new mines open, the exhausted sections of the mined will commence initial rehabilitation by landscape development and re-vegetation. **No mine shall be abandoned without adequate rehabilitation and a monitoring program.**

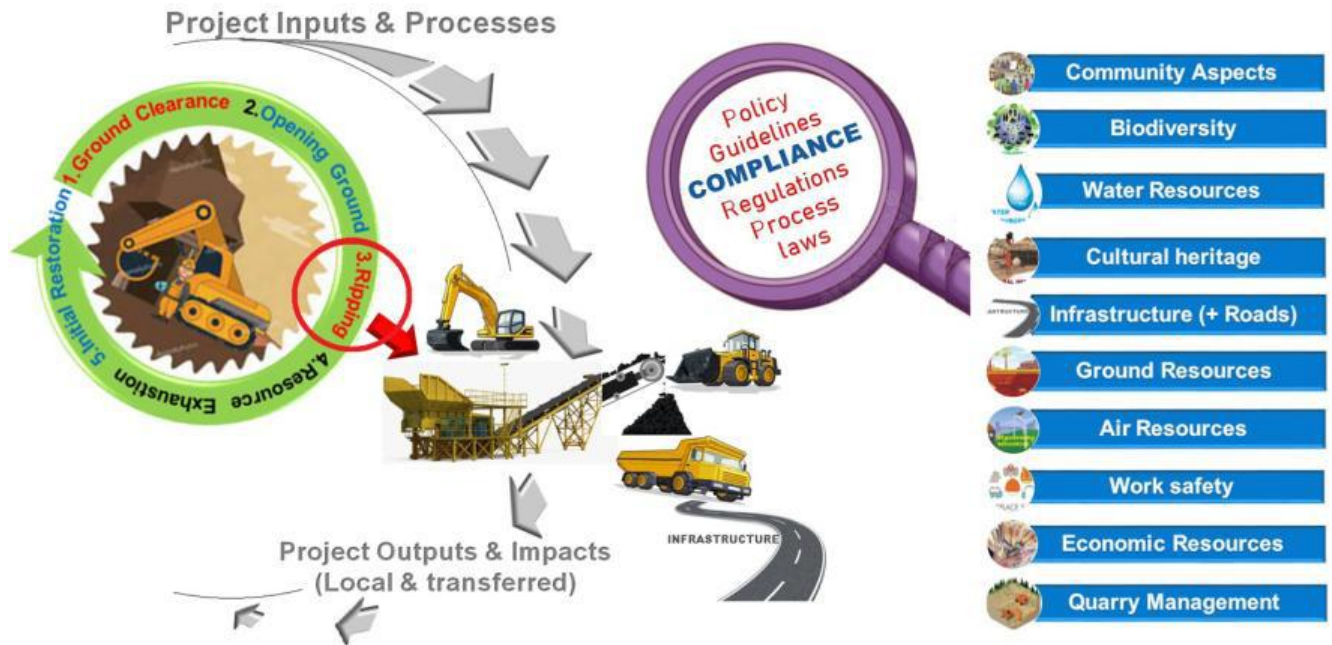


Figure 6: Limestone Mining cycle, Basis for Scoping of Impacts (Source: EREL Field Work 2021).

The first step as per the green circle (step 1) will be ground clearance where obstacles such as vegetation, rocks and unwanted soils will be removed to expose the Limestone mineral. The ground will be opened (step 2) as the limestone is extracted by ripping technique. Where the resource is exhausted, initial rehabilitation will commence.

Following step three (3), will be conveying or hauling the material for crushing and stalk pilling. In the process, machinery such as conveyor belts, excavators, tippers, bulldozers, compressors and other forms of earth movers will be used. All will be diesel powered. The site may contain camps and associated amenities.

The gray arrows indicate project inputs and processes, where project inputs will constitute resources into the project (i.e: fuel, labour, water, spare parts, forms of paper materials, food, etc). Associated Processes will constitute, those associated with applied community based labour, professional labour, operation procedures such as onsite vehicle maintenance, waste management, etc. The importance of understanding the processes involved is that certain processes may require certain choices of controls, where one may be environmentally friendlier than the other, hence offering opportunity to fulfil justification for selection of **“Alternatives of Options”** which is a sub-heading within this ESIA reporting (chapter 9).

Process outputs reflect on the project operation cycle outputs which may influence the environment positively or negatively. These are identifiable by studying the entire project operation cycle, project location, equipment used, sources of materials, potential emissions, solid waste and effluent if any. All should be with relevance to the aspects indicated according to the blue titles in the figure above, as well as other similar associated fields. The objective should be to identify best alternatives for the project, identify potential negative impacts and developing mitigation measures for these, ascertaining that the project is in line with operating

Policies, guidelines, regulations, laws and observes standard processes. A key aspect in consideration is the integration of Code of Ethics as in provision of the Kenya Law.

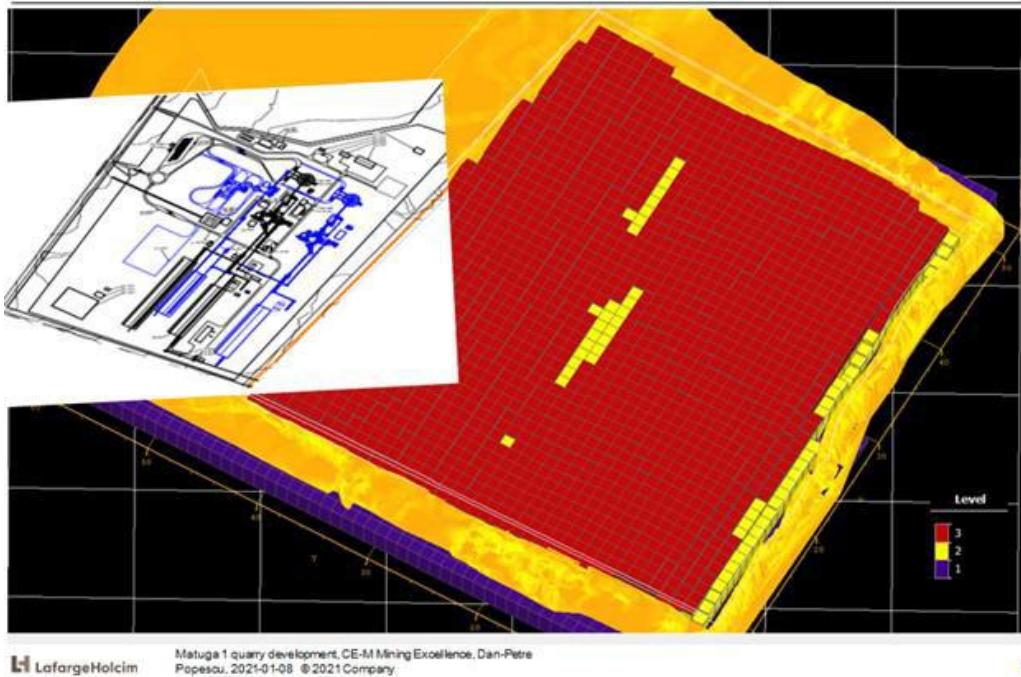


Figure 7: Proposed location Clinker Plant vs the Limestone Quarry at year Zero (year 2025)

Matuga 1: mined limestone in year 1

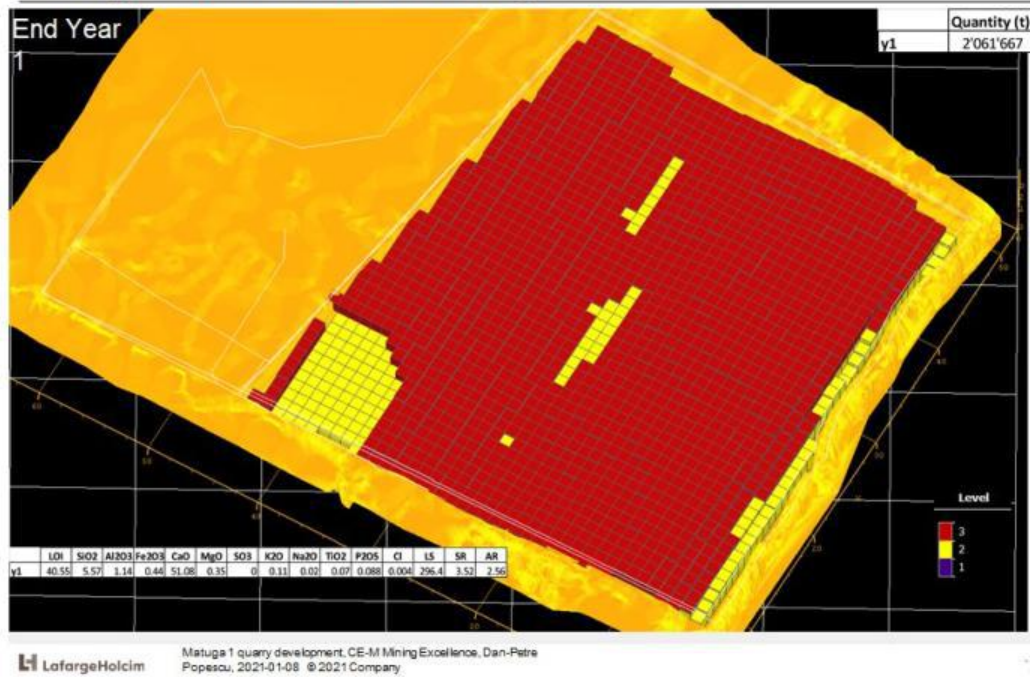


Figure 8: Proposed quarry for Limestone Mining in Year 1 (2023)

Matuga 1: mined limestone from year 21 to year 25

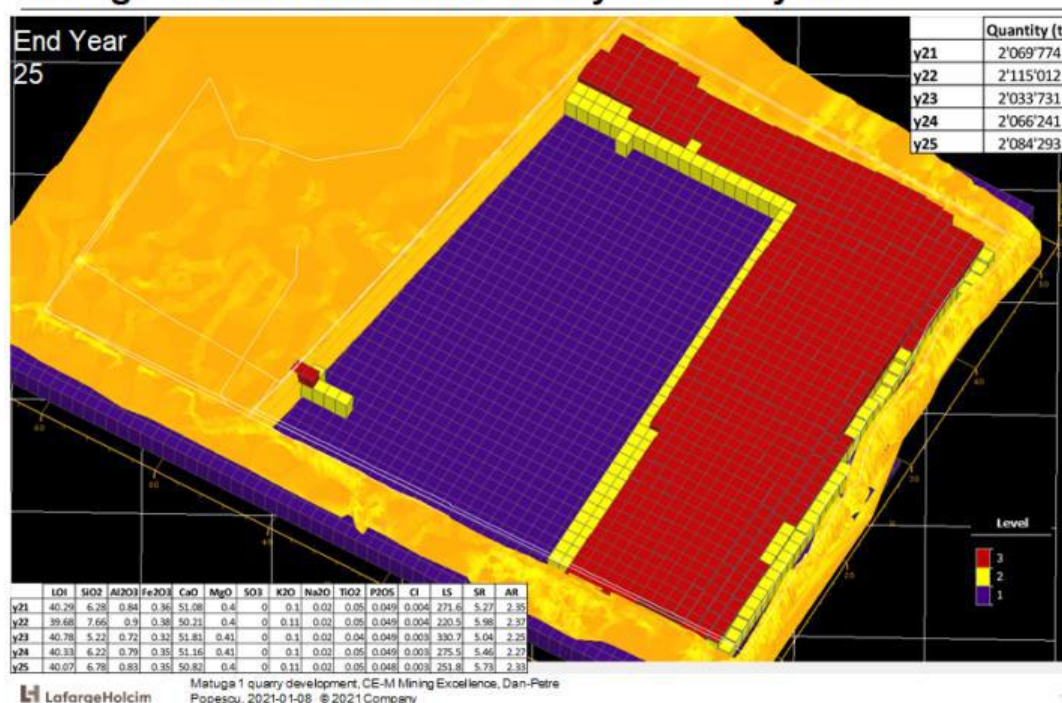


Figure 9: Proposed quarry for Limestone Mining in Year 21-Year 25

The mine will operate 8am-5pm only, while the Production plant will operate 24-hours/day and the workforce will be organized into shifts of 8hours and will be housed at neighboring villages and estates. The workforce during operations is estimated to be 90 employees, for construction phase this is estimated to be approximately 1,500 – 2,000 of casuals managed by contractors. Construction is anticipated to start work in July – August 2022. The Clinker project will source water from Kwale Water Services Company, provide storage reservoir potable water and own wastewater treatment facility.

Project power source is described as follows: 132 kV incoming station, Single step down transformer to 6.6 kV designed for future extension, 6.6 kV distribution network, Workshop substations. Additionally, alternative sources of energy shall be used, for example high calorific rubber in used tires, biomass from food plants.

2.3.4 Sustainable Management in the Mining Sector

The Second Medium Term Plan 2013-2017 of Vision 2030 considers development of mineral resources a priority and states that exploitation of these resources will benefit the people of Kenya. One of the major goals for the Government of Kenya is to ensure that exploitation of mineral resources in the country does not lead to environmental degradation and pollution including having negative social impacts on people and their livelihoods. Nonetheless, there is a wide range of environmental considerations in the exploration, exploitation and processing of

mineral resources because mining activities can have a wide range of environmental and social risks as shown in the table below.

Table 4: Environmental and social risks in the mining sector

Environmental risks	<ul style="list-style-type: none"> • Habitat alternations, with adverse impacts for local communities, flora & fauna; • Waste management, including general wastes and hazardous wastes; • Gaseous emissions; • Hazardous effluents; • Use of explosives; • Specific hazards in underground mining (fires, explosions) • Water contamination; • Reduction in local water supply from overuse; • Energy use; and • Non-compliance with local environmental laws and regulations.
Social risks	<ul style="list-style-type: none"> • Child labour; • Forced labour; • Worker exposure to hazardous materials; • Use of explosives; • Physical hazards, notably from underground mining (fires, explosions, confined spaces); • Non-payment of minimum wages; • Lack of proper labour contracts; • Lack of workplace associations/unions; • Lack of proper training and protective equipment for workers; • Community concerns over land alternations from mining; • Resettlement of local communities from new or expanded mining operations; • Inflow of non-local workers to new or expanded mining sites, with potential adverse impacts for local communities such as an increase • in prostitution and HIV/AIDS prevalence, especially if new non-local male workers are not with their families;
Human Rights	<ul style="list-style-type: none"> • Impacts on indigenous populations; • Impacts on cultural heritage; • If the mining site is remotely located, there are risks for improper living conditions for workers and their families; • Risks associated with the use of a company security force; and • Non-compliance with local health and safety laws and regulations

2.4 Development of the Clinker manufacturing Plant

The Clinker manufacturing plant will be developed from green field. An environmental and social management value chain within the project development has been integrated by the research and it includes all the different activities that are needed for the project. This has been done so to ensure that the project successfully integrates Environmental and Social safeguards from the planning stages, all the way to the completed and approved building structure.

2.4.1 Key Clinker Plant Project Development Activities

The following will be the project implementation sequence from an environmental and social perspective:

Table 5: Key Clinker Plant project Development Activities

	Major Activity	Key Environmental and Social Considerations
1	Project Planning	<ul style="list-style-type: none"> • Most of this part of the project has been done to completion but the initial plan is usually subjected to continual improvement basing on associated progressive needs factors. Normally, during this phase, Environmental and Social project needs are associates but as an overview factor. •
2	ESIA Licensing	<ul style="list-style-type: none"> • The ESIA process is meant to amplify the Environmental and Social project issues and needs as per the project location physical status, ecological status and performance, community needs, statutory management requirements, professional and public views among other objectives. • It should cover the project implementation, operation and commissioning phases
3	Preliminary Site preparations	<ul style="list-style-type: none"> • This will include fencing of the facility, Clearing of bushed and target area. • In the view of this project, the areas covered will include considerations of either facing off the Mianji dairy farm, or foster a co-existing criteria with the firm. Specific measures will be considered under a separate intervention between the stake holders. • The same shall apply with the GSU stakeholders who are tenants on the facility. • Environmental impacts may include dust activation, noise emissions, accidental concurrences, bites from scorpions, snakes and other associated creatures, as well as emerging social issues with the community and Occupational Health and Safety Hazards, Community Safety issues.
4	Development of structures	<ul style="list-style-type: none"> • This will prominently involve excavation works, Setting of foundation and paving drive ways, Erection of industrial pillars and walls, Designing of the industrial plant to accommodate the line processing equipment, construction of site offices and amenities, and production plants • Machinery and various scopes of employees will be at work. Associated impacts may include Occupational Health and Safety Hazards, Community Safety issues, pollution issues, etc.
5	Acquisition and transportation of the plant processing equipment to site	<ul style="list-style-type: none"> • Acquisition of equipment will consider pollution reduction designs which conform with contemporary standards. This will be acquired from various off-continent countries. • The equipment will be docked at the Port of Mombasa and transported to site via optional routes. The two optional routes are: 1). Mombasa-Samburu-Kinango-Kwale-Site and 2). Mombasa-Likoni-Site. • Once on site, the equipment will be set up through engineering interventions • Most of these sets of equipment are bulky and would require due diligence in terms of protecting overhead power-lines along the transportation corridors, potential damage of properties, loss of trees, damage of infrastructure or even damage of the equipment.

		<ul style="list-style-type: none"> • The two route options are further discussed under chapter 9.
6	Decommissioning construction phase	<ul style="list-style-type: none"> • This involved final works carried out on the industrial plant, clearing off construction equipment, rehabilitating associated damages, remediation of potential spillages, furnishing the facilities with office equipment and furniture, performing industrial test runs and initial production. • At this phase, management cycles will be introduced together with training and various forms of management structures trained (including environmental and social management) • Associated project impacts may include: safety and health issues (Occupational and Community) and environmental pollution
7	Plant Operation	<ul style="list-style-type: none"> • The operation phase will include receiving the raw materials from the crushing site, pre-homogenization and raw metal grinding, preheating, pre-calcining, clinker production in the rotary kiln, cooling and storing, blending, cement grinding and storing in the cement silo (see figure below)
8	Decommissioning phase	<ul style="list-style-type: none"> • This is when all raw resources are exhausted, or when the management decides to face off the project for a reason. The requirements will be that the installation must be removed or used for something else as may be in plan, and the site restores as was or better, or commissioned for another project. • Associated impacts will be similar as for the construction phase, but this will be determined through a separate new ESIA project at that time.

The main contractors will be obligated to provide local community employment within their individual firms during the project cycle.

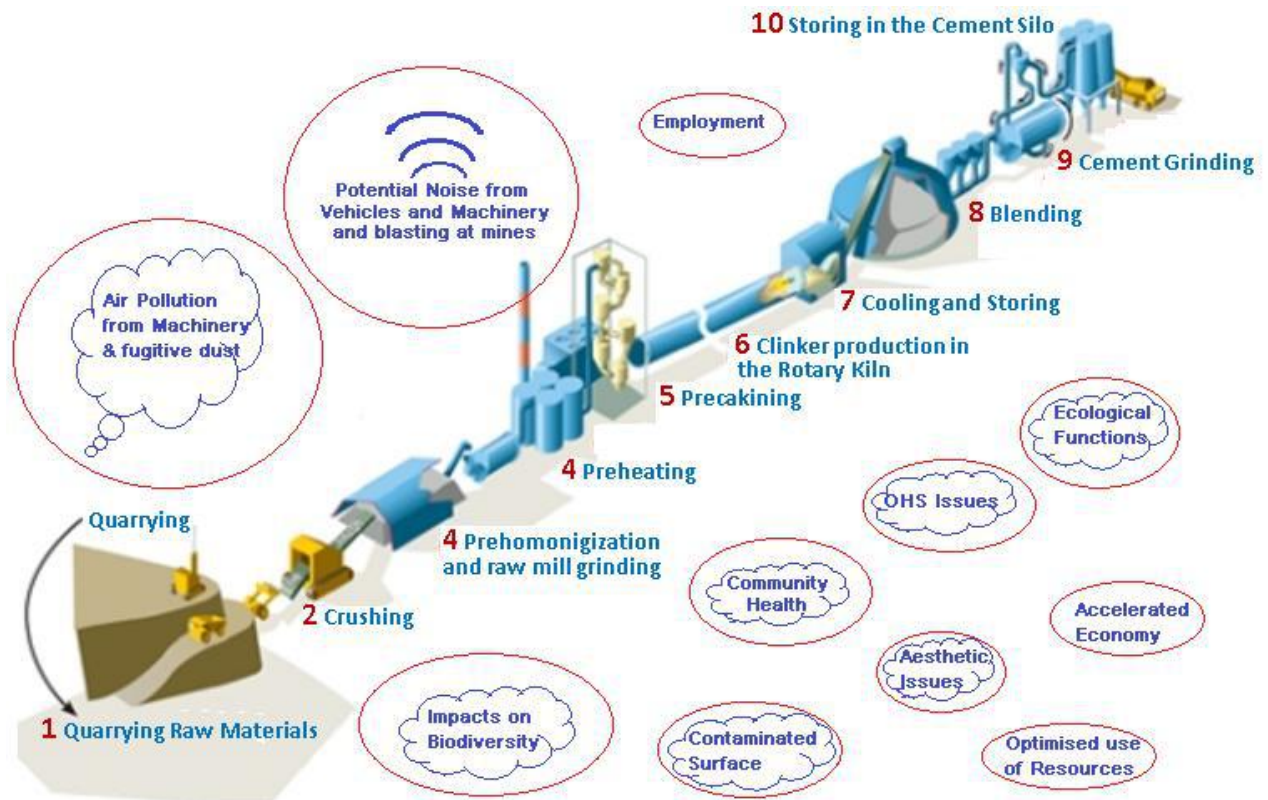


Figure 10: Clinker Production LCA, Process, Steps and Potential Impacts

2.4.2 Value Chain Activities in the proposed Construction

We have teased out environmental and social factors that may be triggered along the construction value chain. There are five main activities within the value chain in the construction. These include:

- **Raw Materials** – These are the materials that will be used within the construction project. In the environmental and social sense, materials must be approved in accordance to national and global regulatory standards. This includes their quality, movement and processing methods, environmental, social and industrial safety aspects, etc.
- **Product Manufacturing** – This includes all the project proponent. The project is controlled by the industry in terms of standards and quality management. There are other competitors and the mining industry values environmental and social conservation with an objective of producing high value products with the least environmental impacts along its entire value chain, determinant measures including their second and third party stakeholders such as sub-contractors and product users. Some of the indicators of success in the industry include enforcement of labour laws during the construction and operation, environmental and social laws, security, and safety & health requirements.
- **Design and Engineering** – The design and engineering section of the value chain includes the proponent, architects, and engineers. Among their environmental and social impact considerations are the location of the plant with regard to wind direction, aesthetics, storm water management, air and noise pollution management, light intrusion into the sea and

community area, etc. Their objective will be to enhance a design that avoids potential negative influences to the community of environment. Or if unavoidable, then to reduce the impacts.

- **Construction** – The construction phase will include the architects and engineers, all the contractors and local community employees that are used as well. The management should integrate to manage all negative aspects associated with the personnel and processes, as well as inherent risks involved.
- **Operations and Maintenance** – Operations and maintenance includes any maintenance firms that are used, the proponent (BCL), and anyone who occupies the building. The design normally integrates the Environmental and Social Audit controls, Safety and health controls and these are also statutory requirements.

The relevant objective of the value chain activities in the proposed project is to ensure that Environmental and Social aspects are integrated effectively until the entire project is complete. Oftentimes, there are organizational structures and control systems in place to ensure nothing gets left out. Technology will play a huge part in the value chain in this particular construction, but so do the employees that are hired to do the work.

2.4.3 Potential Challenges within the project Value Chain

There are many different challenges that the project needs to be prepared for within the project value chain (particularly while operating of the facility). Those challenges include the following:

- **Climate change** – Environmental concerns, as well as the measures continuously being introduced to reduce the carbon footprint of buildings and project operation cycles.
- **Demographic changes** – The number of people inhabiting the surrounding location and with interests of working at the plant may continuously grow and that means some job groups have to be integrated differently. The observation is that, not as many young people in the target location are well qualified to fulfil requirements according to local content laws. That means that the project may not achieve the objective of adequately employing the locals for advanced job levels within the factory construction and operation set-up.
- **Technology changes** – Creating and designing Industrial facilities rapidly change, and this is a factor that has played in the current operating Bamburi Cement plant operating at North Coast, set up in the year 1950. This is due to all the progressive advancements in technology over time. This normally affects all the non-technological features within the value chain in the construction industry. The changes trigger aspects such as the need to redesign the equipment to cope with trending standards, at its worse on a social aspect, such changes may trigger reduction of human resource, replaced with machines. It should be acknowledged that in the Clinker processing value chain, local community members will be employed as a local content requirement.
- **Energy supply changes** – All buildings and homes are supposed to use less energy in the future, but that affects how this activity is implemented within the value chain in construction and operation. The objective should be employing greener energy or sourcing energy resources from waste products that would otherwise end up as polluting environmental agents. ie., The developer already consumes waste tires, oils and other

forms of as a source of energy to power the industrial process. Adoption of such green measures during operation should be encouraged.

2.4.4 Steps Taken to Perform the Environmental and Social Value Chain Analysis

The Environmental and Social value chain analysis is important for the project to ensure that it's safeguards implementation is working as best as it should. The steps that are needed are fairly straightforward, and are as presented below:

Table 6: Steps taken to perform the Environmental and Social Analysis

	Step	Description
1	Identify All the Activities within the Value Chain	<ul style="list-style-type: none"> The very first step is to identify all the activities that are included within the value chain in the planning, field preparation, construction, operation of the project, decommissioning of operations and project decommissioning phase. There are usually other activities within this step, depending on the individual job and how much works needs to be carried out.
2	Analyze All the Activities within the Value Chain	<ul style="list-style-type: none"> Once the activities within the value chain in construction are known, it is best to analyze them to identify any environmental or social aspect that requires consideration in view of that particular project's geographic environment Analyse each impact identified and always go back to the field, planning documents and resource information data sets to identify additional potential project impacts. The analysis should cover both positive and negative aspects
3	Consider the Potential Improvements that are Needed	<ul style="list-style-type: none"> Almost every Environmental and Social Impacts within the value chain in the project can be improved, so this step will almost always be ongoing. Sometimes the answer for improvements is as simple as providing new additional project interventions. However, many times, the proponent will need to invest higher to effectively meet projects environmental and social mitigation requirements as the project progressively advances.

Table 7: Major Components of Limestone Mine Site & Summary of Clinker Plant Capacity

Kiln capacity	5'000	Tons/day
OEE	0.85	
Clinker capacity	1'551'250	Tons/year
RMx/Ck	1.56	
Raw Mix	2'419'950	Tons/year
Limestone in raw mix	1'965'142	Tons/year
Mining loss	~3%	(topsoil 0.6-0.8m)
Quarry production	2'043'748	Tons/year

Pit area		4'112'224	Square Metres	
	Probable Reserves		Total	
	Tons	years	Tons	%
Raw Mix	126'736'068		Raw mix	126'736'068
Matuga 1 limestone	102'917'147*	50.4	Limestone	102'917'147 81.21%
			Divaaen Bauxite	1'945'069 1.53%
			Iron Fines	754'444 0.60%
			Matuga Shale	21,119,408 16.66%

Note: (*) The quantity includes about 3Mt of topsoil (~3%) deducted from the lifetime of the deposit (50.4 years). The quantity also includes the quartzite sand as lenses in the deposit structure. The proposed clinker plant is proposed to start construction in year 2022 and take two to three (2 to 3) years before commencing Operations.

It is estimated that the project construction period will be 2 years and the current expected life of the mine is 50 years. Total yield of the clinker from the proposed Clinker Production project is estimated at 5000 Tons per Day. With a rawmix /clinker factor of 1.6, the raw mix is 8000Tons/Day. Limestone is 80% of rawmix composition-6400Tons/Day.

2.5 Project Cost

From a Total Clinker production of 5000tpd with a Rawmix/ clinker factor of 1.6, the Rawmix is 8000tpd. Limestone is 80% of Rawmix composition - 6400tpd

Estimated variable mining costs for Limestone is KES. 255/t

Therefore, Total Annual Limestone Mining costs - $6400 \times (365 \times 0.9) \times 255 = \text{KES. 536 Million}$

3. BASELINE INFORMATION OF THE STUDY AREA

3.1 Introduction

Kwale County is one of the six Counties in the coastal region. It borders Taita Taveta County to the North West, Kilifi County to the North East, Taita Taveta and Kilifi to the North, Mombasa County and Indian Ocean to the East and United Republic of Tanzania to the South. The County is located in the South-eastern corner of Kenya, lying between Latitudes 30 3' and 40 45' south and Longitudes 380 31' and 390 31' East.

The county covers an area of 8270.2 Km², of which 62 Km² is under water. The area excludes the 200-mile coastal strip known as the Exclusive Economic Zones (EEZ). The position of the county puts it in a strategic location for accelerated economic growth in the Kenyan Coast. The proposed project is currently concentrated within Matuga and Kundutsi Sub-locations of Kwale County.

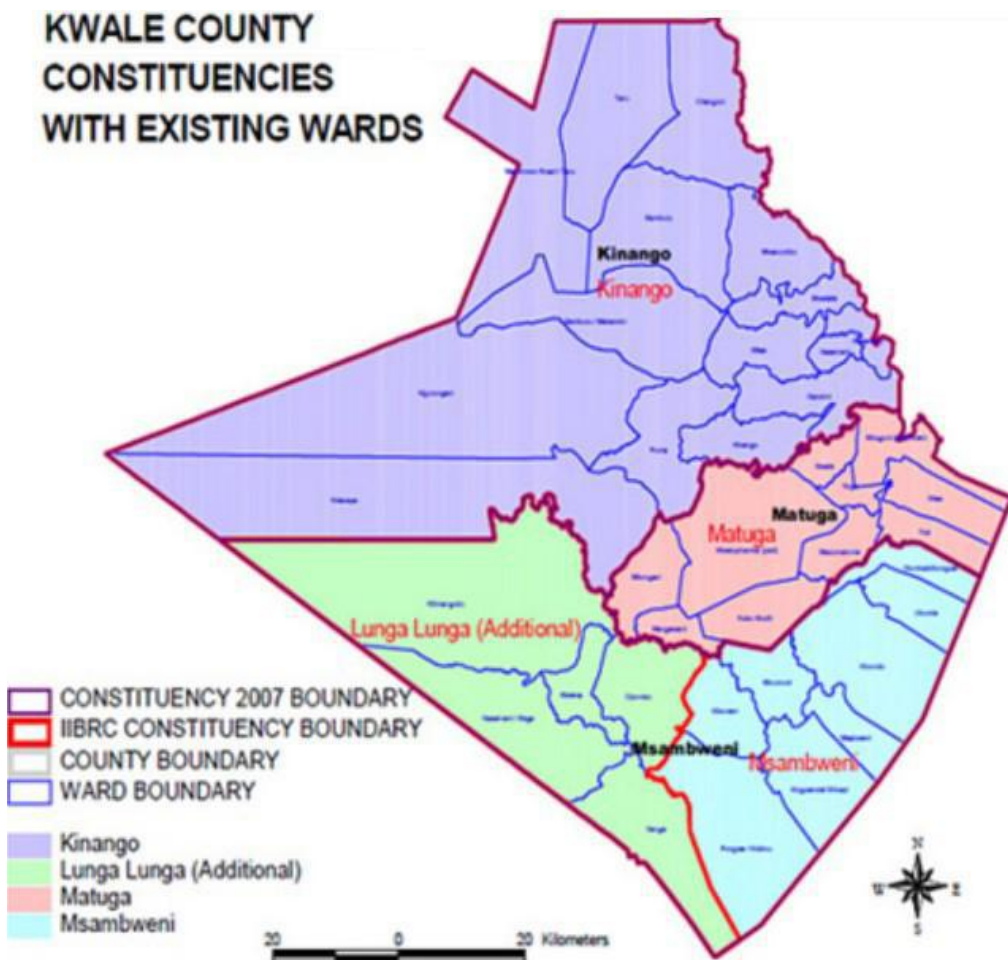


Figure 11: Map showing project area coverage in Kwale County

3.2 Administrative and political units

The county is divided into four sub-counties namely; Kinango, Matuga, Msambweni and Lunga-Lunga. The sub-counties are further divided into wards. Table 8 below summarizes the distribution of wards as per sub-county, and their respective human population:

Table 8: Administrative and Political Units

Sub-County	Constituency	Division	Area (Km ²)	No of locations	No of Sub locations
Matuga	Matuga	Matuga	342.1	6	12
		Kubo	472.8	6	16
		Shimba Hills Nat. res.	216.3	-	-
		Total	1031.2	12	28
Kinango	Kinango	Samburu	1,803.1	5	10
		Kasemeni	592.0	5	12
		Kinango	1,060.7	3	6
		Ndavaya	555.9	1	4
		Total	4011.7	14	32
Msambweni	Msambweni	Msambweni	346.3	4	10
		Diani	232.4	2	5
	Lungalunga	Lungalunga	2648.5	5	9
		Total	3,227.2	11	24
Total			8,270.2	37	84

Source CIDP 2013-2017

3.3 Demographic Characteristics

The County population based on the 2018-2022 County Integrated Development Plan (CIDP) population projection for 2020 was 1,279,682. The population density based on the 2020 projection was 111. The population is projected to rise to total 1,914,796 by 2022.

The labour force (15-64 years) was 352,353 persons (165,636 males and 186,718 females respectively) in 2009 representing 49% of the total population and is projected to increase to 451,391 people in 2022.

At the study area, the most populated centers are Ng'ombeni, Waa and Kombani centres with much concentrations at the centres, and the rest of population spread almost evenly west of the Likoni-Ukunda road at sparse intervals. The west of the road has fewer population, and this is where land is majorly used for commercial development such as tourism and hotels, mining and institutional establishments. There are a few modern private homes and some community housed closer to centres.

Each household at the study area has an approximate population of about 4.8 persons according to the current Mining Baseline survey statistics collected at the field by Earth Resource and Exploration Limited (EREL) .

3.4 Health care

The research attempted to relate disease incidences which may be exacerbated, caused or cause the patient to live under uncomfortable conditions by virtue of operating the Clinker plant. The developer should take considerable account of these, and prioritize mitigation measures gearing towards improvement of community living conditions.

The County has a total of five (5) government hospitals, ten (10) health centres and ninety (90) dispensaries located in Msambweni, Matuga, Lunga-Lunga and Kinango Sub-Counties. The doctor and nurse population ratio stands at 1:76,741 and 1: 3,133 respectively. In addition, the county has a total of thirty six (36) private health facilities and nine (9) health facilities owned by faith based organizations. The average distance to the nearest health facility within the County is seven (7) kilometers as compared to the required maximum of three (3) kilometers. Matuga has a total of 21 level 2 health facilities, 3 No level 3 facilities and 2 No level 4 facilities.

According to the field survey carried out around the project area, the disease burden were as presented below:

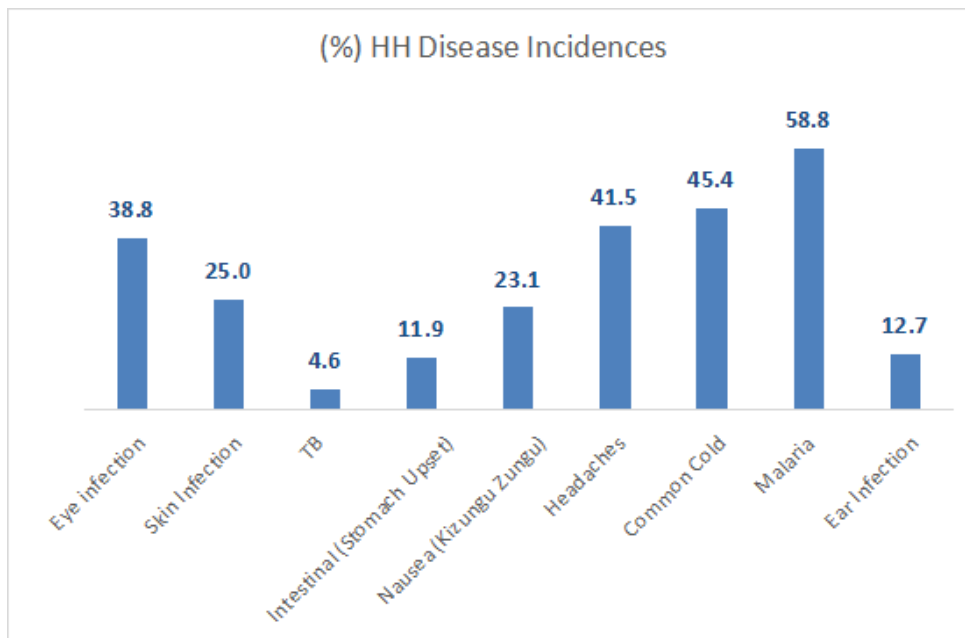


Figure 12: HH Disease incidence according to the HH Survey 2021

Covid 19 was one of the choices but was not recognized as a priority household disease in the area. The most prevalent disease was malaria at 58.8%. Those which were thought to relate to the projects emission factors were eye infections which occur at 38%, TB (by virtue of discomfort and exacerbation at 4.6%, Nausea at 23.1%, common colds also by virtue of discomfort and

exacerbation at 45% and ear Infections at 12.7%. Those which relate at exacerbation level are those not necessarily caused by the project but would logically be worsened by the project's operation if emissions interact with the patient.

The CIDP 2017-2022 (Kwale) indicates that the highest disease burden in the county are malaria, anaemia, HIV, diarrhoea, respiratory conditions and non-communicable diseases. These conditions highly contribute to the high morbidity and mortality in the county. This calls for concerted efforts to address this health challenge in the community. A visit at Tiwi Rural Home Training Centre, the following disease incidences were recorded:

Table 9: Top 12 Disease Incidences recorded at Tiwi health centre

General Disease incidence occurrence recorded at Tiwi Health Centre:		Top Twelve health conditions affecting children under 5 years:	
1. URTI	2692	1. URTI	1328
2. Confirmed Malaria	1651	2. Skin Diseases	772
3. Skin Diseases	1027	3. Confirmed Malaria	382
4. Arthritis	1409	4. Ear Infection	94
5. UTI	950	5. Asthma	93
6. Suspected Malaria	770	6. Suspected Malaria	92
7. Injuries	466	7. Chicken pox	86
8. Hypertension	369	8. Injuries	83 (Burns 37)
9. Asthma	312	9. U.T.I	56
10. Diarrhoea	291	10. Eye Infection	49
11. Deaths from injuries	280	11. Jigger	46
12. Pneumonia	197	12. Others	1222
Other General Disease Incidences recorded at Tiwi Health Centre			
13. Other LRTI	-176	20. STI	- 102
14. Ear Infection	- 163	21. Eye Infection	- 88
15. Abortion	- 150	22. Dysentery	- 55
16. Dental	- 142	23. Anaemia	- 53
17. Chicken Pox	- 131	24. Malaria in PNG	- 43
18. Diabetes	- 119	25. Intestinal Worms	- 33
19. Mental	- 119		

From the above table, disease incidences and conditions which may relate (caused or exacerbated) to negative consequences of the proposed project as either inherent, accidental risks or human error may include: Upper respiratory Tract Infections (URTI), Confirmed Malaria, Injuries, Asthma, deaths from Injuries, Pneumonia, Ear infection (due to dust) and eye infection. Malaria may be a factor attributed by breeding of mosquitoes in poorly managed quarries.

Considering the above indicators, those diseases which relate to adverse project impacts directly or indirectly as a result of open quarries, inhalation of pollutants and noise impacts among others can be identified and mitigation measures justified against the indications. The operator can use the information to determine which County based programs may be associated with to alleviate health performances in the county and in particular the project area

Alternative Medical treatment: There are many varieties of forest medicinal products sold by local community trades from the local forests. The medicines have been traditionally used to treat various ailments including stomach upsets, fatigue, headaches, wound infections, eyes, snake bites, open wounds, etc. Their identification was in ethnic names. These products are sources from the rocky lowland environments where coral rocks occur. The ethno medicinal plants found in the market and treated ailments are provided below:

Table 10: Traditional Medicinal plants and their associated value.

	Plant	Description	Parts used	Ailment treated
1	Mtsalafu	Shrub	Roots and leaves	Stomach, body pains
2	Mgunja	Tree	Roots	Used to purify water
3	Mdaa	Tree	Twigs, roots & leaves	Pain reliever for pregnant women
4	Mrusa Pungu	Shrub	Roots	Running stomach, pregnancy relieve, head aches
5	Mdungu	Shrub	Roots	Stomach upsets and legs
6	Morubaini	Tree	Leaves bark & roots	Malaria, stomach, body pains, headaches, eyes, skin, bleeding gums, (40 diseases)
7	Golonje	Shrub	Twigs and leaves	Ring worms and stomach worms
8	Munga	Shrub	Root and leaves	Placenta ejection, leaves treat anxiety affecting children
9	Mumbu	Shrub	Leaves	Stomach aches & digestive system
10	Mjasusa	Shrub	Leaves	Controls blood flow from cuts, pain reliever
11	Mtserere	Shrub	Leaves	Stops blood flow
12	Mvuma	Tree	Leaves and roots	Stomach aches

All species above grow within the prospective area.

Source: Field (Informant - Mwanasiti Kirauni (0728271923), Ethno Medicinal Practitioner)

3.5 Education

Pre-School Education: The County has a total of 1,072 Early Childhood Development (ECD) centres spread evenly in the county with 820 being public and 252 being private. The total enrolment stands at 83.7 percent and a net enrolment 81.2 percent. The teacher/pupil ratio is at 1:37 and the average ECD attendance age is 4.5 years.

Primary Education: Kwale County has total of 471 primary schools comprising of 392 and 79 public and private primary schools respectively with a total enrolment of 178,166 pupils which constitute a gross enrolment rate of 107.5 percent and a net enrolment rate of 76.1 percent. The primary school teacher population is 4,892 which translate to a teacher/pupil ratio of 1:36. The performance in national examination is very poor due to poor and inadequate school infrastructure such as classrooms, toilets and desks. Another factor attributed to poor performance in the County is malnutrition.

Secondary Education: The county has a total of 79 secondary schools with a total enrolment of 25,739 students which constitutes a gross enrolment rate of 35.5 percent and a net enrolment is 25.3 percent. The secondary school teacher population is 1,173 this translates to a teacher student ratio of 1:21 though the teacher distribution is uneven with hinterland schools experiencing high teacher shortage.

Tertiary Education: The tertiary institutions in the County include a Kenya School of Government (KSG), Kenya Medical Training College and 34 registered public and 4 private vocational training centres. The County has no university but has a satellite campus of Technical University of Mombasa (TUM).

Literacy: The County has a total of 150 adult literacy centres with a total enrolment of 7,133 where 4,391 were females and 2,742 were males. With the introduction of the free primary education for all and adult classes in the County, the literacy levels have reached an average of 57 percent.

School Attendance (Household Survey Outcomes)

The research probed household occupants on the highest education level reached. It was thought considering earliest age for school attendance beginning with Early Child development (ECD) classes which averagely commence at about the age of 5 years. From the total list, 2.2% of household occupants were filtered out due to spoils. Therefore, from the remaining household occupants, those below the age of 5 years (constituting about 8.6% of the total) were also filtered out to reserve the age which qualifies for school attendance. The following graph was presented for analysis according to school level and gender:

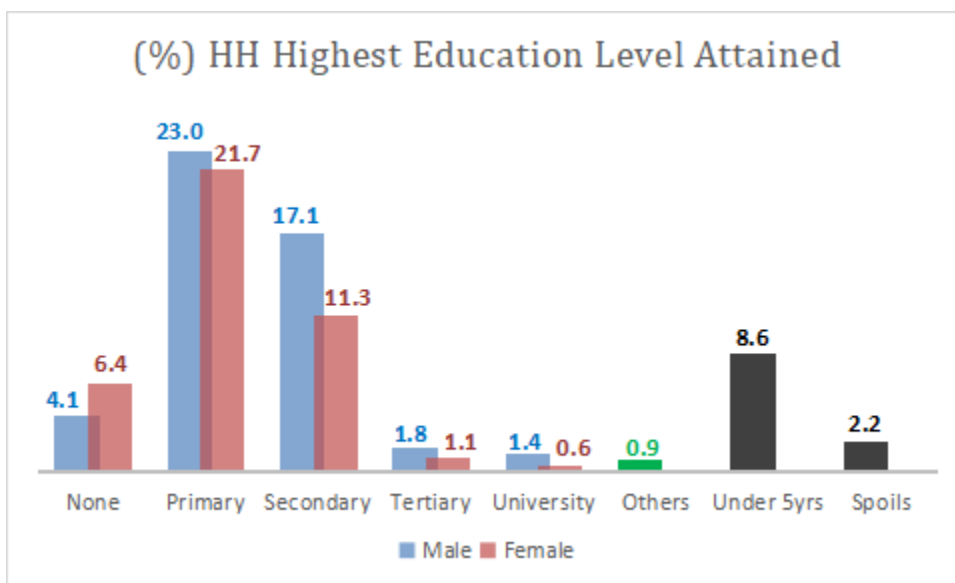


Figure 13 Highest education level attained (for above 5 years) - (Source- Field 2021)

In the study area, the indications show that there is a great -ve variation of enrolment between primary schools and secondary schools, as well as between secondary schools and tertiary schools. This is an indicator of high drop out rates and a high illiteracy level (considering those with no education). It may be difficult for the developer to adequately identify properly qualified qualifications to fill higher cadre jobs which require tertiary or university qualifications from the location, and thus may need to initiate programs to alleviate the potential qualifications to get absorbed into the industry. Indicators from the CIDP as well as existing county programs, and the wish lists developed during this survey can be used to advise the developer on how to prioritize their action to effectively improve education quality in the area.

3.6 Mining

The county has several on-going mining activities such as exploitation of limestone at Waa and Titanium at Nguluku and Mrima by Coast Calcium Limited and Base Titanium Limited respectively. Similarly, Milli Glass Limited, Kenya Breweries Glass Limited and Eastern Chemicals are exploiting Silica Sand in the county. In addition, small scale mining of gemstones is going on in the county. Coral rocks also provide resources for road construction in the county. There has been attempts by Pancontinental Oil and Gas to bring up oil deposits at the 2014 completed Sunbird-1 well off the southern Kenyan coast. Indications are that there are vast deposits at offshore Kwale (World oil, 2014).

Despite the elaborate legal framework on benefit sharing as per the Mining Act 2016, the county is yet to benefit from the mining activities. There are ongoing commercial mining activities by other players and also including unprofessional mining by the local communities at Waa and Tiwi.

3.7 Ranches

There are 13 ranches in the county with an average size of 15,055 Hectares. Out of these five are company ranches and eight group ranches most of which are in Kinango Sub-county (www.kwale County 2021).

3.8 Industry

Kwale County has at least 4 manufacturing industries that include Coast Calcium Limited, Base Titanium, Bixa Limited and Kwale International Sugar Company. By their description, these industries are engaged in mining and agricultural activities. Other industries include 2 bakeries and two water distilling companies. There is a substantial potential for establishing industries and factories for coconut, sugar milling and cashew nut processing in this area. The main challenges affecting small scale industrialization which will be beneficial to the locals according to the CIDP 2018-2022 include:

- Inadequate machinery and equipment for micro-processing/ value addition.
- Inadequate investment in industrial research including limited uptake of appropriate industrial technology.

3.9 Energy Resources

The CIDP indicates 20.1% of residents in Kwale County use electricity as their main source of lighting. A further 17.6% use lanterns, and 41.8% use tin lamps. Electricity use is slightly common in male headed households at 12% as compared with female headed households at 8%. More than half (71.7%) of households rely on firewood for cooking while 12.2% use charcoal, 7.7% use kerosene and 6.6% use Liquefied Petroleum Gas (LPG). The area where the proposed project is located is well distributed with electrical power lines. There is a 134kVa power line passing across the proposed facility. This will have to be relocated to pave way for construction of the Clinker processing factory. Currently, part of the community rely on firewood handouts from the facility forest for their cooking energy. The facility itself is well connected to electricity power from the Kenya Power and Lighting Company (KPLC)



Figure 14: Power Transmission line at the proposed location and firewood harvests (Field 2020).

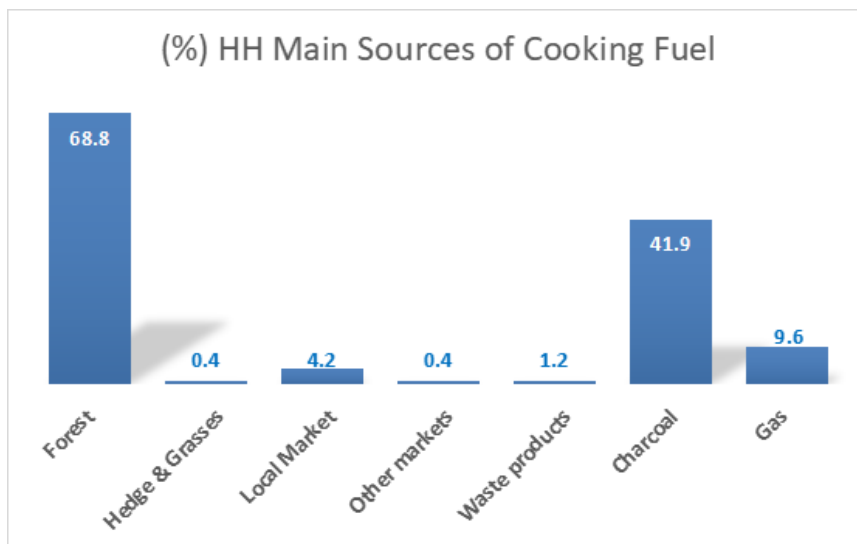


Figure 15: Sources of Energy in the study area (Source: Field 2021)

According to the field survey carried out by EREL team, forest resources are exploited very significantly at about 68.8% and 41.9% for firewood and charcoal respectively. At the location, forest resources have been over exploited to an extent that some of the residents may pouch from the Bamburi cement private forest through the vandalized porous fence. 9.6% of the population use gas for their cooking. This is a clear indication that the community majorly rely on forest resources for charcoal and firewood which is also the resource which the developer protects and objects to use in his processing cycle. There is great opportunity for enhancing forest conservation efforts for the purpose of community livelihood enhancement as a CSR and for industrial use.

3.10 Tourism

The main tourist attraction sites in Kwale are Shimba Hills National Reserve, Mwaluganje Sanctuary, the protected Kaya Forests for cultural heritage, marine reserves and parks, historic sites (Shimoni Holes and Diani Mosques), forest, coral and white sandy beaches, bird habitat areas, hotels and turtle breeding grounds. There still exist potential in this sector such as untapped cultural resources and plenty of potential tourist sites that could offer accommodation facilities and sport tourism.

There is no tourist attraction site within the proposed project area. However, there is an resident association which covers the area and includes the tourist hotel facilities along the southern coast covering areas between the facility, Waa, Tiwi and further south. The closest Kaya forest is Kaya Bombo and Kaya Similani which may offer indicator for monitoring.

3.11 Main Forest Types and Size of Forests

Kwale County does not have commercial plantations. There is one rain forest that is Shimba Hills Forest. The size of the gazetted forest is 350.45Km² and 1900Km² for non-gazetted forest. There are a number of indigenous forests commonly known as Kayas which are sacred sites and are maintained by the Miji Kenda Councils of elders. Kaya forest patches are small in size, ranging in area from 10 ha to 400 hectares and are what remains, preserved by cultural norms, of much more extensive forest. To date, over 50 kayas have been identified in the contiguous districts of Kwale, Msambweni, Kinango, Kaloleni, Mombasa, Kilifi and Malindi. Most Kaya forests tend to be located at strategic sites on hill-tops but a few are found in river valleys and others on flat land. The type of vegetation of the Kayas varies from place depending on the type of forest or woodland that originally dominated the area (NMK, 2008).

Table 11: The Protected Kaya Forests of Kwale County

	Name	Legal Status
1	Kaya Kwale (in FR)	FR/NM
2	Kaya Mtae (in FR)	FR/NM
3	Kaya Lunguma	NM
4	Kaya Bombo NM	NM
5	Kaya Kiteje NM	NM
6	Kaya Teleza	NM

7	Kaya Waa NM	NM
8	Kaya Tiwi NM	NM

NM=National Monument FR=Forest Reserve FR/NM= Dual site

Source: NMK, 2008

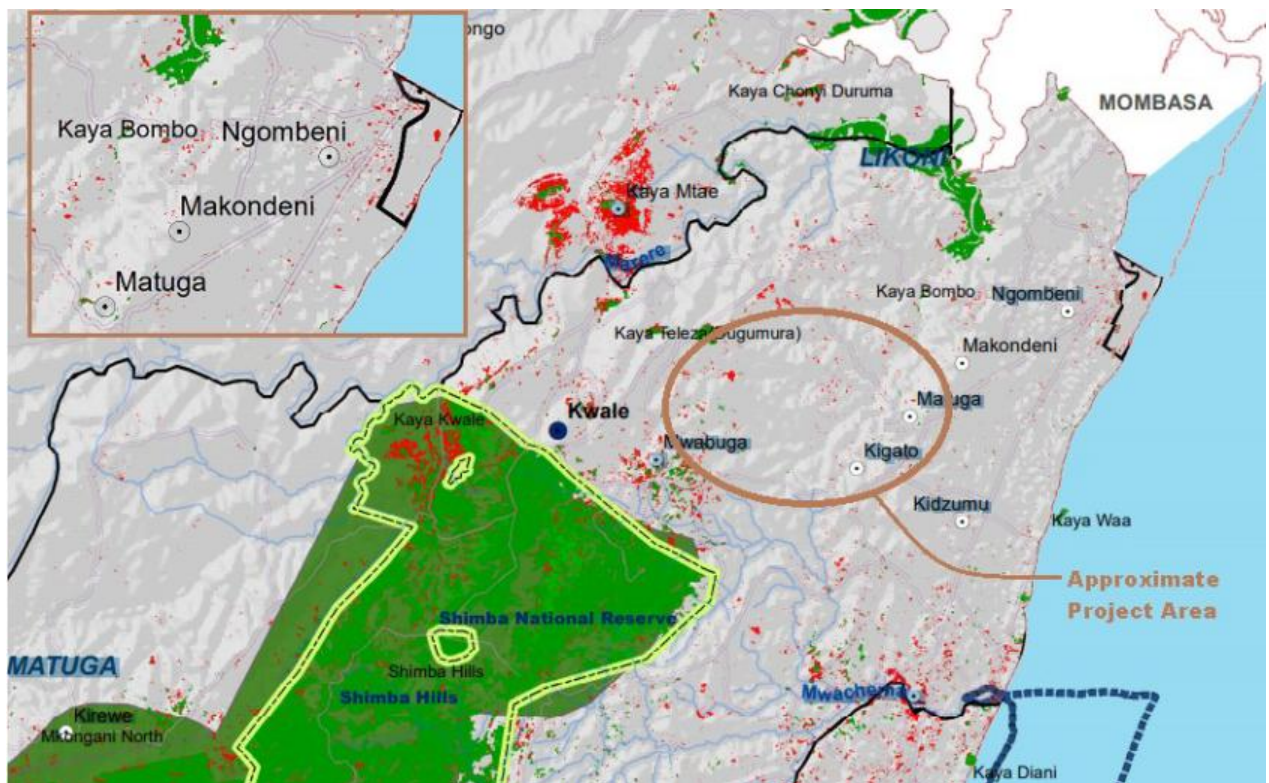


Figure 16: Kaya Bombo and Kaya Teleza: The closest kayas to the project area.

Most farmers have adopted agro-forestry and green economy as a result of on-going promotion of agro-forestry and tree planting sensitization programmes in the county. This is expected to reduce dependency on indigenous forest for wood fuel. Kayas rehabilitation is ongoing to maintain Kaya Catchment for ground water rejuvenation as well as protection of Marere Water Catchment in Shimba Hills Forest. There is horticulture farming at Kubo and Msambweni Division for both domestic consumption and commercial use. Of importance to the community and conservation purposed are certain species of trees which do not grow necessarily within forests or protected areas. These include the Baobab tree and mango trees (Kwale County Website, 2017).

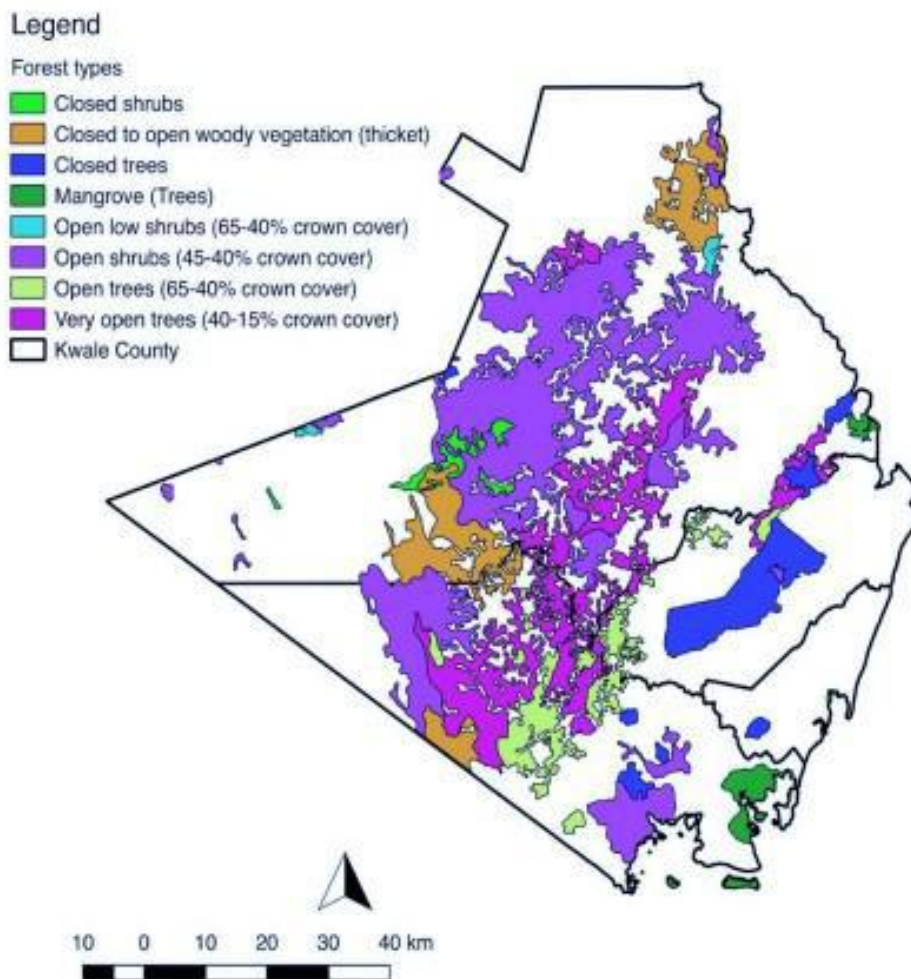


Figure 17: Forest types and sizes in the County

According to discussions from the firewood collectors interviewed during an FGD discussion (see chapter 6.1.5 and appendix 8 for full notes), the areas surrounding the proposed project have been over exploited in terms of forest cover. No meaningful wood can be harvested from the surrounding areas. The land lays bare with minor bush cover. Settlements have expanded to where the land would otherwise have provided forest resources for fruits or firewood. Most did not own the land which they exploit.

3.12 Self-Help Gender Groups

Self-help Gender groups have been registered with the social department and they are engaged through the departments of registration. The groups are facilitated through Sacco funds, merry-go-round initiatives or through NGOs and other groups of interest. Gender groups diversity range between youth groups, elderly groups, the physically challenged, women groups, special persons groups etc.

3.13 HIV-AIDS

With an estimated HIV prevalence of 5.7% (National HIV Estimates 2014) Kwale County is ranked as a medium-epidemic county. With 21,159 People Living with HIV (PLHIV) in the county, it is of concern that two thirds of this population are women and over 2,600 of them are children (National Aids Control Council, 2021).

3.14 General remarks on basic information and gender

Women are clearly side-lined at all levels in the community. The project should develop designs which would object at reducing heavy burdens on women. I.e. incorporation of sustainable water provision, development of structures which would bar the excessive use of fuel wood while lobbying for cleaner energy sources, involvement of women in decision making and local employment opportunities where possible, bench-marking minimal women participation before holding meetings, cooperating with women's groups for their involvement etc. HIV/AIDs preventive measures should be actively implemented throughout the project phases.

The statutory stakeholders involved in Gender and Social Issues are the County Government (Department of social services) and the Youth and Sports department.

4. PREVAILING PHYSICAL AND HUMAN CONDITIONS

4.1 Climate setting

Kwale is one of the warmest regions in Kenya with an average daily high temperature of 31 degrees centigrade. High humidity and high temperatures are making the weather pleasant at times, but also and partly tropical hot and humid. It is warm to hot all year round and invites to bathe at average water temperatures of 27 degrees. Due to the lesser rain the best time for traveling is from December to March. Most precipitation decrease from April to May (www.world data.info).

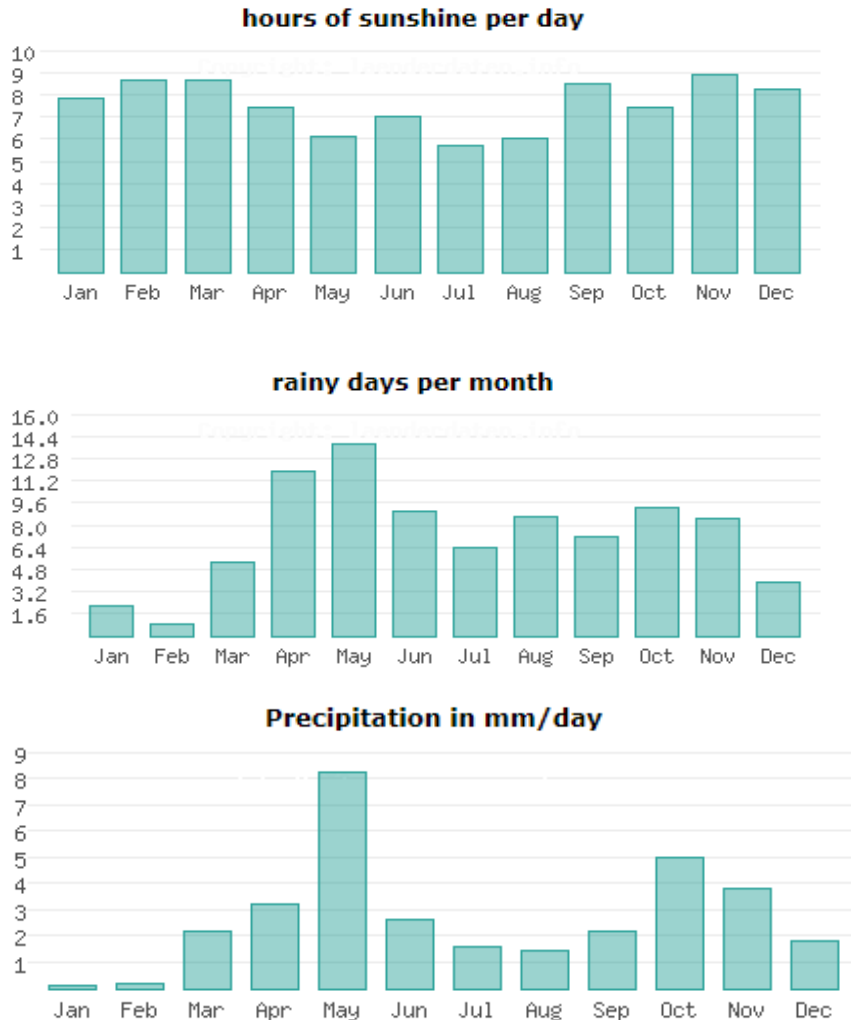


Figure 18: Weather Pattern (<https://weather-and-climate.com>)

Implications of weather: considering the proposed project is that mining is about opening up the ground surface and moving of earth materials, creating huge pits and undulating grounds in the process. High rainfall may trigger high surface runoffs, weaken excavations and may also

activate siltation and transportation of surface soil into the receiving water body. This may cause unusual turbidity, loss of soil and unnecessary pooling. Wet weather on the loose surface roads also render the roads impassable and dangerous to drive on. On the other hand, prolonged drought and high sunshine may trigger dust activation depending on wind strength. This calls for pre-planned remedial measures to suppress adverse occurrences. A good plan would be informed by long term, mid term and short term weather forecasting with the most efficient lead time response to prevent, respond to and to remediate emergency situations.

4.2 Physical and Topographic Features

Kwale County has four major topographic features namely the Coastal Plain, the Foot Plateau, the Coastal Uplands and the Nyika Plateau. The coastline in Kwale County is about 250 kilometers. This strip of land consists of corals, sands and alluvial deposits. The Foot Plateau, behind the Coastal Plain lies at an altitude of between 60 and 135 meters above sea level. The plateau has a flat plain surface with high potential permeable sand hills and loamy soils. This zone is composed of Jurassic rocks and sandy hills consisting of Magarini sands ideal for sugar cane growing (<http://www.dolficode.com>).

4.3 Soils and Geology of the project area

Locally on land, the Matuga1 project site is underlain by fossilized coral limestone that forms a thick unit excellent for quarrying and which is essentially fossilized coral reef. Occasional solution cavities are found in the rocks that do not appear to be large or too deep; such cavities are infilled with silica sand and clays. This does not bar the probability of larger cavities at depth.

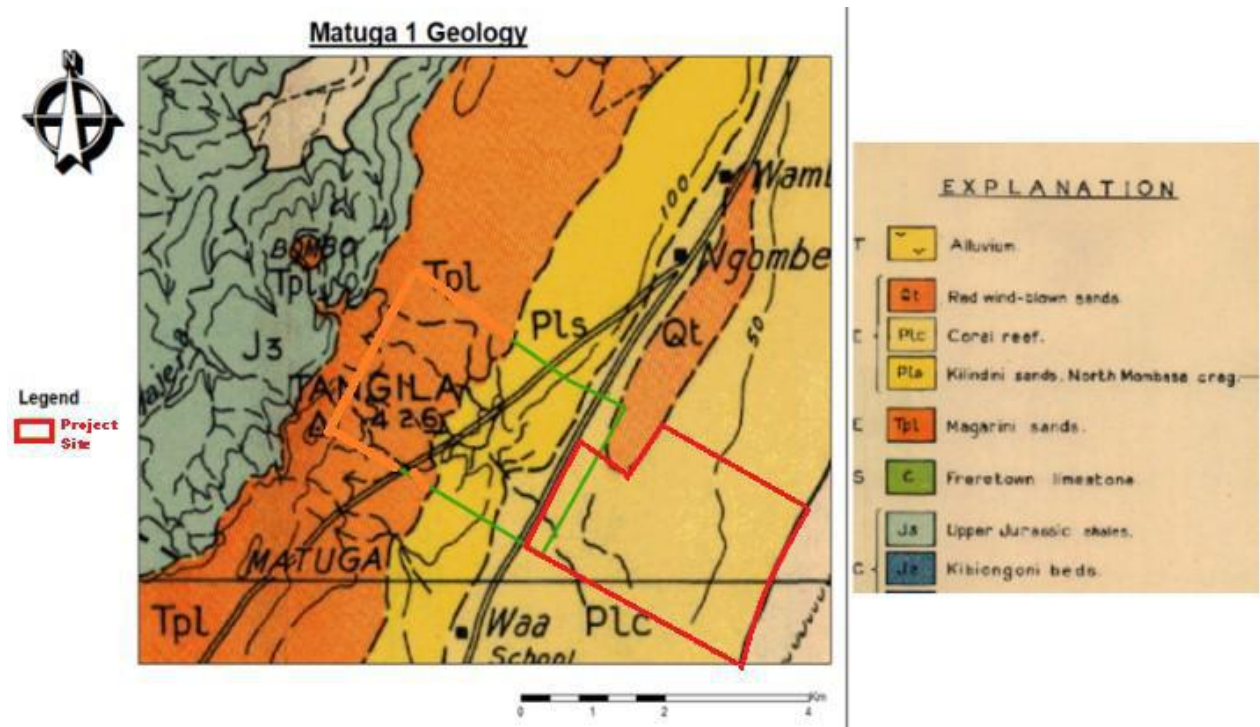


Figure 19: Geological map of the area (extract from Caswell, 1953)

Site soils are poorly developed, calcareous Cambisols. The A horizon is very thin, being 20 cm or less. This horizon rests on the coral limestone, with a very poorly developed B horizon. They have a weak structure and are extremely friable; further inland from the site the soils grade into sandy clay loam. The landscape is a remnant of the Mtondia Plain that lies between 10 – 25 masl; the Matuga 1 site rises to approximately 23 masl (see figure below).

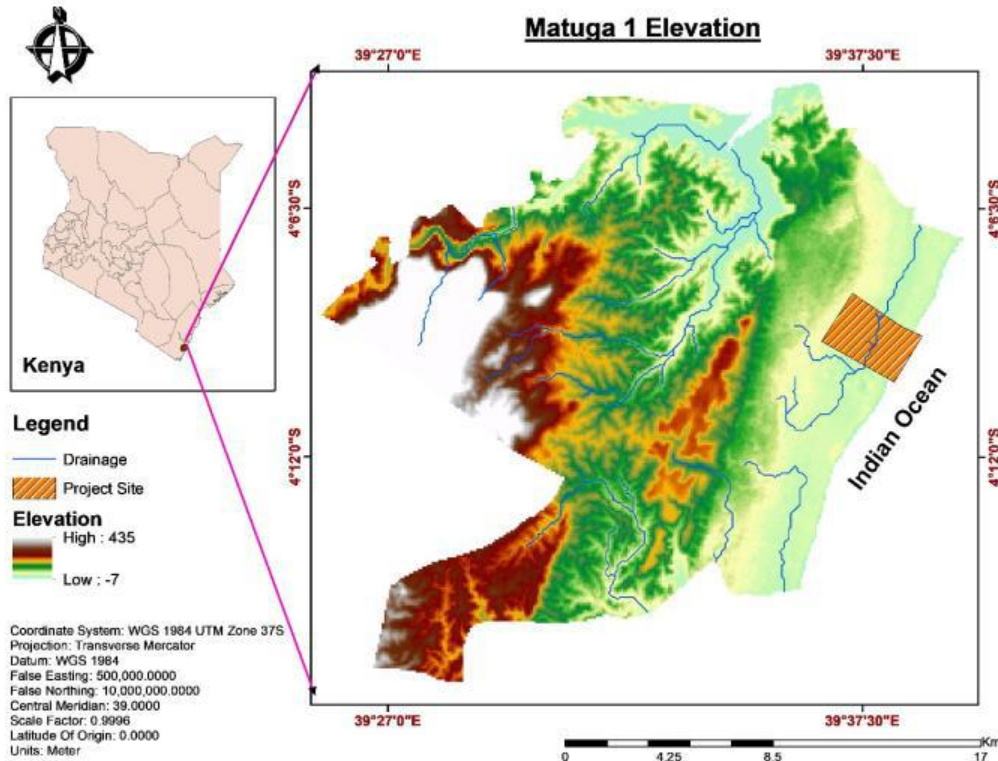


Figure 20: Matuga 1 project site elevation

4.4 Characteristics of the immediate environment

General description: The areas outside the project area towards Ng’ombeni is covered with sparse bushes and occasional vegetation such as baobab trees, neem trees, mango trees and other tree species which are resilient to hot and dry conditions with poor soils. Where the ground is bare, coral or sandy patches of soil are found. There is a mining company (Smoky Hill Quarry Company) which extracts the coral rocks for housing construction products. The eastern boundary is the Indian ocean with coral cliffs ranging between the sea level and about 10 meters. The strip is with coastal vegetation and where accessible due to sea level altitude, accumulation of thousands of floating social waste such as plastics and clothes can be seen in accumulation. The southern side, next to the sea is another mining company (Coast Calcium Limited, Kwale Eye Clinic and another facility which lays inactive. Further south are a series of unconventional abandoned quarries and sparsely populated community households. To the west across the Likoni - Ukunda highway is a ranch and community farms which are also sparsely populated. The images below show the facilities on the proposed project premise:

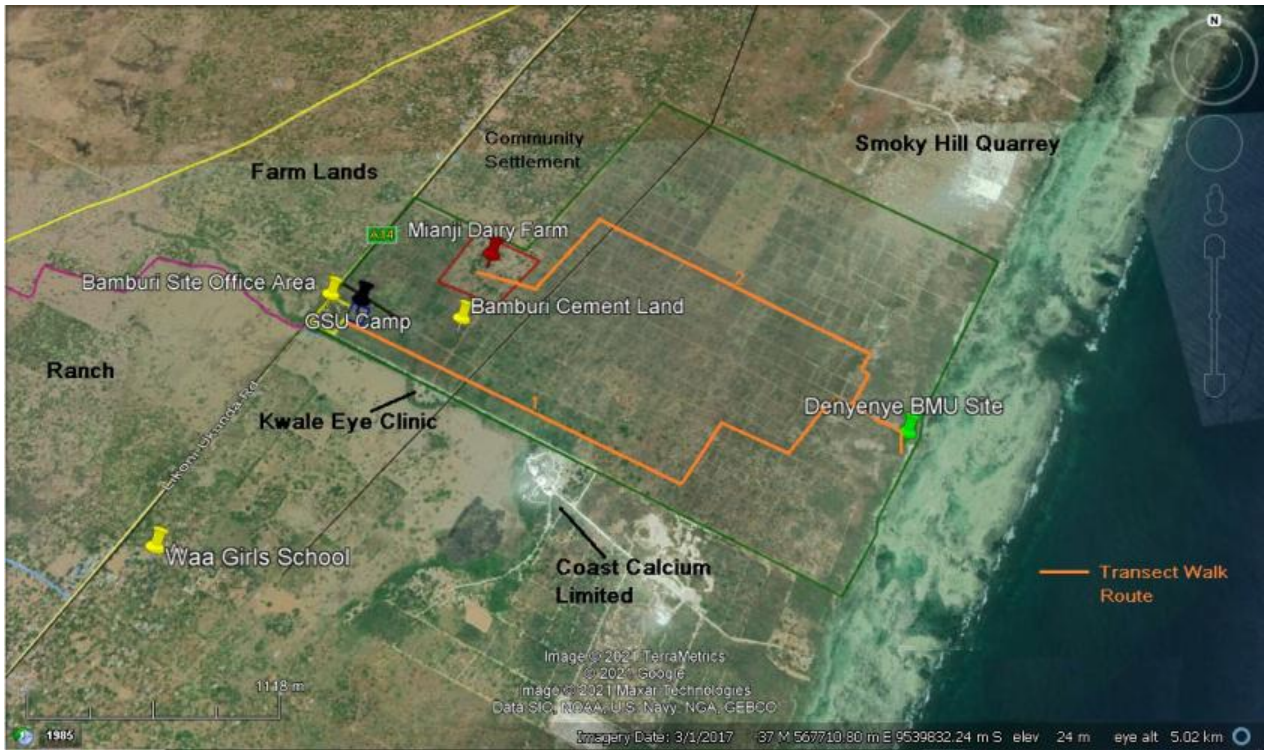


Figure 21: Project area boundary, surrounding amenities, transect walk route (Field 2021)



Figure 22: Images taken during the project area transect walk

4.5 Hydrological characteristics in the county

Generally, the county is well drained by seven major rivers among them Ramisi, Marere, Pemba, Mkurumuji, Umba, Mwachema and the Mwachi River. It is also served by numerous minor streams of the seven (7) rivers, three (3) are permanent. All Kwale rivers flow into the Indian Ocean. Rivers Marere and Mwaluganje have been harnessed to provide piped water.

Table 12: Main Rivers in Kwale County

River	Source	Areas Traversed	Volume M3/D	Quality	Destination
Marere	Marere Spring, Shimba Rain Forest	Shimba Hills National park	9087	Good	Indian Ocean at Bamboo Creek
Pemba	Marere Spring, Kinangop Area	Kinango-Tsunza	7605	Good Saline at Destination	Indian Ocean at bamboo creek
Mkurumudzi	Shimba Hills	Shimba hills, msambweni	9917	Good Saline at Destination	Indian Ocean at Gazi-Msambweni
Umba	Usambura mountains	Lungalunga	6104	Good Saline at Destination	Indian ocean at Vanga
Ramisi	Chenze Ranges	Mwereni-Shimoni	8190	Good Saline at Destination	Indian Ocean at Bod/Shimoni
Mwachema	Majimboni msulwa	Majimboni Gombato-Diani	341.73	Good Saline at Destination	Indian ocean at Diani
Mwache	South Samburu	South Samburu	-	Good Saline at Destination	Indian Ocean at Mazeras

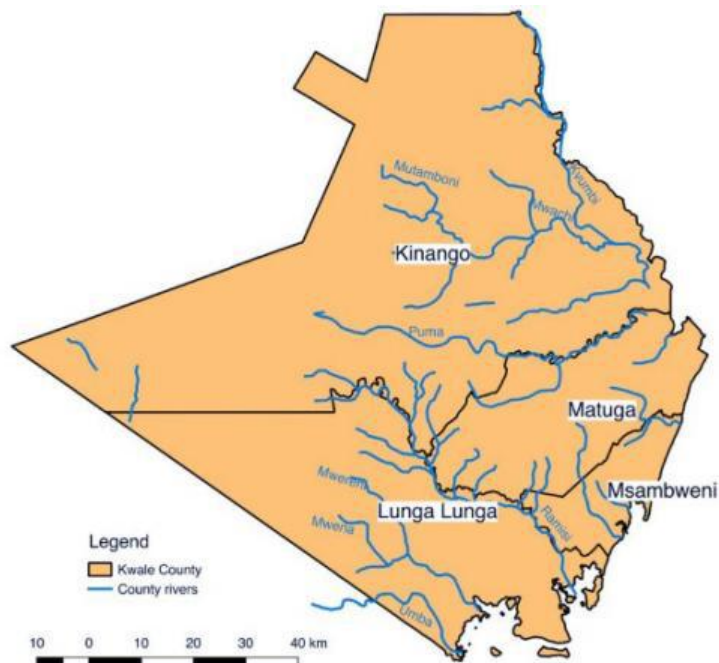


Figure 23: Distribution of rivers in the County (Source: CIDP 2018).

Kwale has great groundwater potential because of its abundant rainfall and porosity of the underlying rock. The water quality is largely determined by the geology of the micro-location. Most of underground water in this series is saline and found in greater depths. The coastal belt has a great potential for potable underground water with six main underground water catchments and/or reservoir. During heavy rain seasons, the hilly Matuga environment holds water pools which slowly sips out through the underground channels. The semi-permanent rivers serve as ground water recharge as well as fall back water sources for some community members and wildlife (including elephants) during extreme dry seasons (CGK, 2013).

There is no conventional river traversing the project area but modified drainage channels which slowly seep into ground water or drain in the sea through the coastal vegetation strip.

4.6 Ecology of the area

Kwale County is divided into agro-ecological zones in terms of agricultural potential. Medium potential and marginal lands constitutes 15 per cent and 18 per cent of the total land area respectively. The rest of the land, about 67 per cent is range, arid and semi-arid land suitable only for livestock and limited cultivation of drought resistant crops. Annual rainfall is less than 800mm on the average and is extremely unreliable.

The climatic zone best fitting the targeted area for Mining according to the National Atlas of Kenya classification is zone 3 (Dry sub-humid to Semi-Arid - moisture index 10 to 30). The land is not of forest potential, carrying a variable vegetation cover (moist woodland, bush land or Savannah).

The trees are characteristically broad leaved (such as Combretum), and other large shrubs which are mostly ever green. Use of this zone prominently includes mining, tourism and settlement. Priority of use is increasingly dependent on prevailing economic trends and fiscal planning systems (National Atlas of Kenya 2006).

4.7 Biodiversity

The distribution of vegetation and wildlife in Kwale County as a region is controlled by climate, the geological formation (soil) and human interaction (tree cutting, clearing and grazing). The total area covered by forests in the region is about 7 per cent, 54,544 hectares (35,043 hectares gazetted and 19,500 hectares not gazetted). The Forest and wildlife species encountered on the facility are highlighted under appendix 8.

Terrestrial Wildlife: The remnant of the tropical forest in the region has been gazetted for conservation as the Shimba Hills National Reserve and the Mwaluganje Elephant Sanctuary. Among animal species found in the reserves are elephant, eland, sable antelope, giraffe, yellow baboon, Angolan colobus, snakes monkey, Grimm's bush buck, hyena, leopard, buffalo, and water back. The ranches of Kinango and Samburu Division are home to the zebra, impala, etc.

Vegetation: The dominant natural vegetation in the general area consists of wooded grassland in general. Areas immediate to human settlements have been modified to suit community preferences. Areas under wooded grassland are the most dominant. These consist of grassland with scattered or grouped trees, the trees always conspicuous, but having a canopy cover of less than 20%. At the lower coastal trees are mangrove forests which are influenced by the ocean and internal drainage systems. Some of the trees are enhanced for their socio-economic values (i.e. mangos) while others are under populating due to community use and demand for settlement.

At domestic level, the species most exploited for a number of uses include the mango tree and the coconut palm trees. These bear multiple uses and are of high value economically. It is worth noting that the community has reduced efforts to indulge in small scale or kitchen garden farming, bee keeping and innovative use of forest resources for sustainable domestic purposes.

Marine: The country values marine life along the Kenyan coast. Kisite-Mpunguti Marine National Park and Reserve is managed and protected by Kenya Wildlife Service (KWS). The marine park is located on the south coast of Kenya, 40km from Ukunda town in the Msambweni Sub County of Coast Province. The ecosystem covers a marine area with four small islands surrounded by coral reefs. Kisite island is covered in low grass, herbs and rocks, while Upper and Lower Mpunguti Islands have dense coastal equatorial forest. Sea grasses cover a large area of the sub-littoral zone of the reef.

4.8 Major Contributions of Degradation

The main contributor to environmental degradation in the County is solid waste such as plastic bags; bottles; cans; garden and kitchen waste; vegetable waste and oil waste, logging (charcoal burning), bush fire (burning vegetation by farmers), overgrazing, dumping of solid waste by the hotels next to the ocean. Mining and sand harvesting also contribute to environmental degradation by leaving behind sites that are not rehabilitated as well as leaving mines and materials that have radioactive emissions (CIDP 2018). The proposed project should not at all deliver any footprints to exacerbate the above noted contributors of degradation.

4.9 Environmental Hot-spots

These are areas with high amount of biodiversity that experiences habitat loss by human activity. The Shimba Hills ecosystem in the County is a key biodiversity hotspot with Madabara, Mwele, and Longo Mwagandi forests within the Shimba Hills National Reserve hosting the highest number of unique and rare species. The proposed project should check for any potential ecological influence on the closest kaya forests (Kaya Bombo and Kaya similani) during Mine development and Operation Phases. Locally, the environmental hot spots are the informal artisanal mines which exist as man-made directional bunkers objected at stealing limestone resources from underground into neighboring facilities as reported during the interview with Bamburi cement Technical team.

4.10 Road, Railway Network, ports and Airport Network

The County physical infrastructure has remained underdeveloped. Kwale County has a total of 2,028 Km of classified roads of which 212.5 Km are Bitumen surface (paved surface), 425.2 Km is gravelled and 1,695.5 Km of earth surface roads/rural access roads. An international trunk road traverses the county from Mombasa to Lunga-Lunga on the Kenya – Tanzania border. On the northern side the Mombasa – Nairobi Highway virtually forms the boundary of Kwale and Kilifi County. There are 4 Km of railway line and four (4) airstrips at Ukunda/Diani, Shimba Hills National Reserve, Msambweni and Kinango although only Ukunda/Diani is operational. Air transport has contributed to the growth of tourism sector, which significantly contributes to the economic growth of the county. There is a small port at Shimoni which is mostly used for water transport by boats controlled by Kenya Wildlife Service. The County Government through partnership with the Kenya Ports Authority and the National Government intends to develop the Shimoni port facility. Water transport potential in the county remains largely unexploited.

4.11 Housing

The statistics on dwelling structures in Kwale County indicate poor housing conditions with no water or sanitation facilities. Majority of the household structures are thatched using coconut tree leaves (makuti) as roofing materials at 49.8%, while corrugated iron sheet account for 37.1%. The main materials used for the construction of walls include mud and wood, stones, and Mud and cement walls which account for 56.9%, 15.2% and 9.8% of households respectively. Most houses do not have piped water or water closets (CIDP 2018-2022).

Housing quality was considered on a general perspective as observed in the study area during the household survey (Ng'ombeni). The parameter was determined by their construction materials, and can also be used to describe wealth levels of a community, and value of structures. This was considered key information as it highlights on how the community exploits their environmental resources in the area.

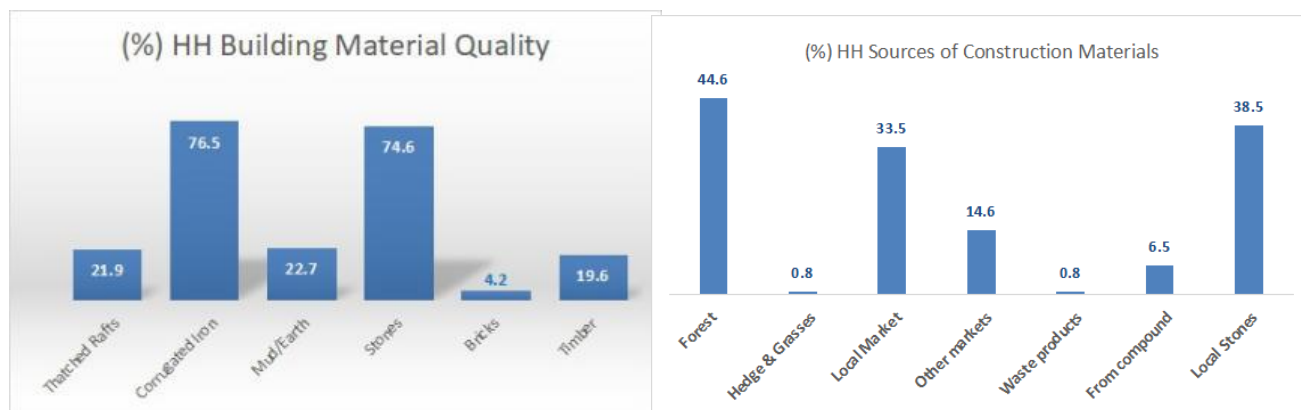


Figure 24: Quality and Source of Household construction materials (Source: Field 2021).

At the field, Most households are constructed by stones and corrugated iron at 74.6% and 76.5% respectively. Only 4.2% were constructed with by bricks and 22.7% by mud, 21.9 with thatched rafts and 19.6 with timber as the main material. The high prevalence of direct exploitation of forest materials for constructions and use of mud and thatched rafts is an indicator of high poverty rates.

Similar to fuel wood resources, it is clear that for construction purposes, the community relies on forest resources, as well as earth resources particularly quarry rocks and soil. The quarry rocks are the same limestone resources as aesthetically indicated at the field. The developer should thus object on sustainability and where possible, may assist the community to enhance alternative options of construction materials to reduce over dependence on the exhaustible and long term renewable resources in the area.

4.12 Employment and Other Sources of Income

Access to jobs is essential for overcoming inequality and reducing poverty. Therefore, levels and patterns of employment and wages are significant in determining degrees of poverty and inequality. According the 2009 census, Kwale had a labour force of about 352,353 comprising of 165,636 and 186,718 male and female respectively.

Table 13: Employment by Education Levels

Education Level	Work for pay	Family Business	Family agriculture	Intern/ Volunteer	Retired/ Home maker	Fulltime Student	Incapacitated	No. of Work	No. of individuals
Total	17.3	12.3	27.2	0.9	18.8	13.9	0.5	9.1	315,948
None	10.3	11.5	40.2	1.1	27.2	0.4	1.1	8.2	98,724
Primary	15.5	12.6	24.5	0.8	16.9	20.1	0.2	9.4	159,276
Secondary+	34.4	12.5	12.5	1.2	9.7	20.0	0.2	9.6	57,948

Source: CIDP 2018-2022

According to the CIDP 2018-2022, wage employment is still very low within the county, contributing just 8.6% of the average household income. It states that wage labour is mainly concentrated in the hospitality sector, catering to tourist sites such as the natural and marine reserves (Shimba Hills National Reserve and Mwaluganje Sanctuary); historic sites (Shimoni Holes, Diani Mosques); forest, coral and sand beaches (Diani, Tiwi, Gazi, Msambweni) and wildlife habitats (bird and turtle breeding grounds). Other formal wage earners include teachers, public servants, general labourers, and those employed in the production and manufacturing sector (mining, agro-industry, distillers). At the study area, about 80% of residents are in the informal sector while 20% are in the formal sector on employment.

Those below 18 years were about 33.2% of the general population. This population, including the spoilt entries which could not be included in the analysis was about 36.9% of the total household population. Among the ones that were above 18 years, there were those few who were still occupied in learning institutions. However, 22% employment ratio against the unemployed (41.1% of the employment age) still presents an extremely low employment level, considering the dependent population.

41.1% were considered unemployed. 12.12% were self employed, 9.2% were paid employees, and 0.6% were employers. From this ratio, a few were students or were engaged in forms of learning institutions.

In this survey, we considered that those who qualify to work as employees must have attained the age of 18 years and above. 3 individuals were found to be employed at the age of under 18 in this survey (14, 14 and 17 years old). This should never be the case with the proposed project as the practice contravenes the labour laws of Kenya. The proposed project can leverage of Corporate Social Responsibility programs to enhance projects that would contribute towards addressing this key issue. The figure below indicates the various sources of income in the study area.

(%) HH DISTRIBUTION OF INCOME SOURCES

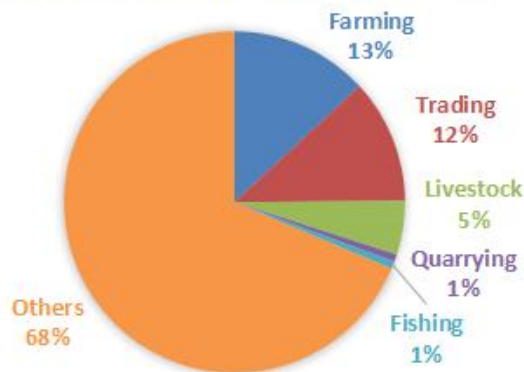


Figure 25: HH Distribution of Sources of Income

13% depend on farming, 12% on trading, 5% on Livestock, 1% on artisan mining, 1% on fishing and 68% from other sources. The results show that the micro environment trades less and some rely on kitchen gardens owing to few small farms. Livestock rearing was also ranked at 5%. The local economy presents opportunity for investment in new businesses to boost the indicators above. However, it is worth studying what the other income sources entail in order to seek further opportunities for this entry.

Poverty is a major determinant of life quality, and thus should be addressed as much as possible to alleviate living standards. The proposed project can leverage of Corporate Social Responsibility programs to enhance projects that would contribute towards addressing this key issue. The figure above indicates the various sources of income in the study area. The County Government can coordinate with the mining sector to formulate strategies which would object at skewing community capacity and interests into the contemporary labour markets to increase the community labour market supply to upcoming industries.

4.13 Waste management

Accumulated waste deposits are an indication of societal lifestyles, waste management practices and production technology. Improper management of waste leads to proliferation of disease; environmental degradation and ultimate impact on livelihoods. The County Government is working on streamlining waste management and should be supported by all stakeholders within. At the moment there are few waste handling points (or collection points) organized by the county government in the project area environment.

From the household survey, it came out that the community uses various means to handle their waste as illustrated in the figure below:

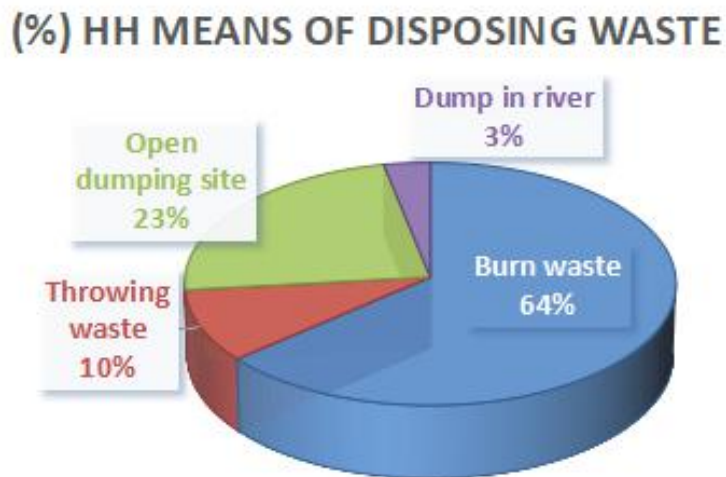


Figure 26: Waste handling at the study area (Source: Field 2021).

Most of the residents (about 64%) get rid of their waste by burning while 10% discard their waste into the open. 23% have open dumpsites which they bury when full and dig new ones. 3% said they throw their waste into water ways to be transported down into the ocean. Some residents practice more than one method of waste handling. The open dumpsites are open to the environmental winds, domestic and small wild animals as well as scavenging children looking for items to play with particularly near trade centres. However, the locality does not generate a lot of waste due to low populations but cumulatively, ignoring proper means of discarding waste may cause eye sores to adjacent environment.

4.14 Water Resources

The main water resources in Kwale County comprise of seven rivers, some 693 shallow wells, 56 springs both protected and unprotected, water pans, 6 dams (6) and 110 rock catchments and boreholes (<https://kwalecountygov.com>). However, most of the rivers are seasonal and cannot be relied upon to supply the much-needed water in the county for both agriculture and household uses.

Kwale Water and Sewerage Company is mandated by the Coast Water Services Board to supply/distribute, control and manage all the water supply schemes within the county. Private water service providers in liaison with the Kwale Water Services Board have been supplying water to the community to ensure water is available for all. Other water supply schemes include community owned and managed boreholes, dams and water pans. Local community participation in the projects has been poor in both operation and maintenance.

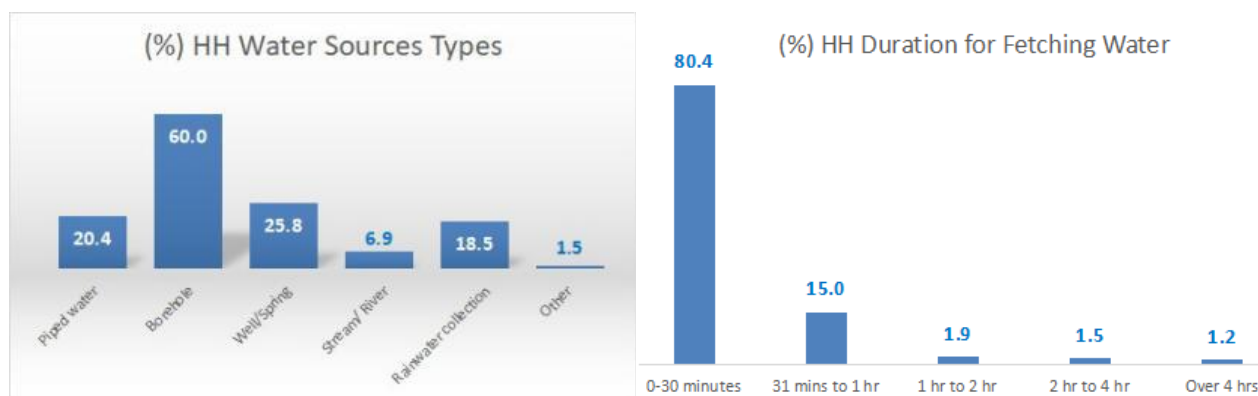


Figure 27: Water sources and access at the study area (Source: Field 2021)

At the study area, about 60% source their household water from boreholes, 25.8% source from wells and springs and 20.4% source from piped water. About 6.9% source from streams and rivers. Note that under waste disposal methods, some residents indicated that they throw their waste in streams and rivers as well. Rain water is collected by about 18.5% of the community members through roof or surface water catchments. 1.5% get their water from elsewhere. Piped water is communally shared by the community. The findings also indicated that most of the community (80%) spent less than 30 minutes to acquire their household water. About 15% spent about 31 to 60 minutes to go, get the water and return home. 1.9% spent more than 1 hour, 1.5% more than 2 hours and 1.2% spent over 4 hours.

The UN's Sustainable Development Goal for water and sanitation, Goal 6, calls for universal and equitable access to safe and affordable drinking water by 2030. The first step is providing everyone with a basic service within a 30-minute round trip, and the long term goal is to ensure everyone has safe water available at home. However, United Nations estimates are that in sub-Saharan Africa, for example, for 29 per cent of the population (37 per cent in rural areas and 14 per cent in urban areas), improved drinking water sources are 30 minutes or more away. In sub-Saharan Africa, one round-trip to collect water is 33 minutes on average in rural areas and 25 minutes in urban areas. According to the Ng'ombeni household field data, almost 20% of the population require interventions to improve access to water. The indicators are allegedly worse during dryer months. Bamburi cement should take initiative to safeguard deep fresh ground water in the process of conducting water drilling should such needs arise. CSR opportunities for rain water harvesting may positively impact on the community.

4.15 The Coastline Water Regime and Ground Water Quality

Summary: Data for this study was sourced from the Water Resources Authority (WRA), Kenya Meteorological Department (KMD), Kenya Marine and Fisheries Research Institute and the online World Meteorological Organization (WMO) ocean weather data station a few kilometers into the sea, off the Matuga 1 site. The WRA data had many gaps and was therefore limiting; the KMD operates only one station in Kwale. Fieldwork for the study was done between 9th and 14th January and additional secondary data collected in the ensuing period.

The main source of water in the study area is rain water, most of it obtained after falling on ground from rivers, ground water, water pans and roof water. Samples were collected from a number of common water resource facilities and processed for quality analysis. Their respective results were used to understand quality status. The key findings from the assessment highlighted the following:

4.15.1 Associated Ground water quality

At the immediate area, the main factors determining quality and quantity of ground water include tidal effect, hydro-geology and lithology of the immediate and surrounding area.

- The mean monthly tidal heights for the period of the study indicate that the highest tides are experienced between March and June with a peak in April. The tidal variations can be attributed to the two monsoon seasons experienced within the study area. Highest tides are likely to be experienced during the rainy season while low tides during the dry season.
- The area adjoins the shoreline and is on the Holocene beach berm from the latest eustatic sea level drop. Corals that grew under the sea became part of the land and subsequently provide storage for fresh water flux from the upper catchment flowing towards the sea. The corals developed in lagoonal conditions hence there are intercalations of fine to coarse sands.
- Under normal circumstances, fresh water moves towards the sea, hindering the flow of seawater inland. The interface between fresh saltwater/seawater and fresh groundwater normally occurs as a transition zone or zone of dispersion, as shown in the figure below.

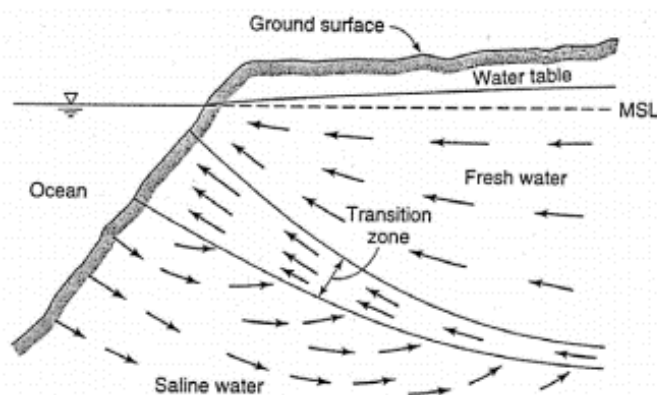


Figure 28: Vertical cross section - flow pattern of fresh & saline water in an unconfined coastal aquifer

- A sharp boundary interface does not exist, rather a transition of finite thickness in which brackish water separates fresh from saline water. The thickness of the transition zone varies significantly according to the local hydro-geologic and geologic conditions as well as the man-made activities related to the exploitation of the groundwater potential of the coastal aquifer.
- The area is known to have shallow wells that are dug to between 18-22 meters deep. Solution cavities attest to presence of conditions that are conducive to groundwater occurrence. The water quality is good: data for one well off the site tested for pH-7.2 and TDS 195 mg/l, which is fresh water. The area is therefore an important groundwater zone.

4.15.2 Conclusions

- An aquifer occurs below the project site, with the water table located +2 to +3m above mean sea level. The freshwater/saltwater transition interface is apparently below sea level at this site, varying between 0 and -10m.
- Previous studies indicate that the fresh water lens extends to a few metres below sea-level. The decision to drill the exploratory and piezometer boreholes to -5m is therefore prudent because it provides an opportunity to define with greater accuracy the elevation of the halocline.

4.15.3 Recommendations for the Limestone Mining project

- The mining should consider factors laid out in this study on tidal scopes, ground water (general) regime as well as fresh water levels in order to safeguard their ecological characteristics throughout the mining period.
- In view of the findings, the developer should regulate mine base altitudes accordingly. Any drilling for underground fresh water should not contaminate aquifers between saline and fresh water as illustrated in this report. A separate exploratory drilling report should be sought. A detailed report is provided under Appendix 17.

4.16 Air quality

This location is characterized with relatively fast winds of natural ambient air throughout, but interrupted by the Bamburi Cement private forest which keeps the micro-location cool most of the day. There are no incidences of bush fires but dryer weathers trigger activation of fine dust from roads and trapped particulates on leaves. It was worth setting a baseline status of the air quality before potential exploitation of the area. Air quality tests for the area were carried out to set baseline at Kwale County, Ng'ombeni Location at the proposed project site, which is also representative to the project area, residential area and beach area.

4.16.1 Methods applied

Parameters: Baseline air quality was conducted for the air quality monitoring study was conducted for gaseous parameters (Sulphur dioxides (SO₂), Nitrogen dioxides (NO₂), Carbon monoxide (CO), Hydrogen Sulphide (H₂S), and particulate matter (PM10 & PM2.5). Baseline air quality monitoring was done using the Aeroqual 500 series machine.

Location: The location selected was based on proximity to the highway where vehicle would probably be the main sources of emissions and the proposed project area where the mining will take place when the project commences.

Control Parameters: The two control parameters of reference were the *Environmental management Coordination (Air Quality) Regulations, 2014* and the *WHO Guidelines 2005*. The applied standard limits are as presented below

Table 14: Extract of the EMCA Ambient Air Quality (Tolerance Limits)

	Pollutant	Time weighted average	Industrial	Residential, Rural & other area	Controlled Areas
1	Respirable particulate matter (<10 µg/m ³) (RPM)	24 Hours	150 µg/Nm ³	150 µg/Nm ³	75 µg/Nm ³
2	PM _{2.5}	24 Hours	75 µg/m ³		
3	Sulphur dioxide	Instant Peak	500 µg/m ³		
4	Hydrogen Sulphide	24 Hours	150 µg/m ³		
5	Total VOC	24 Hours	600 µg/m ³		
6	Oxides of Nitrogen	24 Hours	100 µg/m ³	0.1 PPM	
		Instant Peak		0.5 PPM	
7	Carbon monoxide / carbon dioxide	One hour	10 mg/m ³	10 mg/m ³	10 mg/m ³

Table 15: WHO Air Quality Guidelines Values

	Pollutant	Time Weighted Average	WHO Guidelines
1	PM ₁₀	24 hours mean	50 mg/m ³
		Annual mean	20 mg/m ³
2	PM _{2.5}	24 hours mean	10 mg/m ³
		Annual mean	25 mg/m ³
3	Sulphur dioxide	24 hours	20 mg/m ³
		10 Minutes mean	500 mg/m ³
4	Nitrogen dioxide (NO ₂)	Annual Mean	40 mg/m ³
		1 Hour mean	200 mg/m ³
5	Ozone O ₃	8 Hour mean	100 mg/m ³

The air quality data obtained for the two selected monitoring station is summarized below. Detailed air quality data obtained from the field is under appendix 16.

Table 16: Findings of the gaseous parameters, particulate matter & meteorological conditions

LOCATIONS	CARBON MONOXIDE (mg/m ³)	NITROGEN DIOXIDE (µg/m ³)	SULPHUR DIOXIDE (µg/m ³)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	Hydrogen Sulphide	WEATHER	WIND SPEED AND DIRECTION
Near the Indian Ocean	0.08	12	16	12	16	0.12	Sunny and windy	17km/hr North East to South
At the boundary area	0.10	18	22	13	14	0.14	Sunny and windy	16km/hr North East to South West
500 M from the boundary area	0.12	22	26	16	16	0.22	Sunny and windy	17km/hr North East to South
At the proposed factory location	0.34	26	32	28	38	0.24	Sunny and windy	15km/hr North East to South West
At the boundary between residents and the proposed project site	0.48	32	40	33	44	0.34	Sunny and windy	16km/hr North East to South

WHO GUIDELINES 2005	200 ug/m ³	500 ug/m ³	10 ug/m ³	50 ug/m ³
EMC (Air Quality) Tolerance Limits	10.0 mg/m ³	150 ug/m ³	125 ug/m ³	75 ug/m ³

4.16.2 Comments

- Upon comparison with EMC (Air Quality) Regulations, 2014, all parameters tested for the 5 monitoring locations complied with the stipulated EMC (Air Quality) guidelines, 2014
- Upon correlation with the WHO Air Quality Guidelines 2005, both Nitrogen dioxide, Particulate Matter 10 and Sulphur dioxide were below the Air Quality Guidelines while PM2.5 surpassed the WHO Air Quality Guidelines (AQG).

4.17 Noise

The proposed location is descriptively at a largely rural setting and is under developed with few earth roads traversing the area and connecting to that moderately busy Kwale Mombasa road. There are relatively few motorbikes serving the area. Noise near the main roads is commonly from the few vehicles and motor bikes plying the area and is considered insignificant.

Noise measurements were taken from the Bamburi cement facility at Denyenye, in the forest at a point close to the Kwale Eye Clinic and Coast Calcium where potential noise impacts would occur, from the shore at a point where the community use as a landing site for their fishing activities and from the Matuga - Ng'ombeni road at an approximate middle point between the centres.

Most of the noise captures was as a result of cross winds through the forest at Denyenye forest plantation, and a combination of the cross winds cutting through the forest and above the ocean

at the beach area. At the Matuga - Ng'ombeni road, most of the noise came from bleating livestock, motor bikes and occasional vehicles which we did not capture during the measurement. The current site under study bear no active quarries or heavy vehicles. The general levels are considered to be low due to the nature of the point. The residents informed that night hours are relatively silent. The high noise attributed to winds should be an advantage considering its consistency (see wind-rose data in section 5.33). The advantage point is that it will be beneficial in diffusing potential smog or high stack emissions should an emission abatement industrial system put in place fail to work for a reason or the other. Below are noise measurements taken from the facility and one of the community roads which may be used as a transport corridor during set up and construction phase.:

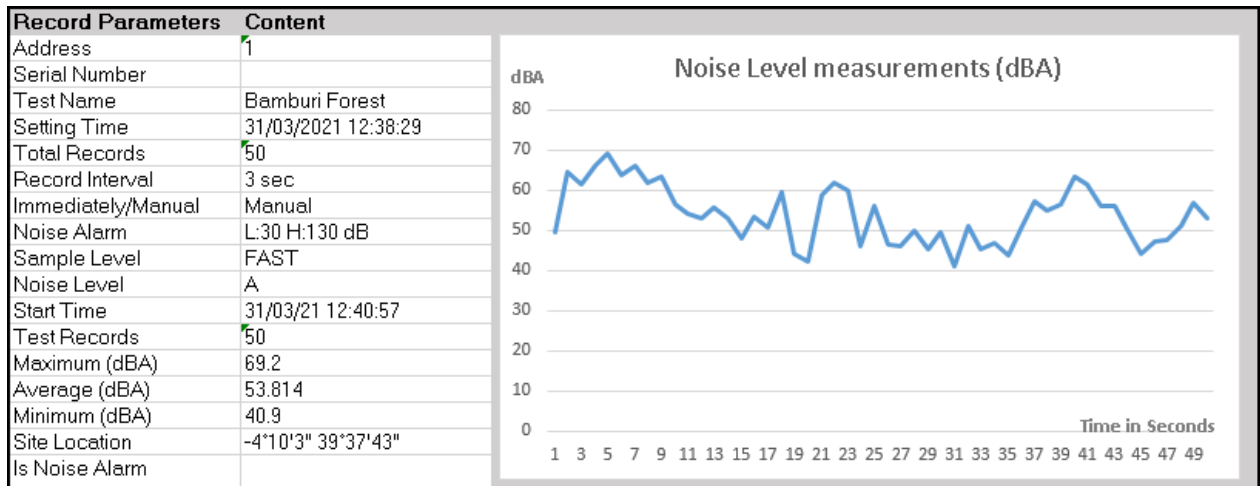


Figure 29: Noise level at Bamburi Forest near Kwale Eye Clinic

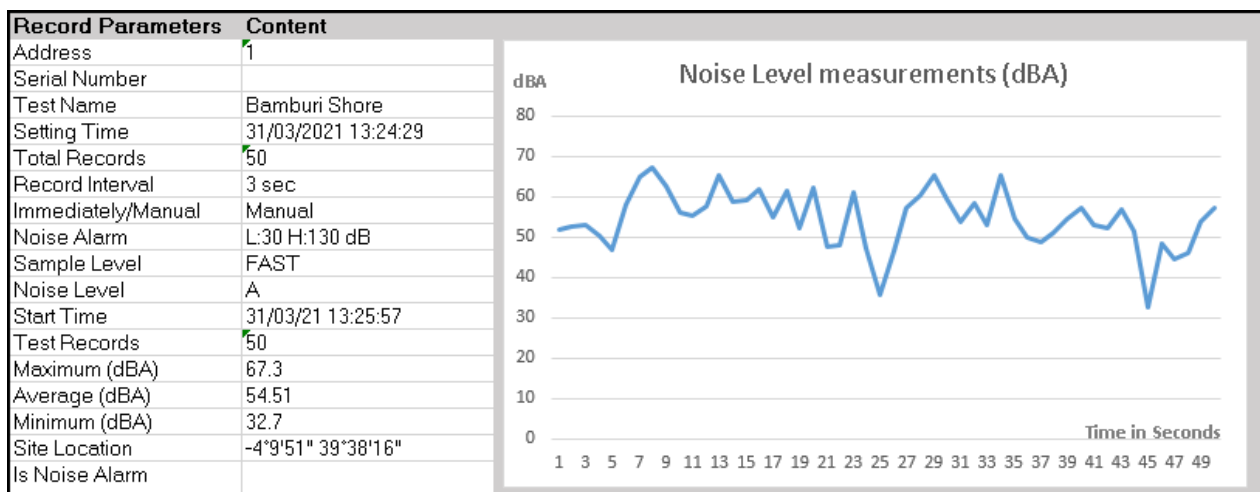


Figure 30: Noise level at Bamburi Shore (Denyenye Community Fishing landing Site)

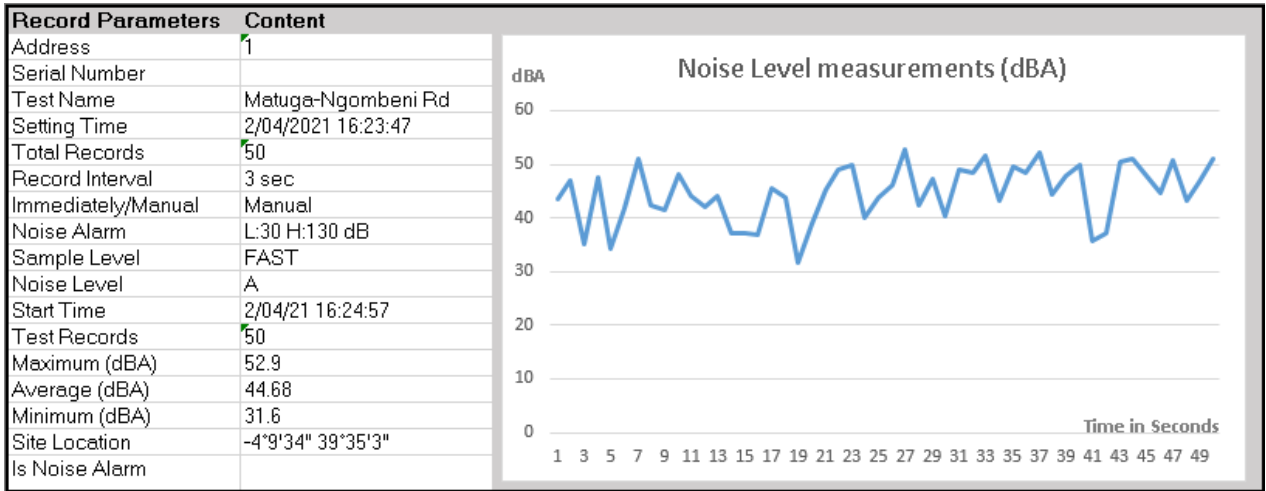


Figure 31: Noise level at Matuga-Ngombeni Road

Table 17: Maximum Permissible Noise levels

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

Time Frame: Day: 6:01a.m. – 8.00 p.m (Leq, 14 h) Night: 8:01p.m. – 6:00 a.m. (Leq, 10 h)

Criteria for noise level analysis: Mean noise level recordings at 30 meters from source for various categories of sources in the area, or any other source observed against frequency of occurrence per selected point. Noise measurement procedures can be requested for from NEMA or County Public Health offices. Note that the maximum permissible noise levels at residential outdoor areas according to EMCA 1999 (Rev 2019), Noise and Vibrations regulations of 2009 are 55dB for daytime hours and 35dB for night hours.

5. RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

5.1 Introduction

EIA is an instrument for environmental management and development control. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. It is a condition that all developers conduct EIAs on the development projects.

EIAs are carried out in order to identify potential positive and negative impacts associated with the proposed development with a view of taking advantage of the positive impacts and developing mitigation measures for the negative ones. The guidelines on EIAs are contained in section 58 to 67 of the Act. According to section 68 of the EMCA 1999 Amendment 2019, the authority shall be responsible for carrying out environmental audits on all activities that are likely to have a significant effect on the environment.

There are a number of policies, laws and regulations that govern the protection, conservation and exploitation of the natural resources coupled with provisions for environmental management. These national policies, laws and regulations cover infrastructure, water, agriculture, forestry and health just to mention a few. The national environment action plan documents cover policy directions regarding integration of environmental concerns including EIA into development planning process.

Some of the key national laws, policies and regulations that govern the management of environmental resources in the country are discussed herein.

5.2 The Constitution of Kenya, 2010

The provisions of Chapter V (Protection of Fundamental Rights and Freedoms of The Individual) shall have effect for the purpose of affording protection to those rights and freedoms subject to such limitations of that protection as are contained in those provisions, being limitations designed to ensure that the enjoyment of those rights and freedoms by any individual does not prejudice the rights and freedoms of others or the public interest. The constitution protects citizens from deprivation of property. No property of any description shall be compulsorily taken possession of, and no interest in or right over property of any description shall be compulsorily acquired, except where it is necessary for public interest.

5.3 Relevant National Policies

The following national policies are of relevance to Environmental management in Kenya and to the proposed project:

5.3.1 The National Environmental Action Plan (NEAP)

The NEAP was a deliberate policy effort to integrate environmental considerations into the country's economic and social development initiatives/plans. The integration process was to be

achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and conservation of natural resources are an integral part of societal decision making. As a result of its adoption and implementation, establishment of appropriate policies and legal guidelines as Well as harmonization of the existing ones have been accomplished and/or are in the process of development. Under the NEAP process, EIAs were introduced targeting the industrialists, business community and local authorities (now the county governments).

The mining project shall be implemented and operated based on these guidelines and where the guidelines will be seen to fall below requisite threshold, international standards will be adopted.

5.3.2 National Policy on Water Resources Management & Development (1999)

While the National Policy on water resources management and development (1999) enhances a systematic development of water facilities in all sectors for promotion of the country's socio-economic progress, it also recognizes the by-products of this process as wastewater. It therefore calls for development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. This implies that Industrial and business development activities should be accompanied by corresponding Waste management systems to handle the waste water and other waste emanating there from. The same policy also requires that such projects undergo comprehensive EIAs that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighborhood and further downstream are not negatively impacted by the emissions.

5.3.3 Policy Paper on Environment and Development (1999)

The key objectives of the policy include;

- i. To ensure that from the onset, all development policies, programs and projects take environmental considerations into account,
- ii. To ensure that an independent EIA report is prepared for any industrial venture or other development before implementation,
- iii. To come up with effluent treatment standards that will conform to acceptable guidelines.

Under this paper, broad categories of development issues have been covered that require a sustainable development approach. These issues relate to waste management and human settlement. The policy recommends the need for enhanced re-use/recycling of residues including wastewater, use of low or non-waste technologies, increased public awareness raising and appreciation of a clean environment. It also encourages participation of stakeholders in the management of wastes within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as Water, drainage and waste disposal facilities among others.

So far, in the course of the ESIA process, the environmental consultants have attempted to reach out to the project stakeholders through public consultative processes. As the ESIA process matures, the experts will be keen to see that all necessary clean development mechanisms are incorporated for the benefit of environmental receptors of the project.

5.3.4 The National Poverty Eradication Plan (NPEP)

The objective of NPEP was to alleviate poverty in rural and urban areas by 50 percent by the year 2015 as well as the capabilities of the poor and vulnerable groups to earn income. It also aimed to narrow gender and geographical disparities and a healthy, better educated and more productive population. This plan had been prepared in line with the goals and commitments of the World Summit for the Sustainable Development (WSSD) of 1995. Since poor health status is among the indicators of poor societies, the plan pursues to address its capacity to relieve poverty.

5.3.5 Public Health Policy

The prevailing public health policy calls upon the project proponent to ensure that buildings and work areas are adequately provided with utilities so that they are fit for human habitation. The proposed development has been designed by professional architects and engineers and as such will have all amenities/utilities that are essential for safeguarding public health for all people using the facilities during the construction, operational and decommissioning phases of the project.

The proponent must adhere to the provisions of the relevant Act of parliament, Public Health Act (CAP 242).

5.3.6 Sustainable Development Goals (SDG's)

On September 25th 2015, countries adopted the United Nations Sustainable Development Goals (SDG's) aimed at contributing towards ending poverty, protecting the planet, and ensuring prosperity for all as part of a new sustainable development agenda. The SDG's have very significant implications for investment needs and the role of the public sector is fundamental and pivotal. At the same time the contribution of the private sector is indispensable.

The proponent must be committed to the SDG's through the proposed development in the following ways:

Goal 1 – No Poverty: Targets to be achieved

It states that, to end poverty, everyone should have basic healthcare, security and education. The project is a mining facility that will employ, thus will also directly contribute towards the goal.

Goal 6 – Clean Water and Sanitation: Targets to be achieved:

The project will contribute to improved water provision as a corporate association with the community through development of prioritized projects including safe adequate water distribution projects.

Goal 8 - Decent Work and economic growth: Targets to be achieved:

During construction and operation phases, employment creation will contribute to reducing the proportion of youth not in employment.

The project will also provide an environment that emphasizes on protection of labor rights and promotes safe and secure Working environments for all Workers

Goal 9 - Industry and infrastructure: Targets to be achieved:

This will involve building resilient infrastructure and fostering innovation. This project will meet international standards and will be the first of its kind outside the Capitol City of Nairobi. It will alleviate many other satellite sectors such as transport industry within the region, medical industry and others.

Goal 12 – Sustainable Consumption and Production process: Targets to be achieved:

The project is about exploitation of land resources and this comes with some alterations of usable land. The proponent is aware of this fact and is well known as an environmental sensitive institution. Each and every foot print within the production and consumption cycle is well understood and parallel measures to mitigate negative impacts are well established.

Goal 15 – life on Land: Targets to be achieved:

The proponent is aware that Human life depends on the earth as much as the ocean for our sustenance and livelihoods. Plant life provides 80 percent of the human diet, and we rely on agriculture as an important economic resource. Forests cover 30 percent of the Earth's surface, provide vital habitats for millions of species, and important sources for clean air and water, as well as being crucial for combating climate change. And therefore, must align policies to uphold this key principle.

5.4 Legal framework

5.4.1 Environment Management & Coordination (Amendment) Act, 2019

Section 58 (1) of the Act states “Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee”.

Section 59 (l) states that upon receipt of an environmental impact assessment study report from any proponent under section 58(2), the Authority shall cause to be published in the Gazette, in at least two newspapers circulating in the area or proposed area of the project and over the radio"

This Act provides a legal and institutional framework for the management of the environmental related matters. This report has been written pursuant to section 58 (l) of this Act and the proponent shall take note of its provisions. Involvement and disclosure on the project has been extended to the statutory stakeholder institutions, in tangent institutions, the community and the general public.

5.4.2 Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003

Environmental Impact Assessment (EIA) is a critical examination of the effects of a project on the environment. The goal of an EIA is to ensure that decisions on proposed projects and activities

are environmentally sustainable. An EIA is conducted in order to identify impacts of a project on the environment, predict likely changes on the environment as a result of the development, evaluate the impacts of the various alternatives on the project and propose mitigation measures for the significant negative impacts of the project on the environment.

The EMCA, 1999 (rev 2019) requires that during the EIA process a proponent shall in consultation with the Authority seek views of persons who may be affected by the project or activity through posters, newspaper, radio and hold at least three public meetings with the affected parties and communities.

Environmental Audit (EA) is the systematic documentation, periodic and objective evaluation of activities and processes of an ongoing project. The goal of EA is to establish if proponents are complying with environmental requirements and enforcing legislation. The purpose of EA is to determine the extent to which the activities and programs conform to the approved environmental management plan. A comprehensive EA ensures a safe and healthy environment at all stages of project operations and decommissioning.

An initial environmental audit and a control audit are conducted by a qualified and authorized environmental auditor or environmental inspector who is an expert or a firm of experts registered by the Authority. In the case of an ongoing project the Authority requires the proponent to undertake an initial environmental audit study to provide baseline information upon which subsequent environmental audits shall be based.

Self-Audits are carried out after the environmental impact assessment study report has been approved by the Authority or after the initial audit of an ongoing project. The proponent shall take all practical measure to ensure the implementation of the environmental management plan by carrying out a self-auditing study on a regular basis.

This Report complies with the requirements of the Environmental Regulations in the coverage of environmental issues, project details, impacts, legislation, mitigation measures, management plans and procedures. The Proponent shall be required to commit to implementing the environmental management plan laid out in this report and any other conditions laid out by NEMA.

5.4.3 Environmental Management & Coordination (Water Quality Regulations)

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. The objective of the regulations is to protect human health and the environment. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget.

The regulations also provide guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Third Schedule of the regulations. The regulations have standards for discharge of effluent into the sewer and aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewer lines based on the given specifications, NEMA regulates discharge of all effluent into the aquatic environment.

Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental Management and Coordination Act (EMCA) Gazetted in 1999 (Rev 2019). It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings

The proponent has been advised to develop a closed system where all waste streams including toxic agents, waste water, and effluent from the facility is well managed to avoid pollution risks. The proponent has also been advised to develop emergency procedures to contain any potential incident that would result to local or community water contamination.

5.4.4 Environmental Management and Coordination (Waste Management Regulations)

The Minister for Environment and Natural Resources gazetted these regulations in 2006. These Regulations may be cited as the Environmental Management and Co-ordination (Waste Management) Regulations, 2006. Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. Currently, different types of waste are dumped haphazardly posing serious environmental and health concerns. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source.

The Proponent shall observe the guidelines as set out in the environmental management plan laid out in this report as well as the recommendation provided for mitigation /minimization /avoidance of adverse impacts arising from the Project activities.

5.4.5 Environmental Management and Coordination Controlled Substances Regulations, 2007 (Legal Notice No.73 of 2007)

The Controlled Substances Regulations defines controlled substances and provides guidance on how to handle them. This regulation mandates NEMA to monitor the activities of persons handling controlled substances, in consultation with relevant line ministries and departments, to ensure compliance with the set requirements. Under these regulations, NEMA will be publishing a list of controlled substances and the quantities of all controlled substances imported or exported within a particular period. The list will also indicate all persons holding licenses to import or export controlled substances, with their annual permitted allocations.

The regulations stipulate that controlled substances must be clearly labeled with among other words, “Controlled Substance-Not ozone friendly”) to indicate that the substance or product is

harmful to the ozone layer. Advertisement of such substances must carry the words, “Warning: Contains chemical materials or substances that deplete or have the potential to deplete the ozone layer.”

Producers and/or importers of controlled substances are required to include a material safety data sheet. Persons are prohibited from storing, distributing, transporting or otherwise handling a controlled substance unless the controlled substance is accompanied by a material safety data sheet. Manufacturers, exporters or importers of controlled substances must be licensed by NEMA. Further, any person wishing to dispose of a controlled substance must be authorized by NEMA. The licensee should ensure that the controlled substance is disposed of in an environmentally sound manner. These regulations also apply to any person transporting such controlled substances through Kenya. Such a person is required to obtain a Prior Informed Consent (PIC) permit from NEMA.

The proponent shall put in place measures to track the use of all controlled substances and ensure that safety and health principles and systems are established to manage handling of such substances according to requisite standards. An orientation of all project-based Material Safety Data Sheets (MSDSs) shall guide on the use of such materials.

5.4.6 Environmental Management and Coordination (Conservation of Biodiversity regulations 2006)

Kenya has a large diversity of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrubland, dry woodlands, and inland aquatic, and coastal and marine ecosystems. In addition, a total of 467 lake and wetland habitats are estimated to cover 2.5% of the territory. In order to preserve the country’s wildlife, about 8% of Kenya’s land area is currently under protection.

The country has established numerous goals, as well as general and specific objectives that relate to these issues, among others: environmental policies and legislations; involvement of communities; documentation of national biological resources; sustainable management and conservation of biodiversity; fair and equitable sharing of benefits; technical and scientific cooperation; biodiversity assessment; dissemination of information; institutional and community capacity building; and integration of biodiversity concerns into development planning

The Proponent has commissioned this environmental assessment study and seeks to obtain an EIA License from the Authority (NEMA) in compliance with the Act; the environmental management plan included in this report provides guidelines for the mitigation of potentially adverse impacts on natural resources. The proponent also notes that the project area hot-spots are known to be forest environment, water resource areas, rivers, and waste handling and these will be safeguarded as the project progresses.

5.4.7 Environmental Management and Coordination Draft Air Quality Regulations, 2008

This regulation is referred to as “The Environmental Management and Coordination (Air Quality) Regulations, 2008”. The objective is to provide for prevention, control and abatement of air

pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999 (Rev. 2019). It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. The regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas. The following operations (provided they are not used for disposal of refuse), are exempt from these regulations:

- i. Back-burning to control or suppress wildfires;
- ii. Firefighting rehearsals or drills conducted by the Fire Service Agencies
- iii. Traditional and cultural burning of savanna grasslands;
- iv. Burning for purposes of public health protection;

The Proponent shall observe policy and regulatory requirements and implement the mitigation measures proposed in this document in an effort to comply with the provisions of these Regulations on abatement of air pollution. In addition to the above, the proponent is aware that the projects inherent factor will be dust activation from the proposed mines and roads during dry seasons, as well as from exhaust engines. In this consideration, measures have been put in place to ascertain minimal pollution impacts.

5.4.8 Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009.

These Regulations determine that no person or activity shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

- Time of the day;
- Proximity to residential area;
- Whether the noise is recurrent, intermittent or constant;
- The level and intensity of the noise;
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
- Whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise.

These regulations also relate noise to its vibration effects and seek to ensure no harmful vibrations are caused by controlling the level of noise. Any person(s) intending to undertake activities in which noise suspected to be injurious or endangers the comfort, repose, health or safety of others and the environment must make an application to NEMA and acquire a license subject to payment of requisite fees and meeting the license conditions. Failure to comply with these regulations attracts a fine of KES 350,000 or 18 months jail term or both.

The Proponent shall observe policy and regulatory requirements and implement the measures proposed in this documenting an effort to comply with the provisions of the Regulations. Measures such as observation of work hours, adequate maintenance of machinery, institution of reactive continuous and periodic monitoring, etc. Shall be factored.

5.4.9 Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation, 2009.

This Act applies to all wetlands in Kenya whether occurring in private or public land. It contains provisions for the utilization of wetland resources in a sustainable manner compatible with the continued presence of wetlands and their hydrological, ecological, social and economic functions and services.

The rivers in this area discharge into the nearby Indian Ocean. The Proponent shall comply with the provisions of the Act in protecting wetlands, preventing and controlling pollution and Siltation in rivers.

5.5 Governance Framework in the Mining Sector

According to the Environmental Management and Coordination Act (EMCA, Cap 387), the management of all development activities in mining areas should be approved under appropriate legislation. The central legislation that is the bedrock for environmental protection is the EMCA, which is the framework and overarching legislation that takes precedence over other sectorial legislation that touch on any aspect of environmental management, including mining law. In the Second Schedule to the EMCA (as amended in 2019), mining is set out as mandatory activities that require submission of an EIA Study report, and the scope of mining is defined to include quarrying and open case extraction of - a) precious metals b) gemstones (c) metalliferous ores coal, e) phosphates, f) limestone and dolomite, g) large scale commercial stone and slate, h) commercial large scale harvesting of aggregate, sand, gravel, soil and clay, i) exploration for the production of petroleum in any form, j) extracting alluvial gold with use of mercury, and k) Geothermal energy exploration and production. Prior to 2015, the only legal provision was through Regulation 42 and 43 of the 2003 Environmental (Impact Assessment and Audit) Regulations. The laws governing the Mining sector Framework, Institutions and Roles are presented below:

Table 18: Governance framework for the mining sector in Kenya

Framework, Role, Designated focal institutions & agencies		
Policy		
1. Mining and Minerals Policy, 2016	The policy provides a firm foundation and basis for establishment of an enabling framework for accelerated and sustainable development of the country’s mining and minerals resources sector. The policy is expected to ensure that benefits from the sector are shared by stakeholders, including investors,	Ministry of Mining

	local artisan and small-scale miners, national and county governments, local communities and the people of Kenya	
Legal framework		
1. Mining Act, 2016	The Act of Parliament to give effect to Articles 60, 62, (1) (f), 66 (2), 69 and 71 regarding minerals. It provides the terms and conditions for prospecting, mining, processing, refining, treatment, transport and any dealings in minerals	Ministry of Mining
2. Local Content Bill, 2016	The Bill provides a framework to facilitate local ownership, control and financing of activities connected with the exploitation of gas, oil, and other mineral resources; to provide a framework to increase the local value Capture along the value chain in the exploration of gas, oil and other mineral resources	Ministry of Mining Ministry of Energy & Petroleum
Regulations		
1. Mining (Local Equity Participation) Regulations, 2012	The regulations require that the mineral right in respect of which mining license is issued shall have a component of local equity participation amounting to at least thirty-five per cent (35%) of the mineral right	Ministry of Mining
2. Draft Mining (Use of Local Goods and Services) Regulations, 2016	The purpose of these regulations is to: - <ul style="list-style-type: none"> • promote job creation through the use of local expertise, goods and services, businesses and financing in the mining industry value chain and their retention in the country • create mining and mineral related supportive industries that will provide jobs and sustain economic development • achieve and maintain a degree of participation for Kenyans or companies incorporated in Kenya for the local supply of goods and the provision of services • provide for a robust, transparent monitoring and reporting system 	Ministry of Mining
3. Draft Mining (Award of Mineral Rights by Tender) Regulations, 2016	The regulations are associated with award of mineral rights in order to ensure free and fair, open-market competition which encourages investment in the mining sector	Ministry of Mining
4. Draft Mining (Community Development Agreement) Regulations, 2017	The purposes of the regulations are to: - <ol style="list-style-type: none"> (1) provide a legal basis on which mining operations and mining-related activities are conducted throughout the entire life of the mine in order to ensure that: <ol style="list-style-type: none"> a) benefits of the mining operations or activities are shared between the holder and affected community; b) mining operations are consistent with the continuing economic, social and cultural viability of the community; and c) mining operations significantly contribute to the improved economic, cultural, and social welfare of the community; 	Ministry of Mining

	<p>(2) ensure accountability and transparency in mining related community development;</p> <p>(3) define when Community Development Agreements (CDAs) are required and provide a framework for such agreements</p>	
5. Draft Dealings in Minerals Regulations, 2016	The purpose of the regulations is to give effect to section 223(1) of the Mining Act in so far as it relates to dealings in minerals by providing for the scope and procedures to be followed by a person who requires a mining license or permit including the renewal and revocation of such licenses and permits	Ministry of Mining
6. Draft Mining (Employment and Training) Regulations, 2017	<p>The purpose of the regulations is to: -</p> <p>a) promote job creation through the use of local expertise in the mining industry and across the entire mining value chain and retain the skills within the country;</p> <p>b) develop local capacities in the mining industry value chain through education, skills and technology transfer, research and development;</p> <p>c) achieve the minimum local employment level and in-country across the entire mining industry value chain;</p> <p>d) provide for the submission of the Employment and Training Plan in the mining industry which should include:</p> <ul style="list-style-type: none"> • a recruitment and training programme; and • the supervision, implementation and monitoring schedule of holders of mineral rights to ensure that Kenyan nationals are employed and properly trained 	Ministry of Mining
7. Draft Mining (Mine Support Services) Regulations, 2016	The purpose of the regulations is to provide the scope and procedures to be followed by a person who requires a mine support service license including the renewal and revocation of such licenses	Ministry of Mining
8. Draft Mining (National Mining Corporation) Regulations, 2017	The purpose of the regulations is the establishment of the National Mining Corporation as the investment arm of the national government in respect of minerals	Ministry of Mining
9. Draft Mining (Reporting of Mineral Related Activities) Regulations, 2017	The purpose of the regulations is to provide directions on the submission of relevant reports on mining activities by mining companies	Ministry of Mining
10. Draft Mining (Use of Assets) Regulations, 2016	The purpose of the regulations is to ensure regular audit of all movable and immovable assets in mining activities	Ministry of Mining
11. Draft Mining (Licensing & Permitting)	The purpose of these regulations is to regulate the licensing and permitting of mineral rights and dealing permits in accordance with the Mining Act, 2016	Ministry of Mining

Regulations, 2016		
12. Draft Mining (Mineral Royalty) Regulations, 2017	The mineral royalty regulations apply to holders of mineral rights, dealers' licenses or permits under the Act and the former Act (Mining Act, 1940)	Ministry of Mining
13. Draft Mining (Strategic Minerals) Regulations, 2016	The purpose of the regulations is to provide clarity on the process through which strategic minerals are identified, declared as strategic and regulated based on a transparent and consultative process that includes technical review and expert consideration. Strategic minerals apply to all radioactive minerals	Ministry of Mining
14. Draft Mining (State Participation) Regulations, 2016	The purpose of these regulations is to provide for State participation in prospecting or mining operations carried out by the holder of a mineral right	Ministry of Mining
Guidelines		
1. Draft Mining Guidelines for Work Programs and Exploration Reports, 2017	The purpose of the regulations is to give effect to sections 223(1) and 221(1) of the Mining Act in so far as they relate to guidelines for work programs and exploration reports. It provides guidance to applicants for, and holders of, reconnaissance, prospecting and retention licenses on how to prepare and submit compliant work programs and exploration reports	Ministry of Mining

5.5.1 Policy

The Government of Kenya formulated the Mining and Minerals Policy (2016) to enable the country obtain maximum benefits from its mineral deposits after operating without a clear policy for many years since the colonial times. Previously, the mining sector was mainly governed on the basis of the Mining Act Cap. 306, a legal framework enacted way back in 1940.

The Mining and Minerals Policy (2016) comprehensively addresses the gaps that have existed in the mining sector and aligns them with the aspirations of Kenya Vision 2030, the provisions of the Constitution of Kenya (2010) and the African Union Mining Vision (2009). The African Union Mining Vision policy aims at positioning mining as a key driver of Africa's socio-economic development. In addition to the mining policy, there are other policies in Kenya, which directly impact the mining sector and therefore form part of the mining governance framework. The specific policy prescriptions in these policies in relation to environmental management and human rights are highlighted below

Table 19: Environmental and human rights prescriptions in the mining policy

Policy	Relevant prescriptions
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<p>Mining and Minerals Policy, 2016</p>	<p>3.2. Guiding principles</p> <ol style="list-style-type: none"> i. Inter-generational equity and sustainable utilization of mineral resources ii. Integrating sound environmental protection, safety and health considerations in mineral resources development iii. Equitable access to mineral resources and benefit sharing iv. Transparency, accountability, and public participation v. Respect of socio-cultural values, access to justice, gender equality and inclusiveness vi. Value addition and development of horizontal and vertical linkages to the local economy
	<p>Policy objectives are to provide a framework for: -</p> <ul style="list-style-type: none"> • harmonizing mining, health and occupational safety and environmental legislation s • gender mainstreaming and eradication of child labour in mining industry • mainstreaming activities of artisan and small-scale miners • local participation in the mining investment ventures • equitable sharing of mineral benefits between the National Government, County governments and local community
	<p>Policy strategies are to: -</p> <p>Strategy 4: Develop legislative mechanisms for accessing land for mineral development</p> <p>Strategy 5: Achieve an acceptable balance between mining and environmental conservation and ensure that the sector operates within the approved (national and where necessary international) standards of health, safety, human rights and environmental protection</p> <p>Strategy 8: Pursue a responsive regulatory framework that ensures that benefits accruing from the mining sector are maximized for greater socio-economic development</p> <p>Strategy 9: Design mechanisms for sharing benefits accruing from exploitation of minerals between the National Government, the County Governments and Local Communities</p> <p>Strategy 10: Develop and implement mechanisms to enhance participation of Government (National & County), affected communities and other stakeholders in mining investments</p> <p>Strategy 11: Develop a framework for mainstreaming and formalizing artisan and small scale mining operations in order to support livelihoods and entrepreneurship</p> <p>Strategy 12: Develop and implement frameworks, structures and mechanisms that ensure equitable participation, ownership and decision-making in mining value chains by women, youth, and disadvantaged groups</p>
	<p>Chapter four: Institutional framework – establishment of directorates with clear mandates as follows: -</p> <ol style="list-style-type: none"> 1. Directorate of Mines <ul style="list-style-type: none"> • Arbitration of mining disputes • Mine health, safety and environment 2. Directorate of Geological Surveys <ul style="list-style-type: none"> • Evaluating and monitoring hazards associated with earthquakes, landslides, toxic minerals, subsidence and other ground failures 3. Directorate of Mineral Promotion and Value Addition <ul style="list-style-type: none"> • Promoting mineral value addition • Providing extension services to small scale and artisan miners on mineral processing and value addition 4. Directorate of Resource Surveys and Remote Sensing <ul style="list-style-type: none"> • Land use land cover mapping • Data generation for sustainable conservation; and • Mapping of land degradation

5.5.2 Mining & Minerals Policy - Environmental & Human Rights Considerations

The specific environmental and human rights considerations in the Mining and Minerals Policy (2016) are summarized below.

Table 20: Environmental obligations considered - Mining and Minerals Policy (2016)

Impact dimension	Relevant statutes in Mining and Minerals Policy (2016)
Physical environment	<ul style="list-style-type: none"> • Mining hazard monitoring and management • Land degradation mapping and management
Biological environment	Nil
Social environment	<ul style="list-style-type: none"> • Inter-generational equity and sustainable utilization of mineral resources • Mineral value addition • Equitable benefit sharing • Transparency, accountability and public participation • Stakeholder engagement • Gender equality and inclusiveness • Involvement of youth and disadvantaged groups • Occupational safety and health • Arbitration of mining disputes
Human rights	Eradication of child labour
Environmental protection	Environmental protection, safety and health
Environmental rehabilitation & restoration	Nil

5.5.3 Legal frameworks

Principally, the mining sector in Kenya is governed by the 2016 Mining Act, whose purpose is to; a) give effect to Article 60, 62(1(f), 66(2) and 69 of the Constitution, and b) provide for prospecting, mining, processing and any dealings in minerals. Previously, the mining sector was governed on the basis of the Mining Act Cap. 306 enacted way back in 1940, meaning that the industry was operating within an archaic legal framework which was out of touch with the constitution and current international best practices. The new mining law seeks to guide mineral resources wealth exploitation and address governance and environmental issues. It seeks to address key gaps in the Mining Act of 1940, and align the sector to the latest global trends such as value-addition and use of technology to spur investor interest. In addition to the mining legislation, there are other legal frameworks governing the mining sector, and which impact various elements of the mining sector, including investment promotion, employment, occupational safety and health, land legislation, physical planning legislation, and HIV/AIDs prevention and control. The specific legal prescriptions, from these legal frameworks, in relation to environmental management and human rights are highlighted below.

Table 21: Environmental and human rights prescriptions in the mining law

Legal frameworks	Prescriptions
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**Mining Act,
2016**

- 20(1) Responsibilities for the Director of Mines: –
- (i) facilitating access to information by the public
 - (n) promoting co-operation among state agencies, county governments, the private sector, research bodies, non-governmental organizations and other organizations which are engaged in mining activities
 - (o) advising on ways of ensuring that mining operations take into account local and community values
- 3) ensuring the health and safety of persons employed by a holder of a mineral right
- 21(1) Responsibilities for the Director of Geological Survey: –
- (c) undertaking geological, geophysical, geochemical, seismological and hydro-geological surveys, investigations and mapping aimed at defining the character and distribution of rocks and superficial deposits and determining the mineral potential
 - (d) conducting geo-environmental studies; monitoring of seismic processes and mapping of potential geo-hazards
 - (f) conducting geological analysis and valuations
 - (g) developing a national repository of geo-science information and facilitating access to this information by the general public
 - (i) undertaking audits of mineral right holders
- 36(2) Responsibilities for the Mineral Rights Board including mining approvals through: -
- (a) National Land Commission, in relation to public land;
 - (b) Relevant State agency where that mineral right is on public land
 - (c) Appropriate Cabinet Secretary or other authority, where the area in respect of which a mineral right is in a place of burial, or an area of religious significance, a public building, or for any other public purpose;
 - (d) Cabinet Secretary responsible for matters relating to wildlife conservation and management, where the mining land is situated within a marine park, a national park or a local sanctuary under the Wildlife Act
 - (e) Cabinet Secretary responsible for matters relating to the environment, where the mining land is situated within a protected area, a protected natural environment, or a protected coastal zone under the Environmental Management and Coordination Act;
 - (f) Director of the Kenya Forest Service (KFS), where the mining land is situated within forest area or; operations on, under or over an area, that has been declared a forest area under the Forests Act;
42. (1) Conditions before the granting of mineral right: -
- (a) the protection of the environment
 - (c) community development
 - (d) safety of prospecting and mining operations
 - (e) health and safety of persons undertaking those operations
 - (f) the protection of the lawful interests of the holders of any other mineral right
43. Improper mining practice
- (1)(a) engage in wasteful mining or treatment practices
- 46.(1) Skills transfer to and capacity building for the citizens of Kenya through recruitment and training: -
- (3) Replacement of expatriates, the number of years such expatriates shall serve and provide for collaboration and linkage with universities and research institutions to train citizens
47. (1) Employment preference to members of the community and citizens of Kenya.

- (2) In the case of a large-scale operation, the holder of a mineral right shall:
- (a) conduct training programmes for the benefit of employees
 - (b) undertake capacity building for the employees
 - (c) only engage non-citizen technical experts in accordance with such local standards for registration as may be prescribed in the relevant law

Artisanal mining operations

93. Establishment of offices in the county to:

3 (b) compile a register of the artisanal miners

- (c) supervise and monitor the operation and activities of artisanal miners
- (d) advise and provide training facilities and assistance necessary for effective and efficient artisanal mining operations
- (f) facilitate the formation of artisanal association groups or cooperatives; and
- (g) promote fair trade for artisanal miners

101(2) Information required in the application for a mining license under:

- (g) a plan giving particulars of the applicant's proposals with respect to the employment and training of Kenyan citizens.
- (h) a plan giving particulars of the applicant's proposals with respect to the procurement of local goods and services.
- (i) proof of submission and approval of an environmental and social impact assessment (EIA) report and environmental management plan; and
- (j) a plan giving particulars of the applicant's proposals with respect to social responsible investments for the local community.

103. Conditions for granting a mining license: –

- (c) the applicant has obtained an approved EIA license, a social heritage assessment plan and EMP;
- (d) proposal for procurement of local goods and services;
- (e) proposal with respect to employment and training of Kenyan citizens;
- (f) project feasibility study;
- (g) proposal with respect to engaging in community investments is socially responsible

106. Required mining license information: —

- (f) approved plan for the procurement of local goods and services;
- (h) approved plan to employ and train citizens;
- (i) approved EIA report, social heritage impact assessment and environmental management plan;

109. Compliances for mining license holders: -

- (b) approved programme for mining operations;
- (c) terms and conditions of the approved EIA license, social heritage assessment plan and EMP;
- (d) demarcation of mining areas;
- (g) stacking or dumping of any mineral or waste products in the manner provided for in the license;
- (i) Community development agreement (CDA).

110(1) complete and accurate record of the mining operations including: -

- (2)(1) copies of all maps, geological reports, sample analysis, aerial photographs, cores, logs and tests and other data obtained and compiled by the license holder;

115. Information required for application for the renewal of a mining license: -

(c) approved EIA license, social heritage assessment plan, EMP and Community Development Agreement;

Part V - Mineral agreements

117(2) Terms and conditions for mineral agreements: –

- (d) environmental obligations and liabilities, subject to the requirement of the EMCA Cap 387;
- (j) Community development plans.

119. (1) Subject to Article 35 of the Constitution and any other written law, all mineral agreements shall be public and be made accessible to the public

128 Conditions for allocation of mineral rights in community land

(1) Consent requirement for reconnaissance license or permit and prospecting license from: –

(a) the authority obligated by the law relating to administration and management of community land to administer community land; or The county government in relation to the community land that is un-alienated.

(2) Consent shall be deemed to have been given for the purposes of this Act where the registered community land representatives have:–

- (a) entered into a legally binding arrangement with the applicant for the mineral rights or with the Government, which allows the conduct of mining operations; or
- (b) Entered into an agreement with the applicant for the mineral right concerning the payment of adequate compensation.

133. Terms and conditions for holders of a prospecting permit for protection of the environment; 140 Obligations to mining permit

- (c) demarcation of the mining area;
- (d) protection and restoration of the environment within the mining area;
- (f) stacking or dumping any minerals or building materials or waste products in the manner provided for in the permit;
- (g) not using such equipment as may be prescribed in Regulations or chemicals such as cyanide and mercury.

Part VIII—Surrender, suspension and revocation of mineral rights

144 (4) An application made under subsection (2) shall include –

- (c) proof of implementation of any EMPs

149. (1) The holder of a mineral right who applies to surrender the right shall furnish the Cabinet Secretary with

- (c) Notification of any potentially hazardous substances.

Part IX—Surface rights compensation and disputes

152. The owner or lawful occupier or user of an area of land which is the subject of a mineral right shall continue to enjoy the right to graze livestock on the land or to cultivate the land to the extent subject to the following conditions–

- (b) does not, by virtue of those operations, constitute a danger or hazard to livestock or crops;
- (b) causing loss of or damage to buildings and other immovable property;
- (c) causing damage to the water table or deprives the owner of water supply;

153(1) Where the exercise of the rights conferred by a mineral right

- (b) causing loss of or damage to buildings and other immovable property;
- (c) causing damage to the water table or depriving the owner of water supply;
- (d) in the case of land under cultivation or grazing of domesticated animals, causes any loss of earnings
- (e) a demand or claim for compensation may be made to the holder of the mineral right to pay prompt, adequate and fair compensation to the lawful owner, occupier or user of the land in accordance with the provisions of this Act

(8) The Cabinet Secretary in consultation with the community and the NLC shall ensure that the inhabitants or communities who prefer to be compensated by way of resettlement as a result of being displaced by a proposed mineral operation are settled on suitable alternate land, with due regard to their economic wellbeing, social and cultural values and the resettlement is carried out in accordance with the relevant physical planning law

155. Subject to the provisions of this Act, the Cabinet Secretary may inquire into and determine the following matters:

- (a) a dispute of the boundaries of an area held under a prospecting or mining right;
- (c) a claim by any person to be entitled to erect, cut, construct or use any pump, line of pipes, flume, race, drain, dam or reservoir for mining purposes;
- (d) a claim to have any priority of water taken, diverted, used or delivered for mining purposes, as against any other person claiming the same; or
- (e) assessment and payment of compensation where provided for under this Act.

Part XI - Health, safety and environment

176 (1) A mineral right or other license or permit granted under this Act shall not exempt a person from complying with any law concerning the protection of the environment.

(2) A mining license shall not be granted to a person under this Act unless the person has obtained an EIA license, social heritage assessment plan and the EMP has been approved.

177. A provision of this Act and any right or entitlement conferred under a mineral right shall not exempt a person from compliance with the provisions of the Water Act, 2016 concerning the right to the use of water from any water resource.

187(1) A provision of this Act and a right or entitlement conferred under a mineral right shall not operate to exempt a person from compliance with the provisions of the Occupational Health and Safety Act, 2007 concerning the safety of workers and mine operations.

(2) In addition to provisions in subsection (1), the Cabinet Secretary shall make regulations for safety and health of persons employed in mines, and the carrying on of prospecting or mining operations in safe, proper, sanitary and effectual manner.

179. Conditions for holders of a permit or license to ensure that: -

- (a) the sustainable use of land through restoration of abandoned mines and quarries;
- (b) the seepage of toxic waste into streams, rivers, lakes and wetlands is avoided and that disposal any toxic waste is done in the approved areas only;
- (c) blasting and all works that cause massive vibration is properly carried out and muffled to keep such vibrations and blasts to reasonable and permissible levels in conformity with the EMCA Cap 387; and
- (d) upon completion of prospecting or mining, the land in question shall be restored to its original status or to an acceptable and reasonable condition as close as possible to its original state.

	<p>180. (1) The Cabinet Secretary shall not grant a prospecting license, a retention license or a mining license to an applicant, unless the applicant has submitted a site mitigation and rehabilitation or mine-closure plans for approval.</p> <p>(2) The Cabinet Secretary may prescribe regulations for site rehabilitation and mine-closure obligations.</p> <p>181. (1) An applicant for a prospecting license, a retention license or a mining license shall provide a bond or some other form of financial security in this section called an environmental protection bond sufficient to cover the costs associated with the implementation of the environmental and rehabilitation obligations.</p> <p>(2) An environmental protection bond required under subsection (1) shall be in a form and for an amount as may be determined by the Cabinet Secretary having regard to the particular characteristics of the project.</p> <p>Part XIV—Monitoring, compliance and enforcement</p> <p>(k) require such changes, as may be necessary in regard to the safety of the operation and protection of employees, to be implemented within a specified time, failing which the license holder will be considered in breach;</p> <p>(l) order the temporary cessation of operations where he considers that the mining or processing activities are so hazardous as to constitute a serious and imminent danger to life;</p> <p>(m) enter into any premises used in or connected with prospecting, mining or mineral processing operations to examine the circumstances surrounding any accidents or incidents affecting the health of employees including the subsequent actions taken by license holder; and</p> <p>Part XV—Miscellaneous provisions</p> <p>221(1) The Cabinet Secretary may publish and disseminate manuals, codes or guidelines relating to large scale and small-scale operations, including in relation to environmental matters.</p> <p>(2) In developing manuals, codes and guidelines for the purposes of subsection (1), the Cabinet Secretary shall ensure that any such publications are consistent with guidelines issued by other Government departments, agencies and authorities.</p> <p>(3) Evidence that a person -</p> <p>(a) has complied with manuals, codes and guidelines may be used to show that the person has complied with his environmental obligations under this or any other Act; and</p> <p>223(2) Without prejudice to the generality of the foregoing, the Cabinet Secretary may make Regulations prescribing,</p> <p>(h) the measures to be observed to protect and rehabilitate the environment;</p>
<p>Local Content Bill, 2016</p>	<p>Part II – Role of the national and county governments</p> <p>6. Obligations for national and county governments</p> <p>7. establishment of the Local Content Development Committee</p> <p>20. Local content plan</p> <p>20(5): (a) employment and skills development plan;</p> <p>(b) research and development plan;</p> <p>(c) technology transfer plan</p> <p>(i) employment and skills development plan;</p> <p>(ii) research and development plan;</p> <p>(iii) technology transfer plan</p>

	23. Capacity building 24. Employment and skills development plan 25. Education and training for nationals 26. Consideration of employment of local persons 28. Strategies for transfer of technology 30. Transfer of technology plan 40. Preference of local companies 41. Preference of local goods and services 43. Thresholds for Kenyan equity stake in operator 51. Public participation
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5.5.4 Human rights issues in the mining sector

The mining sector throughout the world has been considered as having a high risk of violating human rights in a number of ways. The Constitution of Kenya, 2010 has clearly pronounced the various types of human rights which all the people of Kenya are entitled to, and which should not be violated by any development including activities in the mining sector. These rights are provided in Chapter 4 of the Constitution of Kenya under the Bill of Rights shown in Table below. Article 42 of the Constitution of Kenya provides the right to a clean and healthy environment for the benefit of present and future generations. This right to a clean and healthy environment includes a procedural right, under article 70, that creates a legal pathway for anyone whose environmental right has been violated, or about to be violated, to apply to a court for redress through legal remedies. In addition, article 42 is to be fulfilled through the measures and mechanisms that are set out in article 69 of the Constitution, which include, among others, several obligations on the Kenyan state to

- a) ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
- b) work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
- c) protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
- d) encourage public participation in the management, protection environmental conservation;
- e) protect genetic resources and biological diversity;
- f) establish systems of environmental impact assessment,
- g) environmental audit and monitoring of the environment;
- h) eliminate processes and activities that are likely to endanger the environment; and
- i) utilize the environment and natural resources for the benefit of the people of Kenya.

In addition, article 35, 43, 46 and 47 set out the rights of access to information, the economic and social rights, consumer rights and rights for fair administration, respectively. The specific

environmental and human rights considerations in the Mining Act (2016) and Local Content Bill are summarized below.

Table 22: Environmental obligations considered in the Mining Act (2016) and Local Content Bill

Impact dimension	Relevant statutes in Mining Act 2016 and Local Content Bill
Physical environment	<ul style="list-style-type: none"> • Mapping of potential geo-hazards • Prevention of wasteful mining practices • Protection of surface water and groundwater resource • Mitigation for massive vibration
Biological environment	<ul style="list-style-type: none"> • Protection of forests • Protection of wetlands • Protection of protected areas, national parks and sanctuaries
Social environment	<ul style="list-style-type: none"> • Community development agreements (CDAs) • Local employment plan (LEP) • Approved plan to employ and train citizens • Approved plan for the procurement of local goods and services • Skills transfer and Capacity building • Replacement of expatriates • Employment and training • Adequate and fair compensation for land for and property damage • Compensation for displacement • Proper resettlement • Dispute resolution • Protection of burial sites • Protection of areas of religious significance • Health and safety of prospecting and mining operations • Health and safety of mining workers • Mining accidents or incidents affecting the health of employees • Social heritage impact assessment (SHIA) • Heritage restoration plans
Human rights	No environmental obligation
Environmental protection	<ul style="list-style-type: none"> • Environmental impact assessment (EIA) • Environmental management plans (EMPs) • Demarcation of mining areas • Sustainable stacking or dumping of mineral waste • Controlled use of toxic materials such as cyanide and mercury
Impact dimension	Relevant statutes in Mining Act 2016 and Local Content Bill
	<ul style="list-style-type: none"> • Notification of any potentially hazardous substances • Prevention of toxic waste disposal into streams, rivers, lakes and wetlands • Environment, health and safety
Environmental rehabilitation and restoration	<ul style="list-style-type: none"> • Sustainable restoration of closed or abandoned mines and quarries • Environmental rehabilitation and restoration plans • Environmental protection bonds

Environmental framework referencing	<ul style="list-style-type: none"> • EMCA Cap 387 • Water Act, 2016 • Forest Act, 2005 • Wildlife Conservation and Management Act, 2013 Occupational Health and Safety Act, 2007
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5.5.5 Regulations governing the Mining Sector

The key regulations for the governance of the mining sector has previously been the Mining (Local Equity Participation) Regulations, 2012. However, up to 13 additional draft regulations are under preparation to support the implementation of the Mining and Minerals Policy 2016 and enforcement of the Mining Act 2016. These are: -

1. Mining (Use of Goods and Services) Regulations, 2016
2. Mining (Award of Mineral Rights by Tender) Regulations 2016
3. Mining (Community Development Agreement) Regulations, 2017
4. Dealings in Minerals Regulations, 2016
5. Mining (Employment and Training) Regulations, 2017
6. Mining (Mine Support Services) Regulations, 2016
7. Mining (National Mining Corporation) Regulations, 2017
8. Mining (Reporting of Mineral Related Activities) Regulations, 2017
9. Mining (Use of Assets) Regulations, 2016
10. Mining (Licensing and Permitting) Regulations 2016
11. Mining (Royalty) Regulations, 2017
12. Mining (State Participation) Regulations, 2016
13. Mining (Strategic Minerals) Regulations, 2016

5.5.6 Legal Prescriptions Pertaining Human Rights

The specific legal prescriptions in relation to environmental management and human rights are highlighted in the table below.

Table 23: Environmental and human rights prescriptions in the mining regulations

Regulations	Prescriptions
1. Mining (Local Equity Participation) Regulations, 2012 (LN 118, 2012)	3. Every mining license issued shall have a component of local equity participation amounting to at least thirty-five per cent (35%) of the mineral right
2. Mining (Use of Local Goods and Services) Regulations, 2017	3. The purpose of these regulations is to: - (a) promote job creation through the use of local expertise, goods and services, businesses and financing in the mining industry value chain and their retention in the country; (d) create mining and mineral related supportive industries that will provide jobs and sustain economic development; achieve and maintain a degree of participation for Kenyans or companies incorporated in Kenya for the local supply of goods and the provision of services (f) provide for a robust, transparent monitoring and reporting system;

	(g) provide a plan for provision of goods and services;
3. Mining (Award of Mineral Rights by Tender) Regulations 2016	No relevant environmental & human rights prescriptions
4. Mining (Community Development Agreement) Regulations, 2017	<p>3. The objects of these regulations are: -</p> <p>(1) to provide a legal basis for ensuring that the entire life cycle of mining operations and mining-related activities is conducted in a manner that ensures the following: -</p> <p>(a) Equitable sharing of benefits between the holder and affected community;</p> <p>(b) mining operations are consistent with the continuing economic, social and cultural viability of the community; and</p> <p>(c) mining operations significantly contribute to the improved economic, cultural social welfare of the community and its members;</p> <p>(2) to ensure accountability and transparency in mining related community development</p> <p>5.(1) A holder, as part of the ESIA and with the approval of the NEMA, shall assess potential community impacts of its proposed operations and identify one or more communities with which it proposes preparation of a Community Development Agreement</p> <p>(2) The holder shall notify, in writing, the affected mine community or communities with copy of such notice to the Cabinet Secretary within seven days of the grant of a mining license.</p> <p>(3) A community that has not been identified by the holder may give notice to a holder that it should be identified as a party to a Community Development Agreement.</p> <p>(4) Where a community gives notice to a holder that it should be identified as a party to a Community Development Agreement and the holder is not in agreement, that community may give notice to the Cabinet Secretary.</p> <p>(5) The Cabinet Secretary in consultation with the County Government and the National Environmental Management Authority shall notify the holder within thirty (30) days from the date of such notice, specifying whether the community should be made a party to a Community Development Agreement.</p> <p>6. (1) Where a holder is required to enter into a Community Development Agreement (CDA) with more than one affected mine community, it shall enter into one agreement that includes multiple affected mine communities</p> <p>(2) Where there are several affected mine communities located in more than one county, the holder may have a separate Community Development Agreement with an affected mine community that is located in a different county.</p> <p>8. Drafting of community development agreement</p> <p>(4) The issues to be addressed in the CDA may include but not limited to the following:</p> <p>(b) educational scholarship, apprenticeship, technical training and employment opportunities for the people of the affected mine community;</p> <p>(c) employment for members from the affected mine communities;</p> <p>(d) financial or other forms of contributory support for infrastructural development and maintenance such as education, health or other community</p>

	<p>services, roads, water and power;</p> <p>(e) assistance with the creation, development and support to small-scale and micro enterprises;</p> <p>(f) special programmes that benefit women;</p> <p>(g) special programmes that benefit youth;</p> <p>(h) protection of natural resources;</p> <p>(i) support for cultural heritage and sports;</p> <p>(j) treatment of cultural and sacred sites;</p> <p>(k) treatment of ecological systems, including restoration and enhancement, for traditional activities such as hunting and gathering;</p> <p>(l) how cultural values will be respected;</p> <p>(m) funding and control mechanisms to ensure funds are utilized as intended and are transparent and auditable;</p> <p>(6) Special programmes that will benefit persons with disabilities.</p> <p>10. (1) The holder and the affected mine community shall establish a schedule of consultations to be published in a manner that is acceptable to the affected mine community or any other mode of publication mutually agreed upon by the parties.</p> <p>11. (1) The content of a Community Development Agreement shall comprise of an explanation of the Community Development Agreement goals, objectives, obligations and activities aimed to achieve sustained community development</p> <ul style="list-style-type: none"> • description of environmental and social impacts; • description of environmental and social impacts including a gender awareness assessment; <p>16. (1) The parties shall use best efforts to establish meaningful mechanisms that ensure transparent transactions relevant to Community Development Agreement commitments</p> <p>18. Where a mining license is transferred to another holder in accordance with the Mining Act, the transferee shall, in writing, assume all rights and obligations of the transferor under any Community Development Agreement relating to the mining license or transitional mining right</p> <p>20. Where a holder of a mining lease or special mining lease has entered into a Community Development Agreement or has started some community development initiative, scheme or social development programme prior to the coming into force of these regulations, the holder shall ensure that such a scheme, initiative, programme, agreement or howsoever described shall be in compliance with the requirements of these regulations within eighteen months after coming into force of these regulations.</p> <p>24. Dispute resolution</p> <p>25. Dispute resolution committee</p> <p>26. Meetings and decisions of the committee</p> <p>27. Dispute resolution procedure schedules</p>
<p>5. Dealings in Minerals Regulations, 2016</p>	<p>No relevant E&HR prescriptions</p>

**6. Mining
(Employment and
Training)
Regulations, 2017**

5. (2) Where experienced expatriates are needed, a plan for the progressive replacement of expatriates by Kenyan nationals shall be required.

6. (1) Every holder of a large-scale mineral right or a mine support service license shall, within ninety days of the coming into force of these regulations, submit to the Cabinet Secretary a detailed Employment, Training and Succession Plan which corresponds with the work programme or programme of mining operations that accompanied the application made by the holder for the grant of the license.

(6) A holder of a mineral right shall comply with the relevant labour, employment, social security laws and any regulations made under such laws of Kenya.

(7) A holder shall provide to the Director of Mines a half yearly report on the employment and training activities for the reporting period not later than fourteen days after the end of the reporting period.

7. (1) A holder of a mineral right or mine support service license shall employ only Kenyans in junior level or middle level positions.

(2) For the purpose of sub regulation (1), a junior or middle level position includes the position of foreman, supervisor or any other corresponding position or grades designated by the holder.

(1) A holder of a mining license shall, within one (1) year of the commencement of mining operations, submit a programme to the Director of Mines for the promotion of education, research and development in Kenya in relation to its overall activities or operations

(1) A holder of a mineral right or a mine support service license shall, not later than thirty days of the beginning of each year, submit to the Director of Mines an annual performance report covering all the activities related to employment and training for the year under review.

7. (1) Every holder of a large-scale mineral right or a mine support service license shall, within ninety days of the coming into force of these regulations, submit to the Cabinet Secretary a detailed Employment, Training and Succession Plan which corresponds with the work programme or programme of mining operations that accompanied the application made by the holder for the grant of the license.

(8) A holder of a mineral right shall comply with the relevant labour, employment, social security laws and any regulations made under such laws of Kenya.

(9) A holder shall provide to the Director of Mines a half yearly report on the employment and training activities for the reporting period not later than fourteen days after the end of the reporting period.

(10) (1) A holder of a mineral right or mine support service license shall employ only Kenyans in junior level or middle level positions.

(2) For the purpose of sub regulation (1), a junior or middle level position includes the position of foreman, supervisor or any other corresponding position or grades designated by the holder.

9. (1) A holder of a mining license shall, within one (1) year of the commencement of mining operations, submit a programme to the Director of Mines for the promotion of education, research and development in Kenya in relation to its

	<p>overall activities or operations</p> <p>10.(1) A holder of a mineral right or a mine support service license shall, not later than thirty days of the beginning of each year, submit to the Director of Mines an annual performance report covering all the activities related to employment and training for theyear under review.</p>
7.Mining (Mine Support Services) Regulations, 2016	<p>11. Environmental obligations of mine support services providers</p> <ul style="list-style-type: none"> • A person granted a license under these regulations to provide mine services shall comply with the conditions and obligations of the environmental license or any other authorization that may be issued to the person or any mineral right holder being offered a mine supportservice. • A person contracted by a holder of mining license or permit to provide mine support services shall be liable for the restoration or reclamation of any damage caused to the environment as a result of its operations.
8.Mining (National Mining Corporation) Regulations, 2017	No relevant E&HR prescriptions
9.Mining (Reporting of Mineral Related Activities) Regulations, 2017	<p>4. (1) A holder including the National Mining Corporation shall submit to the CabinetSecretary, not later than the first day of March every year, a report on,</p> <p>(a) gross revenue from the sale of minerals, disaggregated by mineral;</p> <p>(b) total number of persons directly employed by the holder including expatriates if any;</p> <p>(c) the identities of beneficial owners of holders of licenses of privately owned reportingcompanies or persons.</p> <p>6. (1) For each year, the report shall include but not be limited to the following information</p> <p>(h) total land area or blocks held under mineral rights;</p> <p>(i) total area or blocks surrendered during the year;</p> <p>(j) total number of each type of mineral right in force at end of the year;</p> <p>(k) number of mineral agreements entered into during the year;</p> <p>(l) number of mineral agreements in force at end of the year;</p> <p>(m) number of new operating large-scale mines that commenced production during theyear;</p> <p>(n) number of operating mines;</p> <p>(o) number of community development agreements entered into during the year;</p> <p>(p) total number of community agreements in force at end of the year;</p> <p>(q) identities of beneficial owners of mineral rights; and</p> <p>(r) any other statistics or information that the Cabinet Secretary may deem necessary.</p> <p>7(1) The Cabinet Secretary shall ensure that a comprehensive and detailed report,prepared in accordance with regulations 5 and 6 above, is published annually by way of publication on the official website of the Ministry of Mining.</p>
10. Mining (Use of Assets) Regulations, 2016	No relevant E&HR prescription

<p>11. Mining (Licensing and Permitting) Regulations, 2016</p>	<p>8. Online Mining Cadastre (OMC) information management (6) Public access to the Online Mining Cadastre by the Mining Cadastre Office (MCO) 16. Charges and fees, obligations and penalties(c)Other payments (vi) Environmental bonds</p> <p>20. Environmental and social information in support of applications (2) ESIA Report (3) An environmental and social screening (ESS) report shall be required before the commencement of activities under the following mineral rights (a) reconnaissance license; (b) prospecting license; (c) retention license; (d) reconnaissance permit; (e) prospecting permit; (f) artisanal mining permit</p> <p>(4) ESIA, ESMP and ESS reports shall comply with the requirements of the Environmental Management and Coordination Act (EMCA) and any regulations or guidelines</p> <p>22. Areas designated for small-scale mining or artisanal mining</p> <p>(1) The Cabinet Secretary may, by notice in the Kenya Gazette, designate land exclusively for small-scale mining and/or artisanal mining operations.</p> <p>37. Boundary disputes 38. Land surface rights 39. Consent from land holders to conduct mining operations 40. Categories of land (1) Restricted or excluded land (2) Private land (30) Community land</p> <p>41. Inheritance of artisanal mining rights 42. land compensation guarantee bond 52. Management of assets and hazardous materials on expiry or revocation of mineral right Part VIII – Large scale mining operations</p> <p>Part IX – Small-scale mining operations Part X – Artisanal mining operations Part XI – Schedules</p>
<p>12. Mining (Royalty) Regulations, 2017</p>	<p>5. Royalty base 8. Royalty rate</p>
<p>13. Mining (State Participation) Regulations, 2016</p>	<p>6. State Right to Free Equity Participation 7. State Right to Participation Interest 8. State Participation in Prospecting Operations</p>
<p>14. Mining (Strategic Minerals) Regulations, 2016</p>	<p>1. Submission of request to declare a mineral, minerals or mineral deposit as Strategic 10. Authority to declare a mineral, minerals or mineral deposit as strategic</p>

	11. Declaration of Strategic Minerals and Strategic Minerals Deposits 12. Multiple Strategic Minerals 13. Mining of Strategic Minerals 14. Storage and Stockpiling of Strategic Minerals 15. Processing of Strategic Minerals 16. Transport of Strategic Minerals
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5.5.7 Specific Environmental and Human Rights Considerations

The specific environmental and human rights considerations in various management regulations in the mining sector are summarized below:

Table 24: Environmental & human rights obligations - various Mining management regulations

Impact dimension	Relevant statutes in mining various management regulations
Physical environment	No relevant obligation
Biological environment	No relevant obligation
Social environment	<ul style="list-style-type: none"> • Community consultation and outreach • Community Development Agreements (CDAs) • Employment of mining affected communities • Mining benefits for youth and women • Mining benefit for persons with disabilities • Equitable benefit sharing • Employment, Training and Succession Plans (ETSPs) • Alternative livelihoods plans (ALPs) • Transparent monitoring and reporting • Improved economic, cultural social welfare of the community • Education, health or other community service CSR • Protection of cultural and sacred sites
Human rights	No relevant obligation
Environmental protection	<ul style="list-style-type: none"> • Environmental impact assessment (EIA)
Environmental rehabilitation and restoration	<ul style="list-style-type: none"> • Mine closure plans (MCPs) • Environmental restoration and enhancement • Post-mining environmental monitoring

5.5.8 Guidelines Associated to the Mining Act 2016

The key guidelines associated with the mining sector are the Guidelines for Work Programmes and Exploration Reports, 2017. The specific legal prescriptions in relation to environmental management and human rights are highlighted outlined in the table below.

Table 25: Environmental and human rights prescriptions in the mining guidelines

Guidelines	Prescriptions
Guidelines for Work Programmes and	These regulations are to give effect to sections 223(1) and 221(1) of the Mining Act in so far as they relate to guidelines for work programmes and exploration reports.

<p>Exploration Reports, 2017</p>	<p>(2) Work programme for new applications: A work programme submitted in support of a new mineral right application will be assessed in relation to the known geology and mineralization in the area. The proposed work will be expected to take account of all available geological maps and reports (Geological Survey and previous company exploration reports, where these are available), and should build on past results.</p> <p>(4) Work programmes for renewal applications:</p> <ul style="list-style-type: none"> • The new work programme must make clear how it advances the geological understanding of the area and takes it to the next stage, • In the case of the second renewal of a prospecting license, the work programme and expenditure must cover the entire renewal period applied for (maximum (3) years). This must include plans for a feasibility study, EIA study and all other mine planning investigations necessary for a subsequent mining license application. <p>7. Confidentiality</p> <p>(2) It should be noted that all environmental and community reports are regarded as non-confidential and are, by definition, open to public scrutiny.</p> <p>Annex E: Checklist for Feasibility Study</p> <p>Mine closure plan - Financial plan; timetable and implementation; restoration/rehabilitation of land; alternative uses of mined out ground; safety considerations; social impacts; alternative livelihoods plan; removal of plant & machinery; alternative uses (conversion) of infrastructure; post-mining environmental monitoring of mine area (including tailings); contingencies; etc.</p> <p>ESIA - Full, expert assessment and modelling of effects of mining on the environment and social structures; hazard analysis; mitigation plan; monitoring programme.</p> <p>Annex G: Allowable Exploration Expenses - Environmental activities – includes baseline studies; environmental and social/cultural impact assessments; rehabilitation and mine closure/rehabilitation studies; environmental management and rehabilitation; community consultation and outreach</p>
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The analysis of the above frameworks during the EIA process will be undertaken in order to identify the specific governance prescriptions in the mining sector in Kenya.

5.6 The Standards Act Cap 496

The Act is meant to promote the standardization of the specification of commodities, and to provide for the standardization of commodities and codes of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control. Code of practice is interpreted in the Act as a set of rules relating to the methods to be applied or the procedure to be adopted in connection with the construction, installation, testing, sampling, operation or use of any article, apparatus, instrument, device or process.

The Act contains various specifications touching on limestone products. The Proponent shall ensure that commodities and codes of practice utilized in the project adhere to the provisions of this Act.

5.7 County Government Act (2012)

This is an ACT of Parliament to give effect to Chapter Eleven of the Constitution; to provide for county governments powers, functions and responsibilities to deliver services and for connected purposes. The act helps Authorities ensure effective utilization of the public amenities. It also allows the right to access to private property at all times by County Authorities, its officers and servants for purposes of inspection, maintenance and alteration or repairs of public amenities. According to the Act, any charges so collected shall be deemed to be charges for general services and will be recoverable from the amenities beneficiaries.

5.8 The Wildlife (Management and Conservation) Act

This Act was enacted to consolidate and amend the law relating to the protection, conservation and management of wildlife in Kenya, and for purposes connected therewith and thereto. Section 9 of the Act states that ‘the Director of Wildlife Conservation shall, through the officers of the service, control, manage and maintain all national parks’. It also states that within the National Park, the Director may:

- Reserve or set aside any portion of the park as a breeding place for animals or as nurseries for vegetation;
- Authorize the construction of such roads, bridges, airfields, buildings and fences, the provision of such water supplies, and the carrying out of such other works, as may be necessary for the purposes of the park;
- With the approval of the Minister, let sites for the erection of hotels, or other accommodation for the visitors to the park provided that nothing in any document connected with the letting shall be construed as in any manner abridging the overall control of the Park by the Service, or as preventing the Director from giving directions as to the manner in which the premises concerned shall be managed.

The Proponent shall implement the proposed measures in this document towards protection and conservation of wildlife in the project areas. In cases where the proponent may want to integrate wildlife with the project, then such measures must be advised by the Kenya Wildlife Service (KWS)

5.9 The Agricultural Act

Legislative control over soil conservation and land development are mainly controlled within this Act, and many of the provisions can be generally applied beyond those lands suitable for agriculture. The Minister administering the Act, after concurrence with the Central Agricultural Board and consultation with the District Agricultural Committee, can impose land conservation orders on lands to control cultivation, grazing and clearing. These controls may be necessary to protect the land against soil erosion, to protect fertility, and to maintain catchments. Local authorities are generally empowered to administer these sections of the Act, and the County Agricultural Committee is entitled to make regulations relating to these controls. Agricultural Rules are prescribed under the Act, whereby vegetation clearing in steep slopes areas or adjacent watercourses, without authorization, is controlled.

The Proponent shall adhere to the proposed measures in this document towards land conservation orders on land cultivation, grazing and clearing in the project areas.

5.10 Land Acquisition Act cap 295

It is possible, under the provisions of this Act, for land to be acquired or granted access to for the purposes of new projects. Acquisition or access must be shown to be in the public benefit and compensation must be provided to the land owners whose land is acquired or damaged.

There is a plethora of enactments all governing land and transactions in land. Thus, the substantive land law is to be found in two different statutes while the adjectival land law is to be found in five different statutes not forgetting the customary land law of the various tribes in Kenya.

There are two systems of substantive land law, three systems of conveyance and five systems of registration. The two systems of substantive law are under:

- The Indian Transfer of Property Act 1882 as amended by 1959 Amendment Act
- The Registered Land Act

The three systems of conveyance are those applicable to land registered under:

- Government Lands Act Cap 280, part X Laws of Kenya and Land Titles Act Cap 282, Part III Laws of Kenya
- Registration of Titles Act
- Registered Land Act.
- Registration Systems

The five registration systems are those under:

- The Government Lands Act (G.L.A)
- Registration of Titles Act (R.T.A)
- The Land Titles Act (L.T.A)
- The Registration of Documents Act Cap 285 Laws of Kenya (R.D.A)
- The Registered Land Act (R.L.A)

The Registration of Documents Act is not peculiar to land law, as documents completely unrelated to land are registrable under it.

The Proponent has undertaken a baseline socio economic survey and identification of those who will be affected by the proposed project. The Proponent shall adhere to the requirements of the Act in the implementation of land acquisition.

5.11 Way Leaves Act (Cap. 292)

The Act provides for certain undertakings to be constructed e.g. exploration activities, pipelines, canals, pathways etc., through over or under any lands. This project is under the provision of the Act. Section 3 of the Act states that the Government may carry any works through, over or under any land whatsoever provided it shall not interfere with any existing building or structures of an ongoing activity.

In accordance with the Act (section 4), notice will be given before carrying out works with full description of the intended works and targeted place for inspection. Any damages caused by the works would then be compensated to the owner as per section.

5.12 Land Ownership

Complete ownership can be said to be in the state. Under G.L.A the commissioner of Lands, on behalf of the Republic of Kenya grants leases of town plots for any term not exceeding ninety nine (99) years and of agricultural land for 999 years. The grantee becomes owner and subject to the terms and conditions of the lease he possesses the bundle of rights of ownership. The 999-year leases can be converted into freehold and the 99 years to 999. On conversion or expiry of lease the new grant may be issued under R.T.A or R.L.A. All un alienated land other than trust land and all reversion of government leases are vested in the government. Others whether held on freehold or leasehold are vested in grantees as owners having the rights over them. The power of the state to qualify (extinguish) property rights in the public interest is embodied in Section 75 of the Kenyan Constitution. The section however makes the exercise of that power subject to the process of law. Section 117 of the Constitution further provides that an Act of Parliament may empower a county council to set apart trust land for: The use and occupation of any public body or authority for public purposes; or Prospecting or mining purposes; or the use and occupation of any person or persons for a purpose which is likely to benefit the residents of the area.

Section 117 part 4 stipulates that the setting apart is void unless the law under which it is made makes provision for the prompt payment of full compensation. The Trust Land Act, in Sub-sections 7 to 13, makes provision for the setting apart of land and payment of compensation with regard thereto. All land in urban areas of Kenya and much of the land in rural areas has a registered title. The title to land is either freehold or leasehold. The development and use of freehold title are controlled by land planning regulations which are administered by both the Central Government and the Local Authority in which the Land is situated. (A Local Authority is either a County Council or a Municipal Council whose activities are established and controlled by Local Government Legislation). Leasehold land is held on leases from the Central Government or, less frequently, from the Local Authority and such leases will contain provisions governing the development of the land and the use to which the land can be put. The leases frequently contain provisions against any dealing with the land without the consent of the landlord. The Central Government administers its land through a Department of Lands which is headed by a Commissioner of Lands.

5.13 The National Land Commission Act, 2012 (No. 5 of 2012)

Section 5 of the Act outlines the Functions of the Commission, pursuant to Article 67(2) of the Constitution as follows 5(1): (a) to manage public land on behalf of the national and county governments; (b) to recommend a national land policy to the national government; (c) to advise the national government on a comprehensive programme for the registration of title in land throughout Kenya; (d) to conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities; (e) to initiate investigations, on its own

initiative or on a complaint, into present or historical land injustices, and recommend appropriate redress; (f) to encourage the application of traditional dispute resolution mechanisms in land conflicts; (g) to assess tax on land and premiums on immovable property in any area designated by law; and (h) to monitor and have oversight responsibilities over land use planning throughout the country.

5.14 Bamburi Cement Limited Land Acquisition Procedure

A reconnaissance survey is first done to search for the area that has shale deposits that can be mined. Legal and acceptable procedures are employed with involvement of all stakeholders in order to arrive at a fair and just, well balanced agreed upon settlement leading to land acquisition.

5.15 Labour Institutions Act No. 12 of 2007

The purpose of the Act is to establish labour institutions and to provide for their function, powers and duties. The Act provides for the establishment of National Labour Board, which provides advice to the Minister on all matters concerning employment and labour.

5.16 Employment Act No 11 of 2007

The Act is enacted to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations and federations. Its purpose is to promote sound labour relations through freedom of association, the encouragement of effective collective bargaining and promotion of orderly and expeditious dispute the protection and promotion of settlement conducive to social justice and economic development for connected purposes. This Act is important since it provides for employer – employee relationship that is important for the activities that would promote management of the environment within the energy sector.

5.17 The Occupational Safety and Health Act, 2007

This Act applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to secure the safety, health and welfare of persons at work, and protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work. Some of the areas addressed here are machinery safety, chemical safety and health, safety and welfare special provisions are also provided in the ILO conventions on safety and health in construction recommendation, 1988 R175. Failure to comply with the OSHA, 2007 attracts penalties of up to KES 300,000 or 3 months jail term or both or penalties of KES 1,000,000 or 12 months jail term or both for cases where death occurs and is in consequence of the employer.

5.17.1 Safety

The Act makes a provision that ensures that for the interest of public, all dangerous points of the projects are clearly marked. Fencing of premises and dangerous parts of other machinery is mandatory. Training and supervision of inexperienced workers, protection of eyes with goggles or effective screens must be provided in certain specified processes. Special precaution against gassing is laid down for work in confined spaces where persons are liable to come in contact

with dangerous fumes. Air receivers and fittings must be of sound construction and properly maintained. Adequate and suitable means for extinguishing fire must be provided in addition adequate means of escape in case of fire must be provided.

5.17.2 Health

The premise must be kept clean, ensuring daily removal of accumulated dust from place of work. The circulation of fresh air must secure adequate ventilation of workrooms. There must be sufficient and suitable lighting in every part of working place. There shall also be sufficient and suitable sanitary conveniences separate for each sex, must be provided subject to conformity with any standards prescribed by rules. Food and drinks shall not be partaken in dangerous places or workrooms. Provision of suitable protective clothing and appliances including where necessary, suitable gloves, footwear, goggles, gas masks, and head covering, maintained for the use of workers in any process involving expose to wet or to any injurious or offensive substances.

5.17.3 Welfare

An adequate supply of both quantity and quality of wholesome drinking water must be provided. Maintenance of suitable washing facilities and, accommodation for clothing not worn during working hours must be provided. Sitting facilities for all female workers whose work is done while standing shall be provided to enable them take advantage of any opportunity for resting. Section 42 stipulates that every premise shall be provided with maintenance, readily accessible means for extinguishing fire and person trained in the correct use of such means shall be present during all working periods. Section 45 states that regular individual examination or surveys of health conditions of industrial medicine and hygiene must be performed and the cost will be met by the employer. This will ensure that the examination can take place without any loss of earning for the employees and if possible within normal working hours. Section 55B provides for development and maintenance of an effective program of collection, compilation and analysis of occupational safety. This will ensure that health statistics, which shall cover injuries and illness including disabling during working hours, are adhered to.

The report advises the Proponent on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring, and estimated cost, as a basic guideline for the management of Health and Safety issues in the proposed project.

5.17.4 The Work Injury Benefits Act, 2007

This is an Act of Parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes. The Act was published on 26th October 2007.

The salient features addressed by the Act include the following:

- Obligations of employers
- Right to compensation
- Reporting of accidents

- Compensation
- Occupational diseases
- Medical aid and
- Appeals

According to section 7 (1) of the Act, every employer is required to obtain and maintain an insurance policy, with an insurer approved by the Minister in respect of any liability that the employer may incur under the Act to any of his employees. In addition, every employer carrying on business in Kenya shall within the prescribed period and in the prescribed manner register with the Director - section 8 (1). Pursuant to section 10 (2) of the Act, it is the duty of every employee to ensure his/her safety at the place of work and hence where an accident, not resulting in serious disablement or death, is caused by the deliberate and willful misconduct of the employee, such an employee is not entitled to compensation. However, according to section 12 if an employee is injured in an occupational accident or contracts an occupational disease while the employee, with the consent of the employer, is engaged in any organized first aid, ambulance or rescue work, fire-fighting or other emergency service, the accident or disease is for the purposes of this Act, deemed to have arisen out of and in the course of the employee's employment. In a circumstance where an accident occurs in the course of employment, section 21 makes it a requirement for a written or verbal notice of such an accident to be given by or on behalf of the employee concerned to the employer who shall send a copy of the notice to the Director within twenty four hours of its occurrence in the case of a fatal accident. In line with section 22 (1), an accident that has occurred should be reported to the Director by the employer in the prescribed manner within seven days from the date of receiving a notice of the accident or having learned that an employee has been injured in an accident. Similarly, it is the responsibility of the employee to report to his/her employer the occurrence of an accident not later than 12 months from the date of such an accident or else the right to benefits, in accordance with section 27 (1), shall lapse if the accident is not reported within such a period of time (12 months). According to section 46 (1), the employer shall be responsible for availing necessary means of transport where an employee is injured in an accident, which necessitates his conveyance to a hospital medical facility and from a hospital or medical facility to his residence.

5.18 Public Health Act 1986 Revision 2012

The public Health Act regulates activities detrimental to human Health. An environmental nuisance is one that causes danger, discomfort or annoyance to the local inhabitants or which is hazardous to human health. Although the Act is primarily concerned with domestic water supplies and sources of water used for human consumption, its regime may be extended to cover rivers, streams, lakes and underground water resources since these are the basic water sources for the majority of Kenya's population.

It also outlines the standards of construction of various facilities of any place. In terms of air pollution thermal plants are said to emit a variety of gases, volatile organic compounds and particulate matter depending on the amount and type of fuel used and method used for burning. It is therefore necessary to monitor the air pollution. The Act prohibits activities (nuisances) that may be injurious to health. The primary purpose of the Act is to secure and

maintain public health. It defines nuisances on land and premises and empowers public health authorities to deal with such conditions.

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

On responsibility of the Local Authorities Part XI, section 129, of the Act states in part “It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes. Section 130 provides for making and imposing regulations by the local authorities and others the duty of enforcing rules in respect of prohibiting use of water supply or erection of structures draining filth or noxious matter into water supply as mentioned in section 129. This provision is supplemented by section 126A that requires local authorities to develop by laws for controlling and regulating among others private sewers, communication between drains, power lines, and sewers as well as regulating sanitary conveniences in connection to buildings, drainage, cesspools, etc. for reception or disposal of foul matter. Part XII, Section 136, states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of pests shall be deemed nuisances and are liable to be dealt with in the matter provided by this Act.

The Proponent shall observe policy and regulatory requirements and implement measures to safeguard public health and safety.

5.19 Public Roads and Roads of Access Act (Cap. 399)

Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads.

During the Mining phase of the project, access to the site areas will be required for the vehicles. Where existing roads do not exist, the Proponent shall seek permission from the appropriate authorities to create such access during the construction phase. All conditions shall be adhered too and the adjacent communities shall be sensitized on the development.

5.20 Local Government Act

The Local government Act is concerned with a wide range of matters that affect the day to day activities of individuals and organizations. The sections, which have the most direct relevance, are Sections 145, 146, 147 and 163:

Section 145 is concerned with the miscellaneous powers of local authorities. Subsection (w) empowers a local authority to take measures that may be necessary or desirable for the

preservation or protection of wildlife, and provide amenities for the observation of wildlife. Section 146, Subsection (d) empowers a local authority, with the consent of the Minister, to make grants for the establishment and maintenance of game parks and other related facilities. Section 147, Subsection (d) controls the cutting of timber and the destruction of trees and shrubs.

Section 163, Subsection (e) empowers municipal councils, town councils and urban councils to control or prohibit all businesses, factories and workshops which by reason of smoke, fumes, chemicals, gases, dust, smell, noise or vibration or other cause may be a source of danger discomfort or annoyance to the neighbourhood and to prescribe the conditions subject to which business, factories and workshops shall be carried on.

The Proponent has commissioned a RAP study to identify such Trust Lands that may be affected by the Mining project. The Proponent shall comply with the provisions of the Act in seeking the required authorizations from the Local Authorities as stipulated in the Act.

5.21 The Water Act

The water Act, 2002 provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya. It also provides for the regulation and management of water supply and sewerage services. In general, the Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage. Specifically, section 59 (4) of the Act states that the national water services strategy shall contain details of:

- Existing water services
- The number and location of persons who are not being provided with basic water supply and basic sewerage
- Plans for the extension of water services to under-served areas
- The time frame for the plan; and
- An investment program

The project shall have no adverse impact on the local water supply during operations. Observation of the requirements of the act shall be observed by the Proponent especially during the construction and operation phases. However, where the mining activities shall be thought to impact on water resources, the proponent will be ready to coordinate with WRA and any other authority to arrive at absolute compliance.

5.22 Forests Act 2005

The Act highlights the integration of the community on the management, utilization and conservation of forests and its resources. It prohibits wanton destruction of the forests. As hydro dams depend on good water catchments protection and management, on the upstream and around the reservoirs the enforcement of this Act will minimize the flow of sediments into the rivers which are being utilized for generation of hydroelectric power generation. There are no

formally identified forests within the proposed site, but there are some localities with significant tree and vegetation cutting needs.

Bamburi cement is keen in conservation programs considering the realization that forest resources are scarce around the project area. There are opportunities for CSR programs should the community wish for the same. Otherwise, Bamburi cement had developed own forest within the facility, and will progressively rehabilitate any harvested lots for the mining project with the objective of restoration to a better status.

5.23 Energy Act, 2006

The Energy Act, 2006 was enacted on 2nd January 2007 establishes an Energy Regulatory Commission (ERC) mandated to perform all function that pertains to energy production, transmission, setting and enforcing of energy policies, Public education and enforcing energy conservation strategies, prescribing the energy licensing process and issuing of licenses that pertain to energy sector in Kenya. Section 30 of the Act provides the factors that shall be taken into consideration prior to issuance of license. It states the need and expression of an entity to conserve and protect the environment and natural resources in accordance to the EMCA 1999 (Amendment 2019).

Moreover, the Act gives provisions for the need to protect health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

5.24 Government Lands Act, Cap. 280 (revised 1984)

This Act deals with all actions, suits and proceedings by or on behalf of the Government respecting; Government land or any contract relating to Government land or any breach of any such contract, any trespass on Government land or any damages accruing by reason of such trespass, the recovery of any rent, purchase money or other monies in respect of Government land, any damages or wrongs whatsoever in any way suffered by the Government in respect of Government land or any other land, the recovery of any fine or the enforcement of any penalty under this Act The Government may at any time enter upon any land sold, leased or occupied under a license under this Act, and may there set up poles and carry electric lines across such land, and may lay sewers, water-pipes or electric lines therein, without paying compensation, but making good all damage (Sec 86). Where any damage or loss has been caused to any land by or as a result of entry thereon under section 86 or section 87 by reason of the injury or destruction of trees, bushes or shrubs planted thereon, a reasonable sum, not exceeding the market value of the standing trees, bushes or shrubs, shall be paid by way of compensation for the damage or loss notwithstanding that compensation is not otherwise payable under any of those sections.

5.25 Trust Lands Act Cap. 288 of 1962 (revised 1970)

This Act applies to all land which for the time being is Trust land. Under section 38 a way leave license may be granted to any person empowering him and his servants and agents to enter upon Trust land vested in the council and to lay pipes, make canals, aqueducts, weirs and dams

and execute any other works required for the supply and use of water, to set up electric power or telephone lines, cables or aerial ropeways and erect poles and pylons therefore, and to make such excavations as may be necessary for the carrying out of any such purposes, and to maintain any such works as aforesaid. However, compensation for loss of the use of land in any case where the usefulness of the land for agricultural purposes is impaired must be made before the license is awarded.

5.26 Land Adjudication Act, Cap. 284 of 1968 (revised 1977)

This Act applies to any area of Trust land where the county council in whom the land is vested so requests; and the Minister considers it expedient that the rights and interests of persons in the land should be ascertained and registered; and where the Land Consolidation Act does not apply to the area.

Public consultations have also been undertaken extensively in the affected project area

5.27 Physical Planning Act (Cap 286)

An Act of Parliament to provide for the preparation and implementation of physical development plans and for connected purposes enacted by the Parliament of Kenya Under this Act, no person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33. The local authority concerned shall require the developer to restore the land on which such development has taken place to its original condition within a period of not more than ninety days. If on the expiry of the ninety days' notice given to the developer such restoration has not been effected the concerned local authority shall restore the site to its original condition and recover the cost incurred thereto from the developer.

The site layout plan appended to this report shows the proposed Mining area. The Proponent shall secure all mandatory approvals and permits as required by the law.

5.28 Registered Lands Act, Cap 300 of 1963

This is an Act of Parliament to make further and better provision for the registration of title to land, and for the regulation of dealings in land so registered, and for purposes connected therewith.

The project traverses some areas with Registered Land. The Proponent shall comply with the provisions of the Act in the acquisition of Registered Land.

5.29 National Construction Authority Act, 2011

The act is set to streamline, overhaul and regulate the construction industry in Kenya for sustainable development. The NCA establishes the authority and confers on its power to register contractors within the construction industry. The act requires all the contractors, both foreign and local contractors to be registered with the authority. The act also regulates the practices of foreign contractor by limiting their work to only tender work. The foreign contractors are licensed for only a specific period and once they certify they are in Kenya for that specific time.

5.30 Building Code, 2000

This gives general guidelines for the construction of buildings and attendant safety measures such as installation of fire fighting appliances, fire escapes etc. It equally recognizes local authorities as lead planning agencies and thus requires every developer to submit building plans to the relevant local authority for approval. The local authorities are in turn empowered to disapprove any plan submitted if it is not correctly drawn or does not provide sufficient information that complies with the relevant by-laws. Any developer who intends to erect a building, such as a residential block, must also give the concerned local authority a notice of inspection before the erection of the proposed structure.

After erecting the building, a notice of completion shall be issued to the local authority to facilitate final inspection/approval. No person shall therefore occupy a building whose certificate of completion has not been issued by the local authority. As a precaution against fire breakout, the by-law states that the walls of any premise shall be non-combustible throughout. Similarly, in every building which comprises more than one story, shall have provisions for fire resistance.

5.31 Traffic Act Cap 403

This Act specifies that motor vehicles use proper fuel. The Traffic regulations promulgated under the Act specifies that every vehicle is required to be so constructed, maintained and used so as not to emit any smoke or visible vapour. It also directs on the safe manner which vehicles are to be operated on public roads and highways.

5.32 Penal Code Cap 63

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water from public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighbourhood or those passing along public way, commit an offence.

The Proponent shall observe the guidelines as set out in the environmental management and monitoring plan laid out in this report as well as the recommendation provided for mitigation/minimization/ avoidance of adverse impacts arising from the project activities.

5.33 The Civil Aviation Act, Cap 394

Under this Act, the Kenya Civil Aviation Authority (KCAA) has to authorize and approve the height of masts and other structures for the purpose of ensuring the safety of flying aircraft over the proposed project area. This is under the provision of Legal Notice No. 131, The Civil Aviation (Aerodromes) Regulations, 2008, Part VIII. Section 63 of the act has indicated that the regulation applies for all scopes of Aerodromes and advises that if the proximity may be thought to be close, then the developer will be required to fill an “Aerial Masts and Other Structures Height Approval Application Form” and submit to the authority for approval. Section 64 has defined the scope of obstacles and apart from the physical structure, it has highlighted illumination of light that may intrude into air crafts, mobile vehicles, communication masts and logically, including

activated pollutants such as industrial dust and smoke. Below are relevant descriptions of location with relevance to Aviation ways.

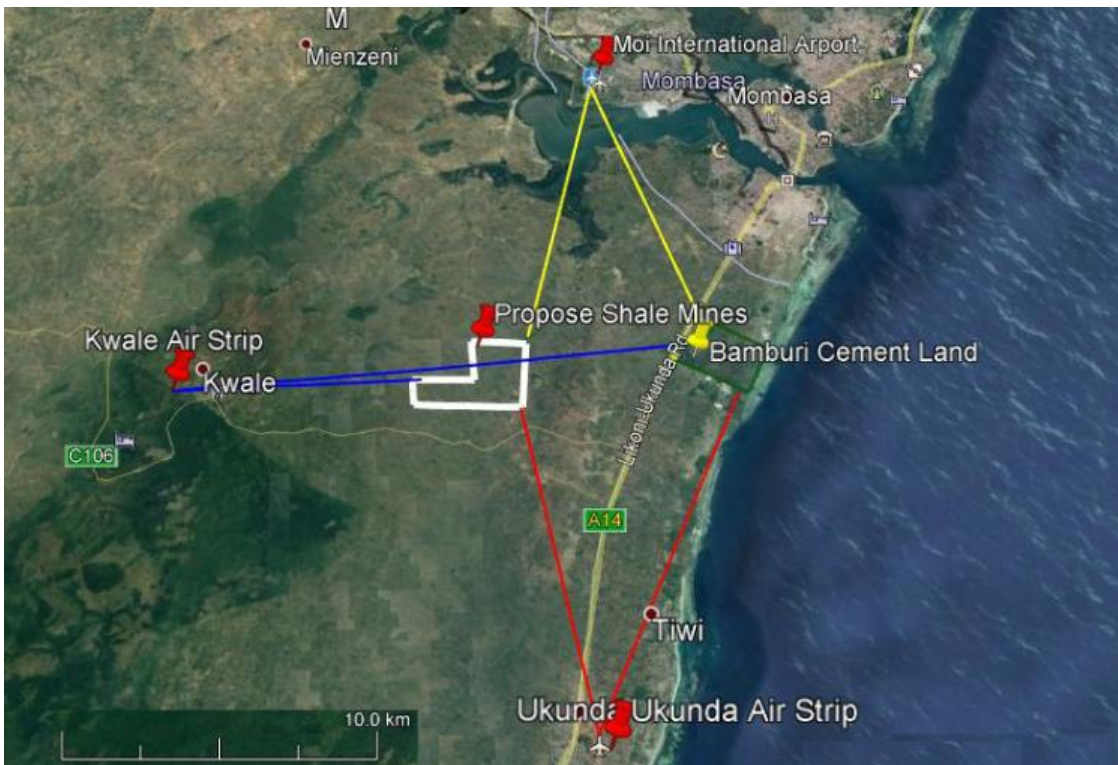


Figure 32: Satellite Image - Positions of runways in relation to the Limestone Mining Area (Source: Google Earth, Field)

Distance from runways: The green square Shaped image, east of the coastline shows the approximate limestone mining location. There are three runways identified from the proposed Limestone Mineral facility at Denyenye. These are the Moi International Airport which is about 12.23 kilometers linear direction from the Proposed project site, Kwale airstrip at about 19.7 kilometers linear direction and the Ukunda Air strip which is at about 14 Kilometers from the airstrip. The direction of the Moi International Airport runway is NE to SE, while that of Ukunda is approximately North to south. That of Kwale airstrip faces NW to SE direction which is tuned off from the proposed mine location. Moi International Airport accommodates larger aircraft while the Kwale air strip can only accommodate lighter air-crafts. The Ukunda airstrip can accommodate mid weight air-crafts.

The height of structures to be put up will not rise above a height of 50 meters. During dry seasons, dust emissions may only be concentrated locally and at a low altitude. Strong winds will quickly diffuse the unavoidable inherent emissions, considering the high wind characteristics of the area. The wind emission characteristics integrated over a number of years is elaborated below:

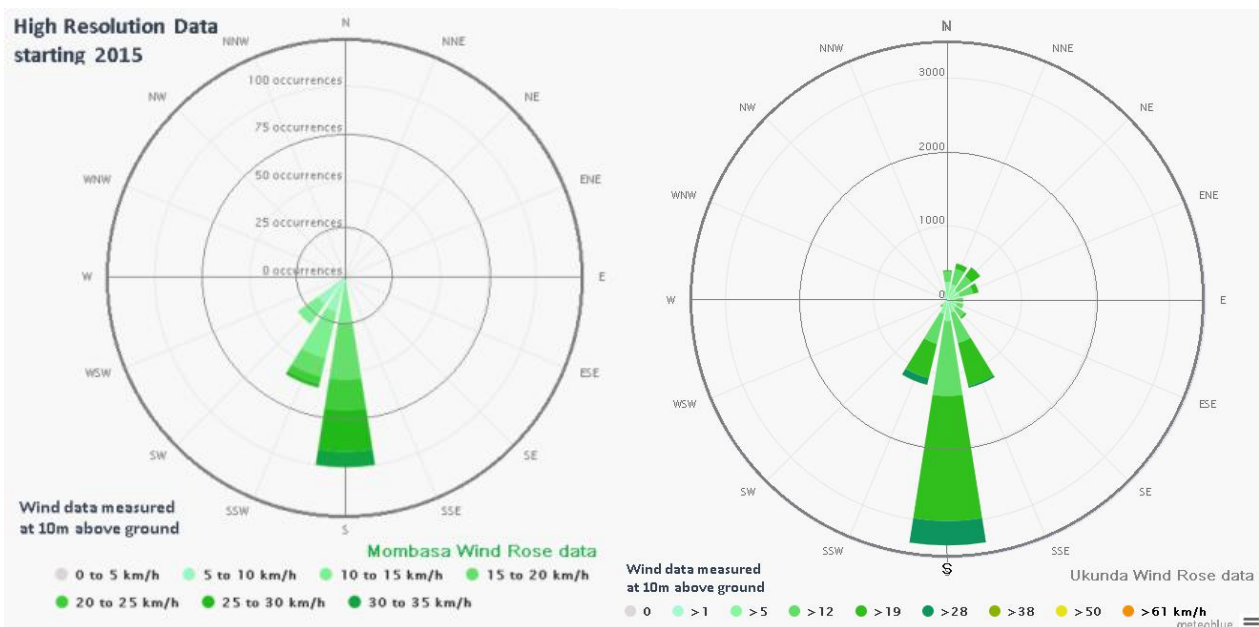


Figure 33: Wind Rose Data, Mombasa and Kwale Counties (Source: www.meteoblue.com)

The circles in the wind rose images indicate number of occurrences that wind blew towards the direction of the air strip location where the data was collected over years. The green images point towards the centre of the circle which indicates the direction where the wind blows to, the centre of the circle being the measuring point. These data represent a wide area of over 30kms radius, not considering micro locations which could be distorted by terrain. The wind rose data for Mombasa shows that strong winds blow south to north most of the times of the year, stronger winds blowing at 30 to 35Kms/h at about 100 occurrences. The wind however is useful in diffusing local ground based smog, which is not expected to be evident at the proposed site. The data for Ukunda is not very different from that of Mombasa, only that winds are stronger at this location. Looking at the data, the winds favor the project in that the direction is off potential emission if off the fly path, the facility is at a safe distance from any of the runways and the potential emission is not expected to be high enough to distract fly paths.

The height of structures to be put up will not rise above a height of 50 meters. Stack emission may only be concentrated locally and at a height of about 30 meters where strong winds will quickly diffuse the inherent emissions, considering the high wind characteristics of the area. The picture is as elaborated below (operation of the existing “older design” Bamburi Cement facility at Bamburi, North Coast. The proposed one will be a contemporary one with state of the art emission mitigation provisions included in the engineering design):



Figure 34: Typical Emission - Bamburi cement Image source (<https://www.afrik21.africa/>)

The distances from Aerodromes declared under this section are considered safe from associated aviation risks. The Proponent is advised to comply with the provisions of the Act in ensuring the height of any structure related levels of dust or exhaust emission or light impacts adhere to the Act and does not interfere with the safety of flying aircraft.

5.34 The Antiquities and Monuments Act, 1983 Cap 215

The Act aim to preserve Kenya’s national heritage. Kenya is rich in its antiquities, monuments and cultural and natural sites which are spread all over the country. The National Museums of Kenya is the custodian of the country’s cultural heritage, its principal mission being to collect, document, preserve and enhance knowledge, appreciation, management and the use of these resources for the benefit of Kenya and the world. Through the National Museums of Kenya many of these sites are protected by law by having them gazetted under the Act.

The report includes consultations held with the National Museums of Kenya to identify physical cultural resources that may be impacted by the implementation of the proposed project as well as the appropriate mitigation measures to protect such resources. Any major or significant fossil met in the study area shall be retained and the relevant department engaged for formal procedures.

5.35 International Laws, Conventions, Treaties and Guidelines

International laws are considered for guidance of the project design, or to cover where national laws are perceived to be weak or absent, provided that they do not contradict, or dilute the strength of the existing national laws. For guidance purposes, as well as for strengthening the scope of social safeguards, International Labour laws, the World Bank Environmental and Social Safeguards Standards (ESS) were considered. The standard practices considered for application are presented in the AMLA (2017) report referenced herein.

Kenya is signatory to a number of international agreements and conventions relating to environmental management, community rights and Indigenous Peoples. The international conventions are not always translated into national legislation. Some of the key agreements are listed in the table below.

Table 26: International Agreements Relevant to Environmental and Social Issues in Kenya

CLIMATE CHANGE/AIR QUALITY		
Agreement/Convention	Notes/Comments	Relevance
Vienna Convention for the Protection of the Ozone Layer, 1985	Protection of the ozone layer, came into force in 1988,	Sets international standards for protection of the ozone layer; emissions from project potential to harm ozone layer
Montreal Protocol on Substances that Deplete Ozone Layer, 1989	Protection of the ozone layer.	As above
United Nations Framework Convention on Climate Change (UNFCCC), 1994	Control of greenhouse gas emissions.	Sets international guidelines on restrictions of GHG emissions in order to prevent climate change; Project will emit greenhouse gases from power generation through heavy fuel combustion
Kyoto Protocol, 1997	Greenhouse gas emissions targets.	As above
BIODIVERSITY/PROTECTED AREAS		
Agreement/Convention	Notes/Comments	Relevance
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), 1971	The conservation and sustainable utilization of wetlands, i.e. to stem progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands, their economic, cultural, value.	Sets international requirements for the protection of wetlands; project has potential to impact local wetland area
Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES), 1973	To ensure that international trade in specimens of wild animals and plants does not threaten their survival and it accords varying degrees of protection to more than 33,000 species of animals and plants.	Sets international restrictions/bans on trade of certain wild animals/plants. Project takes place in high biodiversity area
United Nations Convention on Biological Diversity, 1992	Promotes development of national strategies for the conservation and sustainable use of biological diversity. Often seen as the key document regarding sustainable development.	Sets guidelines for protection and promotion of biological diversity. Project takes place in high biodiversity area.
United Nations Convention to Combat Desertification, 1994	To combat desertification and mitigate the effects of drought through national action programs	Sets guidelines to combat desertification. Project has potential to impact local

	that incorporate long-term strategies supported by international cooperation and partnership arrangements.	water resources and quality and land use
--	--	--

LABOR/HEALTH/SAFETY		
Agreement/Convention	Notes/Comments	Relevance
Constitution of the International Labor Organization	Promotes opportunities for women and men to obtain decent and productive work, in conditions of freedom, equity, security and human dignity in a safe and healthy environment.	Sets international labour standards; project will employ large workforce
World Health Organization	To improve health and Living standards of the people in the World	Sets guidelines to improve health and living standards; project has potential to impact local health/living Standards.

Source: EREL, 2021

6. CONSULTATIONS AND PUBLIC PARTICIPATION

According to Environmental Management and Coordination Act, while undertaking an Environmental Impact Assessment (EIA) study, institutional and public consultation is mandatory. This enables the institutional and public views, opinions, fears and aspirations to be integrated in the report. It also is a way of disseminating the proposed project based information.

As the planned project is likely to have some impacts on the surrounding community, a varied sample of interviewees from the administrative institutions and the community was interviewed so that they could shed some light on their perceptions and expectations from the planned project. The purpose for such interviews was to identify and promote the positive impacts while using the information obtained to mitigate the negative ones. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned.

6.1 Approach to Public Consultation

Methods used for the consultation include: Community household occupant's consultation, lead and private Institutional expert's consultation, Discussions with random informants, Consultative meeting with community elders and a meeting with the host local administrative stakeholder.

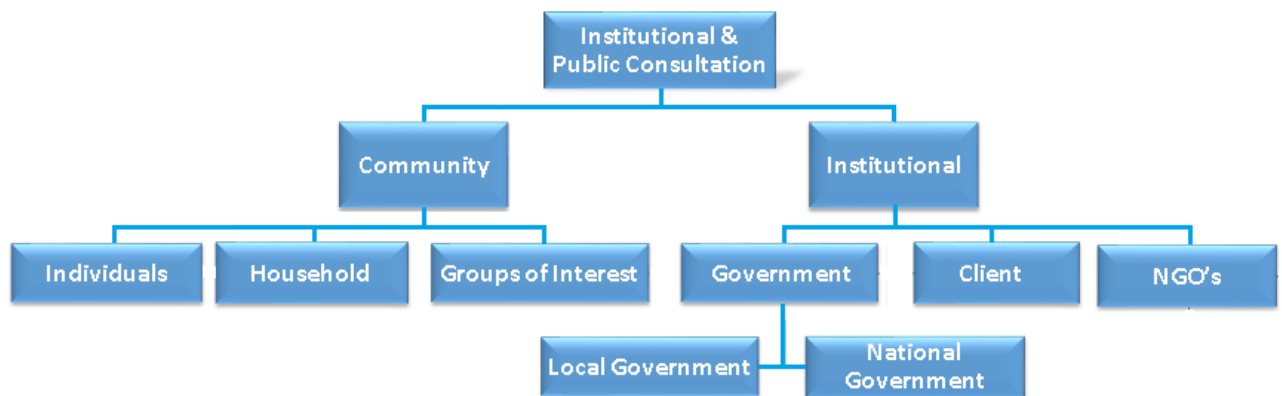


Figure 35: Considerable Groups for Public Consultative meetings

6.1.1 Community Household Occupant's Consultation

This group comprises majority of the project area Residents. The exercise was conducted by a team of experienced enumerators selected from the community and headed by certified team leaders. The consultations were carried out through administration of per-designed questionnaires and by interviewing neighbours surrounding the proposed project site. A total of 260 No. Households were sampled and interviewed. A sample of 10 No. (out of the 260) Community Household questionnaires and the list with details of each household respondents is attached in appendix 2 and 3 and 4 respectively.

The questionnaire issued had details of the proposed project, reasons for conducting public consultation, legal provision pertaining to public consultation and spaces for providing personal details including:

- a. Name/Organization of respondents
- b. National Identification or passport number and
- c. Independent views regarding the proposed project (Social, economic and Environmental sections)

6.1.2 Institutional Consultation (Statutory, Public and private)

These are the decision makers that inform policy implementation regarding their department's position on the project. This makes the group of respondents significant to the project. The questionnaire tool was designed to inform them of the project and to pull out their views on the proposed project. The discussions were made open to allow freedom of expression and to permit the respondents to discuss any information that would be useful to the project. A total of 15 No. Statutory institutional stakeholders were reached out to for this set of interviews. A list of Institutional Visit Discussion Guideline (Plan) is presented under appendix 6, while the discussion summary is appended under appendix 7 herewith.

In addition to the organized groups, Public and private institutions such as those from the business communities (formal and informal), research institutions and organizations, lobby groups, etc fall under this category. The community assessment attempted to reach such groups that were available (see section 6.4 of this report).

6.1.3 Meeting with the chiefs

To formalize our engagements at the field, following the stipulated Community Entry processes, we introduced the company, ourselves, the project, its objectives, what we had already done at higher institutional office levels, and other useful details to the respective area chiefs and sub-chiefs. The purpose was to have our plans and actions known to the administrators and to seek their active support and inputs. The summary details are highlighted under section 6.6 and appendix 11 of this report.

6.1.4 Community Engagement

Full public meetings were not held due to crowd control enforcement under the Kenya Covid-19 management policy, which has been reiterated by Public Health Officers and the President of the republic of Kenya. In line with the policy, representatives were sourced from the various community surrounding the project area and were mobilized for the sensitization and interactive meetings. Their selection was done with the support of the area local administration support (Chiefs and sub-Chiefs). 1 No community meeting was held on 2nd April 2021 at the Bamburi cement Facility. This is discussed in detail under section 6.7 of this report.

6.1.5 Focused group Discussions (FGDs)

A number of FGDs were held with the community. Some Community groups were selected for such engagements considering their proximity to the proposed site, and the perceived project

interest concerning the groups, as well as the potential projected distortions that may be encountered during the development. These groups included: firewood collectors (Women Group), two (2) fishing communities and Miyanji dairy community (See section 6.5 of the report).

6.2 Discussions from Household Respondents

91% of the household respondents were in favor of the project while 9% opposed the projects development. The respondents, both who had positive and negative attitude had a diverse range of mixed views towards the project.

6.2.1 Perceived Impacts on Project Area Households

The Environmental Section probed to understand if the proposed project would affect the household in any way. And so, the responses triggered a wide range of answers bearing three magnitudes. These were: 1). Yes with a positive degree, 2). Yes with a negative degree, and 3). No meaning the respondent did not see how the project would relate to them. This question had two parts. The design of the first part was a closed question requiring a (Yes) or a No, answer and the second part required an open-ended response, allowing the respondent to expound on that first answer. The pie chart and graphs below illustrate the outcomes on the perceived project impacts on project area households:

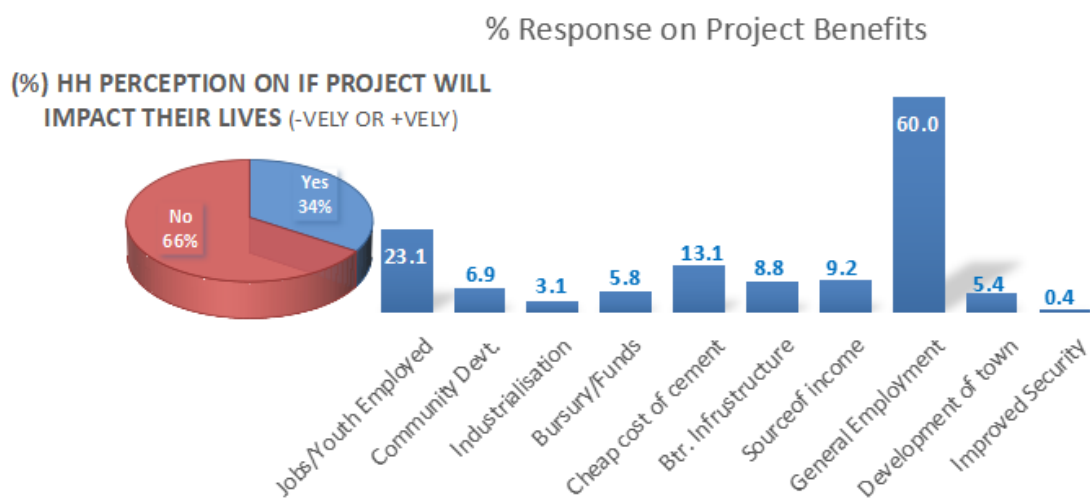


Figure 36: Perceptions on Project Impacts, Perceived Potential Benefits (Source: Field - 2021).

This was an open-ended response (unassisted). Many of the respondents (60%) valued the fact that the project would potentially trigger general employment in the area. The response level was considerably high compared to the rest of responses. 23.1% thought that the project would trigger youth employment. These first two scores are indicative of the high desire of jobs by the community. 13.1% valued the fact that the project would trigger reduced cost of cement in the area while 9.2% appreciated that the project would open up opportunities for local based income. 8.8% thought that the project would trigger better infrastructure while 6.9% thought that the project would contribute towards community development through CSR initiatives and engagements with the local community. 5.8% thought that the project would provide for bursary

funds, 5.4% saw some local area development and 3.1% appreciated the industrialization scales to be involved. 0.4% saw improved security as an opportunity. Infrastructure included aspects of electricity connections, Water provision, Roads construction and maintenance, Improved health centers, and development of schools. In general, most thought the project would eventually improve living standards of the community.

6.2.2 Perceived project impacts on Current Community Operations

The community members were asked if the project would affect their current operations and in which way. The details were as presented in the figures below:

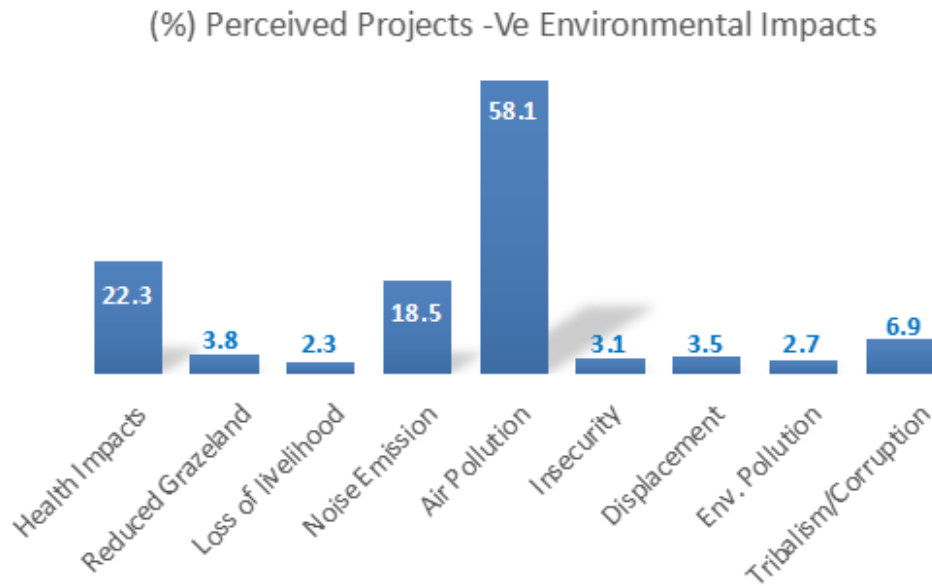


Figure 37: Potential Environmental Impacts during Daily Operations (Source: Field 2021).

From the analysis, 58.1% perceived air pollution mostly characterized by dust, and stack emission as the most potential impact. 22.3% thought that health impacts, mostly deriving from the pollution and open quarry aspects would impact their operations. 18.5% thought that noise would be the impacting factor on their operations, while 6.9% were concerned about potential tribalism and corruption. 3.8% were concerned about the potential reduction of graze-lands and 3.5% were concerned about the potential for displacement. Other fears were insecurity at 3.1%, environmental pollution at 2.7%, and loss of livelihood at 2.3%.

In general, the main factors which contributed to negative impacts were Environmental pollution, reduced graze-lands, health issues, nepotism and tribalism playing out and loss of community livelihood. From among those who opposed the project, the following points were some of those highlighted:

- The number of negative impacts are more than benefits
- The respondent said that they need the land for farming, thus land should be left to the community

- They are looking forward for employment, and so the project should first assure the community that they would not be sidelined
- The project may lead to health complication to residence
- He doesn't see himself benefiting from the project, thus he does not support the initiative

Negative Impacts as perceived by the community (including fears)

- Increased traffic hence associated safety and health impacts
- The poor roads will get further dilapidated
- There will be potential property destruction by virtue of running the facility
- Inequitable distribution of resources and tenders for service provision
- Air pollution leading to infertility of land and health issues
- Destruction of earth resources amounting to poverty
- Cultural erosion

Positive Impacts

- Improved Business
- Improved livelihood
- Improved Infrastructure
- Improved Local and County Economy

The respondents were then asked to suggest mitigation measures for the perceived negative impacts on the community daily lifestyle and businesses. The following suggestions were recorded:

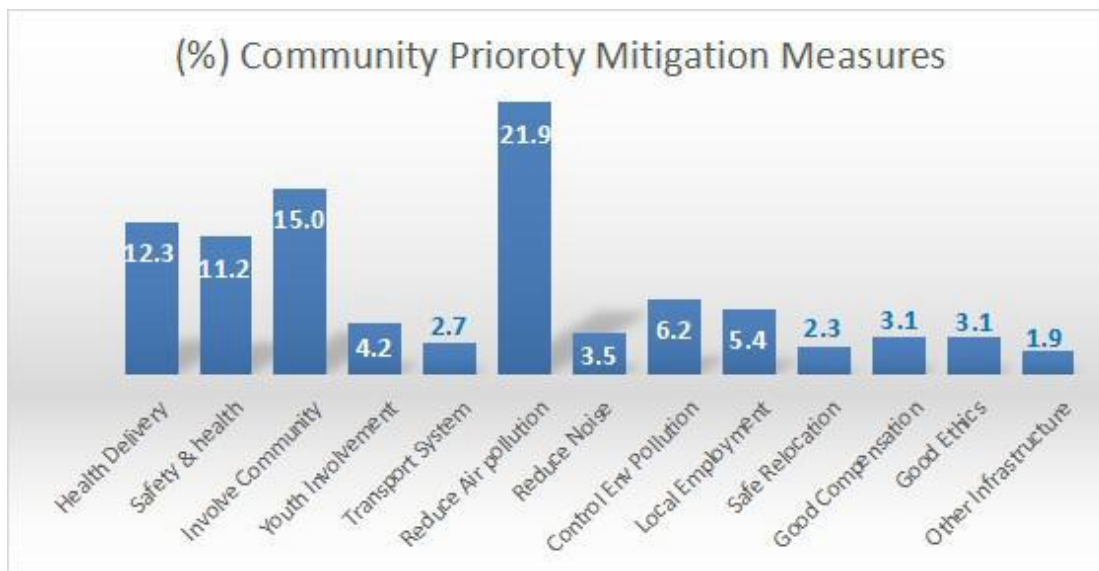


Figure 38: Respondent's Suggestions on Mitigation measures (Source: Field 2021).

All of the 260 No household population responded to this question. 21.9% said that the project should prioritize dealing with air pollution. 15% thought that the project should consider community involvement in the project cycle in terms of negotiations and CSR projects. 12.3% thought that health delivery should be considered while 11.2% thought that safety and health issues should be factored during the project implementation and operation of the project. 6.2% thought that environmental pollution should be a key consideration, 5.4% prioritized local employment while 4.2% considered youth involvement as a key mitigation measure to issues raised. 3.5% suggested that the company should consider a holistic approach to reduce its noise emissions. The following key outlier points and suggestions were also mentioned by a section of the community:

- Involve the community in decision making processes, during negotiations and public consultations
- Involve the community while processing improvement of livelihood projects
- Personal Protective equipment (PPE) to be encouraged among those living near the area
- The employer should provide good working Environment
- Other Infrastructure includes water provision, schools and religious centres

6.2.3 Ranking of issues according to household respondents

The parameters of measures were pre-set for this section, basing on initial rapid research for Kenyan rural setup environment. To achieve the rankings, each respondent was asked to indicate problems affecting their individual homesteads. Results from each respondent were then fed into a matrix sheet and used to produce the graph below (basing on frequency of issues covered). The colour coding in the graph was used to cluster the response frequencies into cohorts with close scores (according to priorities).

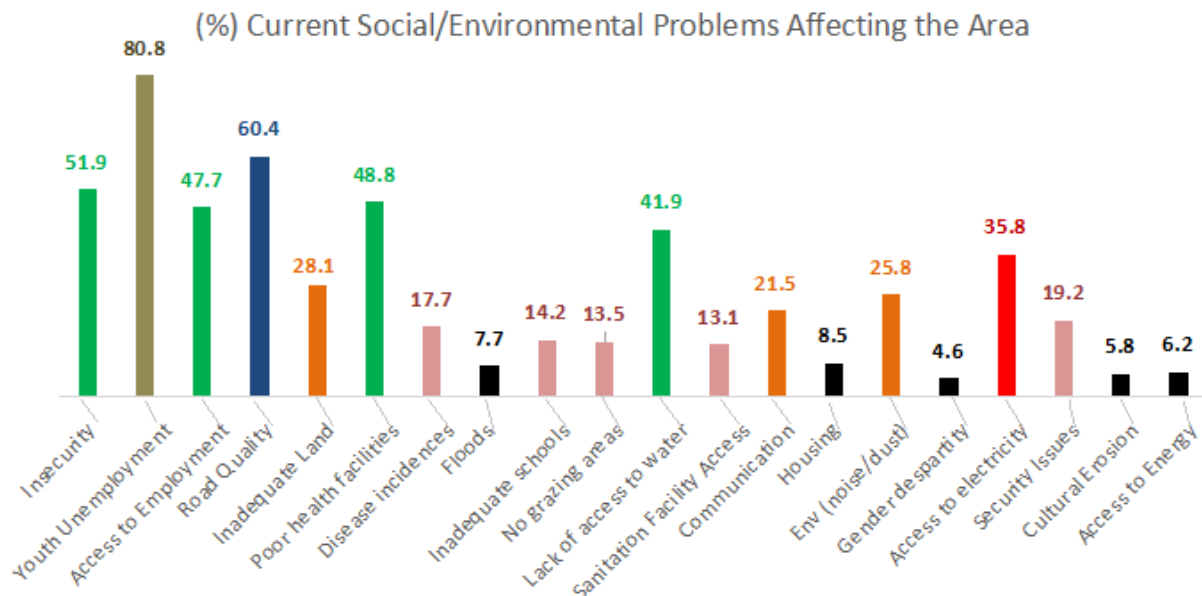


Figure 39: Ranking of problems according to respondents.

According to results issues to do with employment seemed to occupy major popularity within the community. It is adversely noted by other research and Kwale County management as well as national reports that the employment rate in Kwale is one of the lowest in the country. The result scored 80.8% for youth employment and 47.7% for general employment. Away from employment issues, road quality triggered 60.4% as a social/environmental problem affecting the area. From this perspective, 51.9% declared insecurity, 48.8% declared poor health facilities and 41.9% declared lack of access to water. 35.8 said access to electricity was a key issue. 25.8% declared environmental pollution as a general area issue, 28.1% mentioned inadequate land and 21.5 declared communication issues. 17.7% said disease incidences were among area based issues, 14.2% said inadequate schools 13.5% said lack of grazing areas and 13.1% declared access to sanitation facilities. Least among the declaration of area based issues were flooding at 7.7%, housing at 8.5%, gender disparity at 4.6%, cultural erosion at 5.8% and access to energy at 6.2%. Some of the key outliers which were captured as additional notes prominently highlighted by the respondents were:

- Formalized agreement as well as resettlement areas to be disclosed before the project commences.
- Idleness by the youth seems to be the cause of insecurity
- Use of illegal drugs is a major factor for youth under performances
- There are a number households led by widows who are challenged economically
- Despite the good water allocation indicated under water resources section, Water is a major problem particularly during dryer years
- Early marriage and school dropouts is a key emerging challenge in the community
- The company should consider women employment
- Many residents claim lack of access to electricity in their homes
- 75% of the locals should be employed as per the Local Content Laws
- The company should consider developing health facilities as a CSR opportunity
- Bursaries and Scholarships are highly desired by the community
- Safety issues should be well considered by the developer

This information was additional to assist in determining severity of issues among households located within the specific project area. The details may aid the project when prioritizing the best or most preferable CSR undertakings should there be need to facilitate some within the project program.

6.3 Results from Statutory Institutions Expert's Consultation

This research also covered key government ministries and departments who are the custodian stakeholders of the project area management either through county or national authorities. The method of survey carried out with this group of stakeholders was through open discussions. In the process, the respondent was sensitized on the proposed project, the target location (using map reference) and explaining the mining cycle as well as general potential impacts from the project. There was a preset list of about three or four discussion issues developed for each stakeholder (see appendix 6) which was used to capture the major project related aspects which

we needed for the ESIA documentation purposes. Additional information came up in the course of progressive discussions.

Each of the stakeholders interviewed had their generalized views on how the proposed project would relate with their respective operations and how they would coordinate within the projects value chain. The institutional visits were formalized by scheduling meetings with the respective heads and presenting written letters seeking audiences with the respective respondents. A sample copy of the letter is appended herein (appendix 10). The institutions selected as key stakeholders present in the county are presented in the table below:

Table 27: Institutions visited and respective dates of visit

	Institution	Date of Visit
1	County Development and Social Services	26 th 03 21
2	County Education Office	01 st 04 21
3	Kenya Forest Services	29 th 03 21
4	Kenya Wildlife Services (Shimba Hills National Reserve)	25 th 03 21
5	Department of Petroleum and Mining (Regional Geologist)	29 th 03 21
6	Department of Livestock	29 th 03 21
7	Asst Chief Ng'ombeni Sub-Location	26 th 03 21
8	Deputy County Commissioner Office (Acting ACC)	25 th 03 21
9	Public Health Department (Representative Officer)	26 th 03 21
10	Youth and Gender Services (National Office)	29 th 03 21
11	County Roads and Public Works Department	29 th 03 21
12	County Lands Office (District Survey and Settlement Office)	01 st 04 21
13	Social services and Talent Management	29 th 03 21
14	Chief County Finance Office	01 st 04 21
15	Kwale Water Services Company	01 st 04 21
<i>A detailed Institutional visit report is appended under appendix 6 & 7</i>		

In general, the stakeholder institutions presented themselves as the link between the national Government and the County Government. Some departments associate with the community by virtue of supporting their well-being, assisting in their organization to align fiscal planning, supporting their economic interests, monitoring quality of the environment, etc. This is achieved by working closely with certain community groups associated with the relevant departments, or by directly administering government services without any direct link with the community. Some of the departments have stratified the locality into management units, each with a field representative to handle certain mandates of the departments. It was noted that land issues are delicate in the locations of interest and we were subsequently advised to relate closely with the respective departments as we carry on with our initiatives.

The following section presents general views abstracted from the consultations held. Samples of tools used are attached at the appendices section.

a. County development and Social Services

- There are 50 registered groups in Ng'ombeni being assisted in various capacity
- The groups have issues with leadership, resource mobilization and structural organization
- Current issues affecting the area include;
 - ✓ Teenage pregnancies
 - ✓ Drug abuse hence rehabilitation needed
 - ✓ At Kokotoni; Noise and Dust exposure as a health hazard
 - ✓ Widows, single families and disability have various plights calling for dialogue and sensitization
 - ✓ Culture issues though each location has a committee to brainstorm
 - ✓ There are some vigilante groups which needs mentor-ship
 - ✓ Scholarships needs to be distributed to the community as they have been doing
 - ✓ Exchange programme and skill management is also needed

b. Kenya Forest Services Ecosystem Conservator

- There are no major forests managed by the KFS within this proposed area
- There are mangrove forests located not far from the proposed location. Some of these are officially recognized while others are not.
- The planned mining should be accompanied with a restoration plan in conjunction with the KFS
- The Kayas located close to the area include;
 - ✓ Kaya Sije (has more than 50 medicinal plants)
 - ✓ Kaya Lunguma
 - ✓ Kaya Chonyi
 - ✓ Kaya Waa
 - ✓ Other smaller stands of Kayas
 - ✓ There are registered community forest associations which can benefit from conservation programs.
- Evaluation of the tree and amenities such as conservation dams must be done with the help of the KFS.

c. Kenya Wildlife Services

- There are no wildlife designated areas within the vicinity of the project areas, but fugitive and cohabiting wildlife may exist in such environment.
- Communities liaise with the KWS to manage stray wildlife. There have been few complaints which are managed adequately.
- Setting up a cement factory at the proposed location may trigger migration of snakes and aquatic animals when vibrations emanate from the lower parts of the facility.
- The existing forest patches and coastal forests are Important Bird Areas and serve as migratory corridors.
- He proposed that the project conducts a baseline survey to determine local flora and fauna on land and proximal aquatic bodies before establishing the plant.
- He pointed out that there was little understanding about the Kaya forests and it would be good if the project did a study on the closest kaya either at Matuga or at the coastal strip.

Collaborative opportunities

- KWS can only collaborate with the community within areas owned by the community to manage wildlife in such areas.
- Within the wildlife act, there are provisions for institutions which may want to keep certain wildlife for conservation purposes objected at promoting Eco-tourism.
- The officer is interested in the project conducting local biodiversity analysis at Matuga area and at the Bamburi facility.

d. Department of Mines and Geology

- The Regional Geologist was positive about the initiative taken by Bamburi Cement, but however urged that all requisite statutory procedure must be adhered to.
- He highlighted that the mining process should operate under a committee as stipulated in the statutory regulation supporting Local Content mechanisms. The regulation has also provided guidance on revenue allocations from mining benefits.
- He noted that the department makes a follow-up during operation phase on extracted mineral value for accounting purposes.

e. Asst Chief Ng'ombeni Sub-Location

- Majority of youth still do not have enough jobs despite having 210 involved in the Kazi kwa vijana project
- He encouraged youth talent exploration
- The community claims part of the land is owned by the them
- The community expects CSR benefits from the project as well as job opportunities
- The community has various committees handling community issues and there is need to involve them in matters touching the community
- He highlighted on the only current access route to the beach by the fishing community as being the one at the Bamburi land where they are denied access, or when permitted its only by foot and this creates a challenge of transporting the harvest.
- The fisherman also fear that the access to the beach may be closed completely

f. Deputy County Commissioner Office (Acting ACC)

- The project would result to job creation, CSR interventions and other benefits which will boost the community.
- Since relocation will be involved there is need to sensitize the community.
- Local content issues touching on CDAs should be considered a key factor.
- Land ownership issues have created conflict between current occupiers, perceived owners and registered certificate owners-Where all the 3 may be claiming the same land.
- Bamburi Cement should engage an independent consultant to sensitize the community on the magnitude of such projects, benefits, challenges and how to go about it.
- Consider taking the community for a bench-marking experience where the current factory operates in North coast with a main objective of exposing benefits, negative aspects and how to cope with the mentioned.
- The CSR process is very key and should be tailored to the needs of the community.
- The company should engage the local learning institutions to enhance skill sets.

g. Public Health Department

- Dust related disease incidences will be on the rise.

- If not well managed, open quarries will contain water encouraging water and parasitic related diseases including Malaria and schistosomiasis.
- Open pits also pose as health hazards in terms of drowning (at Pungu Ziwani a case was reported).
- The major project impact would impact on the eyes and respiratory organs due to dust.

Suggestions

- Tree planting will be useful in trapping fugitive dust.
- CSR activities should target remedial measures.
- It's important to use local based volunteers who understand the area well.
- Social vices like drug abuse, homosexuality, HIV that comes along due to unemployment should be addressed as the trends are growing.

h. Youth and Gender Services (National Office)

- There are 342 No. registered community groups in the County of a variety of background, some were dormant, and others active, while others were newly registered.
- Trending issues affecting the youth include;
 - ✓ Regulations associated with Covid-19 pandemic.
 - ✓ Drug abuse-the usage of bhang is more prevalent. The boy gender has been mostly affected.
 - ✓ School drop outs are on the rise due to prolonged holidays.
 - ✓ Teenage pregnancies.
 - ✓ Cases of minor offence have gone up (Bhang, petty theft, etc) impacting 16-35 year old.
 - ✓ Sexually transmitted diseases.
- Unemployment is very rampant in the region and Bamburi has been requested to employ the youth as a means of curbing this vice.

i. County Roads and Public Works Department

- Designs of every individual facility constructed must be declared and certified by the roads and civil engineering departments.
- All roads within the county are weighted and should there be excess pressure of use, the contractor should participate in employing remedial measures in conjunction with the department.
- The roads and public works operate as separate departments which complement each other as a single unit. Each has a separate representative.
- The department partners with the business community and community groups as a stakeholder involvement measure in infrastructure rehabilitation and maintenance.

j. County Lands Office

- The department can identify land boundaries and help track the registered mutation of land ownership.
- The respondent officer took the consultants through a detailed land acquisition process (see attached report in appendix 7 section A 19).

Sensitive issues and how to handle acquisitions

- The major challenge involved in the county relating to land issues are majorly Succession and Uncollected Title deeds, and this is due to community illiteracy as well as ignorance.

- Succession issues involve death of title owners following unidentified procedural succession of the titles.
- Internal conflicts emerge as a result of the above (further triggering demographic change).
- Boundary conflicts may also exist as a result of the aforementioned Initial Preliminary Index Diagrams (PID) methodology of mapping (Measurement Techniques).

Way Forward

- Conduct Alternative Dispute Resolution (ADR) techniques which are carried out by ADR experts. The objective should be to foster a “Win-Win” Solution.
- ADR Mechanism include: Negotiations, Mediation and Reconciliation.

k. Social services and Talent Management

- The department contributes towards safeguarding the Kaya forest, medicinal plants and cultural practices in the area.
- A key function of the department is the preservation of National Heritage and Cultural Practices within the county.

l. Chief County Finance Office

- Building plans must be approved and all processes to be declared during Project development and construction as well as operation of the facility. This permits the department to tease out areas of financial interest.
- The Physical Planning department will advise on these areas. Other departments involved will include lands department on revenue allocation.
- Raw materials will be charged on transport. In the process, stickers will be issued for all vehicles involved.
- The basic guideline on revenue is stipulated under the Cess and minerals regulation. Other licenses including mining and single business license permits as well as plans and approvals are advised in the county regulations.

m. Kwale Water Services Company

- KWSCo is one of the water suppliers to the Bamburi facility at Magandia, other sources are water from existing boreholes, one at Miaji dairy farm, and two within Bamburi Office area.
- KWSCo has two main lines passing on opposite side of Diani Estate in Kwale, 8 inches Gi and 4 Inches Gi Pipes with running water, larger one serves water to Kaya Bombombo storage tank before flowing by gravity to Likoni, while the 4inches serves villages and centres along the road including Bamburi and Kwale Eye clinic who use 3/4-1 inches PPR pipes.
- Currently Bamburi has two lines, one via Kwale Eye clinic Culvert near road block and another one via culvert under 33KV KPLC Power-line. This translates to Larfarge Meter and Bamburi Meter. More water is consumed on the Lafarge Meter as compared to Bamburi meter.
- Water availability is near 80% of the flow, due to shortages caused by repairs at pumps and cleaning of tanks or due to power outages from KPLC. Flow rate is also intermittent.

n. Departments where official project introductory letters were issued and officially received (see sample letter in appendix 10)

- i. Department of Livestock and Fisheries
- ii. Education Department
- iii. Head of County Public Health Department

iv. Department of Roads and Public Works, Kwale

For some institutions, only the introduction letters were delivered due to absence of potential respondents, busy schedules affecting the respondents, short notice issues, etc.

6.4 Private and Public Institutions Assessments (Formal and Informal)

The survey considered institutions and institution categories which bear a direct or indirect relationship with the proposed project. The importance was to categorize them as potential stakeholder institutions which would potentially benefit from the project in a positive or negative or both magnitudes. The institutions are listed in the table below.

Table 28: Private Institutions visited and respective dates of visit.

	Institution	Date of Visit
1	Bamburi Cement Liaison Office	23 rd 03 21
2	G4S Officer in Charge, Kwale Bamburi Facilities	23 rd 03 21
3	Bodaboda Youth representatives	23 rd 03 21
4	General Service Unit	23 rd 03 21
5	Kwale Eye Clinic	26 th 03 21
6	Smokey Hill Quarry	01 st 04 21
7	Chairman Ng'ombeni location	31 st 03 21
8	World Wide Fund for nature (WWF), South Coast Region	23 rd 03 21
9	Transporters Service Operators	01 st 04 21
10	Fuel Service Station Operators	01 st 04 21
11	EREL - Prospecting & Exploration Drilling Team (Safety & Health Issues)	23 rd 03 21
12	Coast Calcium Mining Limited	23 rd 03 21
13	Mianji Dairy CEO	23 rd 03 21
<i>A detailed Institutional visit report is appended under appendix 6 and 7</i>		

Each stakeholder presented their association with the proposed projects detailing their issues, views, opportunities and some presented challenges faced. The details can be accessed in the report annexed under appendix 6 and 7 of this report. The summaries are presented below:

y. Bamburi Cement Liaison Office (Ng'ombeni, Denyenye Site office)

- Poverty in the areas is associated with low economic performance at grass root level and poor education structure and resulting attitude by the youth.
- Some of the CSR interventions by Bamburi Cement in the area so far include:
 - ✓ Construction of classrooms in public schools
 - ✓ Construction of perimeter walls for Denyenye and Ng'ombeni primary schools.
 - ✓ Provision of desks
 - ✓ Tree growing in schools (Many schools have benefited)
 - ✓ Provision of 10,000litres water tanks
 - ✓ Construction of offices for chiefs in the area
 - ✓ Motivation talks particularly for Girl's schools
 - ✓ Recently, a talent empowerment centre in Kwale

- The community themselves developed seedlings (about 60 community groups) and these are the same ones planted at the forest at Bamburi cement Limited facility.

Plans and Recommendations

- Bamburi cement should continue identifying opportunities such as supporting the best performing students and advising the community on the best available courses in order to permit themselves to align with the planned development.
- Bamburi cement as well as the local authority and lead institutions should focus on skewing the community education courses towards mining considering the counties rich mineral base.

Challenges faced

- Monotonous claims by some community members suggesting that historic injustices came into play on acquisition of the land by Bamburi Cement. The aggrieved believe that the land should have been given to them. This is a source of potential queries.
- Potential political influences have also been cited as potential hindrance to the project.

z. G4S Officer in Charge, Kwale Bamburi Facilities

- The company provides security for the Bamburi cement facility at Magandia
- The staffs patrol around, confirming that no encroachment takes place in the facility.
- Hazards such as stray animals and broken fences are also reported.
- There is no major conflict with the community apart from those who perceive that the land belongs to the community without considering formal complaint mechanisms.

Challenges

- Encroachment into the facility by individuals from the surrounding villages.
- Dumping of foul waste as well as sewage into the property (including sewage waste).
- Community members living around the area have no proper toilet facilities; they end up using the forest premises.

aa. Bodaboda Youth representatives (Chairman and Assistant)

- The group is Informally organized, meaning that they do not have formal registration status.
- The group highlighted historic injustices associated with land ownership issues.
- They expressed worries about potential pollution by the company when operations commence (dust, noise, poison)
- Their access to the beach is only possible through the Bamburi facility, yet this is considered a breach of security to Bamburi cement

Recommendations

- The informants appreciate the local employment aspects by the company
- They suggested that the land be allocated to the community (and BMUs) in order to permit acquisition of the minerals from themselves by Bamburi Cement
- They appreciated that Bamburi Cement has developed schools and institutions in the area. They hoped for more of CSR activities
- They pointed out that there is only one road connecting the main road to the beach and they wanted this to be of free access by the community
- The informants highlighted that land issues are sensitive in the area and a sensitive approach was needed to address the above.

bb. General Service Unit Manager

- GSU are tenants on the facility. They are located there on contractual agreement
- They respond to government directives to provide security where socioeconomic or political interests are required within the general area.
- The expected impacts of such proposed plants will include social turbulence which is considered a normal expectation emerging from polarized perceptions from communities or political arms.
- The Inspector opposed the tendency of community members accessing the facility and cutting down private forests without consent from the proponent despite being provided with a formalized access to collect harvested firewood from the premise.

Views and recommendations

- The respondents mentioned that there will be definite pollution and safety concerns from such scale of proposed facility, and was optimistic that remedial measures are well in place.
- He advised Bamburi cement to engage the community extensively to avoid unnecessary unrest.
- Existing issues should be solved amicably before engaging the project

cc. Kwale Eye Clinic

- He appreciated the project but said that Bamburi cement should come up with ways averting dust, noise emanating from the factory
- He mentioned that 80% of eye infection from the area is as an effect of dust
- He suggested the need to have separate roads for pedestrian
- He also cautioned that the road within the forest inhibits snakes

dd. Smoky Hill Quarry Limited

- That the outfit is performing with legal structures in place; permits have been issued from Kwale county and NEMA respectively
- That they exercise rehabilitation once the quarry is exhausted by planting of trees
- provision of food at the mosque and churches, giving of free stones for building and giving of scholarships on a needs basis are some of the CSR activities they are engaged in

Effect of the upcoming plant on mining activities

- The economy will be improved
- That they will get more clients as a trickle effect
- Covid 19 has negatively affected the operations of the mines; initially the operations were done in three shifts but this changed to 2 shifts during Covid 19 pandemic, staff reduction have also been done, purchase power has gone down and general income has reduced.

ee. Chairman Ng'ombeni location

- He stated that the community has been willing to cooperate with the current Bamburi Cement occupier and hopes for great established reception
- He acknowledged that the project was generally good due to prospected development in the area
- He also highlighted that due to poverty, the community has been pushed into minor offence activities, use of drugs and unusual sexual activities

- Bamburi cement should now engage in bringing the people together other than ignoring facts on ground
- The community is in dire need of CSR benefits in areas such as:
 - ✓ Hospitals,
 - ✓ Mitigation of social misdeeds which relate to poverty
 - ✓ Drug abuse
 - ✓ Education, etc
- Bamburi cement ought to assure the community about their involvement in the development and reduction of pollution as well as non-interference of their cultural practices such as fishing and access to the beach
- The community's fear is the rise of non-representative local leaders

ff. World Wide Fund for nature (WWF), South Coast Region

- Environmental and Social Impact Assessments and continuous auditing should continue contributing towards the company's sustainability measures.
- The management should appreciate the active works by the existing local non-governmental and community-based stakeholders in sustaining components of the environment in terms of biodiversity enhancement and community involvement in order to be in line with their conservation efforts.
- The local community should enjoy the benefits of the presence of the company through CSR and by employing those that are qualified to carry out available jobs.
- Any unusual adverse negative change of the immediate local biodiversity (birds, land, marine, insects) around the area should be recorded and investigated to rule out activities of the cement Processing facility, either at the Shale mining area, along the roads in use or at the Magandia facility.

gg. Transporters Service Operators (Potential Service providers)

Contractor 1

- Main concerns were on the health issues that may generate with the plant
- Implored the need to observe the Community Development Agreement (CDA) in a bid to include the local community in related engagements.
- Transporters based at Ng'ombeni Labor Group has 6 trucks which should be used

Contractor 2

- He lamented the need for Bamburi to engage the locals in the process
- Registered entities should be sought for transportation businesses.
- The project is going to improve the economy and More employment will be done with regard to labor force
- Challenges include the high cost of living including the fuel; transportation of raw materials is hampered

hh. Fuel Service Station Operators

- The local economy will improve with the entry of the plant

ii. EREL - Prospecting & Exploration Drilling Team (Safety & Health Issues)

Objective of the reporting: To demonstrate the strict application of the OSHA (2010) provision in Bamburi cement business.

The Induction took about 30 minutes. The entire team that had been selected for the site works was involved. They were addressed by the technical field representative on the engineering aspects and by the EREL-EHS representative on the Safety and health aspects.

- At each sector, clear roles were defined, and all hazards were identified. Mitigation measures were highlighted and appreciated.
- Potential hazards and associated challenges were discussed and means of dealing with these were also highlighted. These include potential crowding by the locals, gradients, rainy weather, injuries, etc.
- The team was advised to avoid unnecessary indulgence with the locals.
- They were cautioned to carry enough drinking water and emergency food ration.
- The Bamburi Health and Safety Site Rules were advanced to the team as follows;
 - ✓ Assess and control risks before starting and tasks (Observe Job Safety Analysis and Hazard Identification and Reporting). Major risks may be associated to driving, gradients, snakes and scorpions as well as insects, caught between moving machines, fatigue, dehydration, etc
 - ✓ Only perform authorized activities (apply permit to work systems).
 - ✓ Never override or misuse health & safety devices, and always use the required PPE.
 - ✓ Do not work under the influence of alcohol or drugs.
 - ✓ Report all incidents and practice emergency response plans as trained.
- In addition, the team was advised to consistently observe equipment inspection and equipment isolation when necessary.
- The team leader was advised to select one of the team members to take care of first aid issues.
- The use of Bentonite which is a sample contaminant is prohibited. The alternative should be declared.
- The team was advised to keep the work area clean and to leave it better than was when occupied.
- To avoid social tensions, payments to the locals to be very detailed and clear.
- Tool box talks should be practiced on a daily basis, covering engineering, environment safety and health topics and should only take about 15 minutes of each day.

jj. Coast Calcium Limited (Mining Company)

- The respondent remarked that Coast Calcium has no objection to the proposed development.
- He advised that Bamburi cement to expect challenges related with foul access into the facility forests by the community members.
- Coast Calcium has heavily invested in CSR programs such as paying school fees for the needy, organizing sports events, employing locals from within the area.
- Issues at hand relate to labour problems as it may be a challenge obtaining the right employees from the local area due to lack of adequately qualified experts. (most of the locals are from four leavers).
- They face no major issues from statutory institutions so long as all legal requirements are complied with.

kk. Miyanji Dairy CEO

- He has been in operation on the land for over many years. His dairy farm will be impacted directly with the entry of the new plant.
- There is need for a direct intervention from Bamburi Cement to formally communicate and consider his position
- Has 60 employees on a Permanent basis , and 22 employees as casuals. Indirect or temporary employees are 100 in number in every single day
- Most workers from outside come from Waa and Ng'ombeni, a few come from Kombani.
- Mianji has very great relationship with the community. His CSR action include: Payment of fees, Medical bills, Bursaries and Local employment -Apart from employment at the farm, the fuel petrol stations that he owns also give a platform for employment of the community members
- Mianji also provides vehicles for assisting the community whenever they need ambulance services
- The farm management gets a 1 (one) year lease from Bamburi cement. Mianji stated that he currently makes no significant profit.
- Mianji suggested that there will be no issue if he would be invited to co-exist with the planned development
- Environmental issues affecting the farm and the environment includes fugitive wild animals (2 No Hyenas have been reported), and a leopard at an adjacent farm.

Recommendation by Mr. Miyanji (CEO)

- Bamburi Cement should communicate formally and come up with a logical approach to handle the farm and assets within (including the settled workers)

6.5 Focused group Discussions

It was necessary to consider groups which existed within or around the project area that would provide useful information related to the project. The groups met were those tabulated below. Following the table are the rationale of FGD with the selected group as well as summaries of discussions. The detailed discussion reports are appended in appendix 8.

Table 29: Focused Group discussions and their outcomes

	Institution	Date of Visit
1	Mianji Dairy Farm Workers	23 rd 03 21
2	Timbwani Beach Management Unit	2 nd 04 21
3	Denyenye Beach Management Unit	31 st 03 21
4	Women Firewood Collectors Community (Magandia)	23 rd 03 21
<i>A detailed Institutional visit report is appended under appendix 8</i>		

e. Mianji Dairy Farm Workers

Objective: The main objectives of the FGD was to engage the workers in order to further inform them on the planned development and the potential scope of the planned activities. This would trigger discussions on the settled workers perceptions, fears views, concerns, recommendations, suggestions and any other general views.

Highlights by the Social Expert

- Nobody would be ejected from the facility without being heard. Everything will be systematically done should such a need emerge.
- There are laws to guide relocation of informal settlers on properties and the same binds Bamburi Cement. The community may be issued with certain options which will enhance a win-win situation regarding handling of the informal settlement situation.
- The environmental expert stepped in to highlight how pollution issues are being identified through stakeholder involvement, reviewing relevant studies and through expert surveys at the field. Stakeholders including neighbors and the community are involved in providing indicative reports on environmental performance of the facility
- On job availability, the Social expert said that there will be jobs for technical staffs, non technical staffs, contractors and others.
- She also highlighted that the law provides that 75% of the jobs should go to local residents.

f. Timbwani Beach Management Unit

Key Issues highlighted

- The extent of the BMU Covers three (3) No. BMUs extending further North from Magandia Landing site which is in tangent with the Bamburi Cement land parcel. The three BMUs include: Timbwani BMU, Shika-adabu BMU and, Denyenye BMU
- In the process of going about their business, they advocate for preservation of coral reefs, and take care of the beach cleanliness and environment
- At Timbwani, Turtles used to dock for reproductive purposes but pollution and increased shore waters activities such as mining has caused the environment to be unfavourable for turtles

Concerns and fears

- The BMU fear that access issues where they may be barred from accessing the beach to fish by Bamburi cement
- Noise may scare the fish away
- Fish may migrate should murky waters pollute the ocean
- Compensation of BMUs for blocked access and benefits from the ocean due to company operations may be denied to them

Request

- The BMU requested Bamburi Cement to develop the landing sites by helping them construct toilets and better working areas (see appendix 8)

g. Denyenye Beach management Unit

Activities carried out

- The activities carried out at the beach include:
 - ✓ Bodaboda transportation of the fishermen, harvested fish and necessary items for their day to day work
 - ✓ Selling and mending of fishing nets
 - ✓ Informal hotel industry serving the fishermen
 - ✓ Fishing in the ocean using canoes
 - ✓ BMU related activities such as cleaning the beach, security and other supported works

Discussions and Remarks

- The fishermen complained that access to the beach has become an issue owing to restrictions from Bamburi cement. The only open safe access way is through the facility. The fishermen operate daily during the day and night
- The fishermen complained about the reduced populating of fish owing to a rig boat that was used to break the coral reefs where fish breed for the purposes of road and bridge construction. They were worried about the proposed development causing similar damages
- The two closest Kayas include Kaya Bombu and Kaya Similani

Suggestions

- Bamburi Cement should start talking to the fishermen to understand their grievances and concerns in order to foster good relationships
- The fishermen suggested that an access way should be developed for them to avoid use of Bamburi cement facility
- The fishermen remind Bamburi cement about their promise of the fishing boat
- The fishermen requested Bamburi Cement to consider friendly methods of mining to avoid scaring fish away

h. Women Firewood Collectors Community (Magandia)

Objective of the FGD: To engage the firewood collectors in order to discuss with them about the firewood collection, use, fears and challenges, observations, recommendations and suggestions. This was aimed at eliminating fears from the community.

Discussions with the community

- The community group explained that they collect firewood in turns with a second group (Denyenye Wa-ndimu on Tuesdays and Denyenye Wa-kati on Fridays).
- They are about 30 households represented by the group
- Collection of firewood is charged at about 150Kshs per day in public forests and Charcoal sales at about 1,300Kshs for the big bag
- Household cooking fuel is scarce in the area and a big issue in the community
- The community do not have land of their own
- They hoped that the firewood collection would continue as per the current schedule during project implementation and operation.

6.6 Community meeting held with Local admin and community reps

A meeting was set to hold discussions with the project area chiefs and assistant chiefs on the 2nd of April 2021. The meeting was set by the Matuga Location area chef Mr Athman H Macheso and was attended by the Waa Chief, Ng'ombeni assistant chiefs, Bamburi cement Liaison officer and the EREL team. The meeting was held at the Ng'ombeni chiefs office. The chiefs were made aware that it was impossible to convene a full meeting with the community as desired due to the restrictions governed by the Covid 19 management guidelines (see <https://www.health.go.ke/covid-19/>). The chiefs were informed that there was a follow up meeting with the community representatives and the attendants would be limited to the requisite population as per the COVID-19 management requirements. The agenda for the meeting was to give an overview of the proposed project, trigger reactions by the chiefs in order

to collect concerns, and to scope for opportunities where Bamburi Cement Limited could contribute to foster collaborations and development. The full minutes of the meeting are highlighted in the appendices section 11 and 12. Highlights are presented below:

6.6.1 Procedures of the meetings

The chiefs were mobilized through the help of the Matuga Location Chief who had been in similar coordination with earth Resources and Exploration Limited on behalf of Bamburi cement when dealing with the Shale Mineral prospecting and exploration as well as the current application for a mining license. All were made aware that the County and national Government had been reached out to and were in coordination with the development.

The meeting was held in full compliance of the requisite regulatory controls of the National Covid management regulations as per the Public Health standards. The nature of the meeting was interactive, permitting the attendants to air their views in order to facilitate absolute documentation of all issues related to the propose project location and the surrounding environment (see appendix 11).



Figure 40: Public Baraza attendants and the sensitization processes.

6.6.2 Summary Outcomes of the meetings

The meeting was attended by 9 no institutional representatives. Martin Owiny, a Director of Earth Resources Exploration Ltd, introduced the project and outlined the objectives and purpose of the meeting. He expounded on the project background highlighting how the project process will develop during Implementation, operation and project decommissioning. He touched on the potential positive and negative aspects as well as matters touching on the Local Content Laws.

Concerns by the Chiefs and Responses Reaction

- There are the National and County Governments involved in the region and everywhere. The executive wing has the county government, yet the chief has not seen the county government of

Kwale being involved. How will the County Government be involved considering that grass-root structures should also be factored.

- ✓ Ward administrators and village elders were in the picture and the stakeholder scoping exercise was still ongoing. A representative list of the stakeholders involved during the Matuga Shale Prospecting as well as the past Limestone prospecting was shared in the meeting.
 - ✓ To date, more stakeholders are still being identified.
 - ✓ Part of the reason we were having the chiefs meeting was to use the office as a means of fostering stakeholder involvement with an objective of balancing gender representation, inclusion of the vulnerable communities, the youth and the elderly as well as marginalized members of the community
- In many cases involving such projects, beneficiaries are usually not the targeted ones. How can we ascertain that the correct beneficiaries are identified for this project?
 - ✓ The controls for community benefits particularly in the extractive industry are now formalized and are embedded in the law under the CDA Regulations which require holders of mining licenses (granted under the new Mining Act), mining leases and special mining leases (granted before the coming into force of the new Mining Act) to enter into CDAs with one or more communities located around their exploration and mining operations areas.
 - ✓ Besides the CDA requirements, Bamburi Cement is a key contributor to the community under the CSR good practice, which is not a compulsory obligation by the company.
 - One of the chief asked about how the factory would impact on the community in terms of health and safety because it is thought that associated disease incidences would affect the community.
 - The environmental and social experts responded by emphasizing on the following:
 - ✓ There are inherent risks such as dust, noise, increased traffic and others which may impact the environment. In such projects, negative impacts may be reduced or eliminated completely. In this project, the Environmental and Social Impact Assessment process will carry out tasks to identify all environmental, social, safety and health issues and then provide mitigation measures for each.
 - ✓ The process involves all levels of stakeholders including the community living within the potentially affected area, the in-tangent community, interested parties, lead government institutions and parastatals as well as stakeholder companies, etc.
 - ✓ The objective is to provide mitigative solutions for each while involving the entire diverse stakeholders
 - ✓ During operation, monitoring and audits are carried out to ascertain mitigation of problems encountered or application of improved measures to reduce past issues and in collaboration with the stakeholders
 - ✓ The same principle applies when dealing with social issues. The issues are identified and mitigation measures developed the same way.

Scoping of opportunities in the area

- **Skill set issues:** Currently, none of the community members is aware of the skills that are required by the Cement processing facility to be put in place. Additionally, only a few community members have studied beyond secondary schools to completion.

- **Higher learning Institutions:** the following learning institutions are available or upcoming in the County and near the project area:
 - ✓ Waa Ng'ombeni Polytechnic
 - ✓ Matuga Youth Polytechnic
 - ✓ Kwale National Polytechnic
 - ✓ Upcoming Jomo Kenyatta University of Agriculture and Technology is an upcoming institution

- **Other Upcoming Development:** The following are other upcoming development that may be supported by the upcoming industry:
 - ✓ A Wholesale Market (EU Funded) coming up at Kombani Junction
 - ✓ Blue economy Kwale marine Institute
 - ✓ Water Front Park, Open recreation area at Ukunda

The chiefs also mentioned that the shoreline dredging for sand harvesting has destroyed a stretch of the beach. They requested for a rehabilitation intervention by Bamburi cement as a CSR intervention.

6.7 Meeting with the Ng'ombeni and Waa Location Community Representatives

Summary: The objective was to compliment the Community Public Consultative meeting considering that the Covid 19 regulations had limited the population capacity and procedures of such meetings. For that reason, a representative population was met.

Objective: The main objectives of the discussions was to engage the group in order to sensitize on the proposed project, discuss the key concerns raised by the group, and to ascertain that each and every concern would be addressed amicably in favour of both parties (the community group and Bamburi cement) where possible. The main outcome is to foster a Win-Win situation among the proponent and the community.

Discussions with the community

- Farm ownership issues will be dealt with at a different level and platform due to sensitivity of the matter
- The community to start preparing their children to take relevant courses which will lead to their absorption into job lines offered by Bamburi cement.
- Economic development with the project up and running is inevitable and will benefit the community.
- The community must constitute 70% of the employees in accordance to the Mining Act 2016.
- He said that the plan of the company is to set the company in operation within the next 12 to 24 months.
- Apart from the primary beneficiaries, there will be secondary and indirect beneficiaries and these will majorly be from the surrounding community and will constitute all levels of jobs.
- There are benefits to be advanced to the community as a statutory obligation and also in accordance to CSR action by the company.
- He also encouraged the leaders to assist the community with coming up with a Community Development Agreement (CDA).

- Stakeholders to be involved during setting up of the facility will include representatives such as chiefs, MCAs, Parliamentary representatives, the government, vulnerable community members, women, youths etc.

Community Urgent Needs (Full list under appendix 12)

- Hospital issues (water and ward beds)
 - Schools (bursaries)
 - Madrasa
 - BMU needs
 - Water for Mosques
- Mr. Martin ascertained the community that the issues will be presented to the company as discussed and relevant recommendation would be presented for adoption and consideration.
 - A community member remarked that he was happy with the presentation and the fact that information was now shared with them as they had expected. He added that such information and sensitization brings peace and understanding among the community members. In conclusion, he said that they understood that their association with the company will be on voluntary basis.

Environmental and Social management: The environmental expert explained the cycle of environmental management, stakeholders involved and identification of issues in terms of Environment, Social, safety and health. He explained how mitigation of issues are carried out and how such companies are monitored and audited for performance purposes.

6.8 Ng’ombeni and Waa Locations HH Baseline Survey findings

Below are highlights of findings from the Project Area Household baseline Survey which covered Ng’ombeni and Waa Locations. The sample questionnaire used to obtain baseline survey details is appended under appendix 2, 3 and 4 of this report.

Table 30: Summary of HH Baseline Survey Findings

	Field	Key Points
1	Household size:	<ul style="list-style-type: none"> • The mean population of the individual sampled households was 4.8 persons per household (46% female and 54% male)
2	Travel distances and accessibility:	<ul style="list-style-type: none"> • Mean distances to major facilities - trading centres (2.37Km), -health dispensaries (2.59Km), primary schools (1.74Km) and to water sources (0.83Km) respectively.
3	Water Accessibility:	<ul style="list-style-type: none"> • Main water source is Well/spring (25.8%), Communal piped water (20.4%), Stream/river (6.9%), Borehole 60%, rain water (18.5%) and 1.5% from other sources. • The few water pipe outlets whose source is from Kwale Water Supply in the study area are centrally shared between villages at strategic points. Average distance to water points in the study area is 0.83 Kilometres. • Most of the community (80%) spent less than 30 minutes to acquire their household water. About 15% spent about 31 to 60 minutes to go, get the water and return home. 1.9% spent more than 1 hour, 1.5% more than 2 hours and 1.2% spent over 4 hours. Water access fluctuates with seasons, dry and wet period.

4	Per Capita Consumption of drinking water:	<ul style="list-style-type: none"> • The per capita consumption of water within the surveyed households was at a mean of about 24.7 litres per person per day. • The mean minimum recommended World Health Organization (WHO) per capita water consumption for domestic use is determined according to drinking (3-4 Litres Per Capita/Day Lpcd), food preparation and clean-up, (2-3 Lpcd), Personal hygiene (6-7 Lpcd), and laundry (4-6 Lpcd), or about placed at 17.5 litres per person per day (Reed et. Al. 2005). • Therefore, each individual (out of 1260 No.. Individuals in 260 households) is above below target by about 7.12 litres of the WHO recommended minimal standard value. • However, this was not a water scarce season, and also, some individuals consumed way above the normal average while some consumed way below the normal average. Those who consumed way below the normal average should be considered for interventions.
5	Water Treatment:	<ul style="list-style-type: none"> • Only the piped water supply is pre-treated by the Water Service Provider Company before delivery to clients.
6	Sanitation:	<ul style="list-style-type: none"> • In Kwale County the main type of toilet facility is the pit latrine. In 2018 the latrine coverage in the County was 55%, which was below the national target of 90%. • During the survey, it was determined that the major toilet designs options distributed among the households were usage of bush and pit latrines at about 20.4% and 58.3% respectively. Flush toilets were at about 17%. Most (66%) are privately owned.
7	Solid Waste Handling:	<ul style="list-style-type: none"> • Most of the residents (about 64%) get rid of their waste by burning while 10% discard their waste into the open. 23% have open dumpsites. 3% said they throw their waste into water ways to be transported down stream.. • Some residents practice more than one method of waste handling.
8	Housing Construction materials sources:	<ul style="list-style-type: none"> • Most households are constructed by stones and corrugated iron at 74.6% and 76.5% respectively. Only 4.2% were constructed with by bricks and 22.7% by mud, 21.9 with thatched rafts and 19.6 with timber.
9	Health Care:	<ul style="list-style-type: none"> • The County has a total of five (5) government hospitals, ten (10) health centres and ninety (90) dispensaries located in Msambweni, Matuga, Lunga-Lunga and Kinango Sub-Counties. • The doctor and nurse population ratio stands at 1:76,741 and 1: 3,133 respectively. In addition, the county has a total of thirty-six (36) private health facilities and nine (9) health facilities owned by faith-based organizations.
10	Alternative Medical treatment:	<ul style="list-style-type: none"> • There are many varieties of forest medicinal products used and sold by local community trades from the local forests.
11	Mining and Industries:	<ul style="list-style-type: none"> • Kwale County has a huge potential for mineral exploitation. Clay and Shale soils, limestone, silica are among these resourceful materials.
12	Form of Employment:	<ul style="list-style-type: none"> • Those below 18 years were about 33.2% of the general population. This population, including the spoilt entries which could not be included in the analysis was about 36.9% of the total household population. • 41.1% were considered unemployed. 12.12% were self employed, 9.2% were paid employees, and 0.6% were employers. From this ratio, a few were students or were engaged in forms of learning institutions.
13	Sources of Income:	<ul style="list-style-type: none"> • Most of the households rely on kitchen gardens. Those that have larger farms take excess harvests to the local markets.

		<ul style="list-style-type: none"> • 13% depend on farming, 12% on trading, 5% on Livestock, 1% on artisan mining, 1% on fishing and 68% from other sources. Livestock rearing was ranked at 5%.
14	Household Income levels:	<ul style="list-style-type: none"> • 16.8% of the households earned less than 1,999Kshs and 12.9% earned between 2000 and 3,999Kshs a month. Another 16.4% earned about 4,000 to 7,999Kshs. The cohort levels gradually drop with increased value earned. 13.7% earned between 8,000 and 12,999Kshs, 12.5% earned 13,000 to 17,999Kshs and 9.8% earned 18,000 to 22,999Kshs. • Higher earners were fewer in population as observed. 6.3% earned between 23,000 and 26,999Kshs, 6.6% earned 27,000Kshs to 30,999Kshs and 4.4% earned between 40,000 and 50,999Kshs. Only 0.8% of the population earned above 60,000Kshs. • In some instances, monthly income is dependable on seasonal variation of markets and products.
15	Air Quality & Water Quality tests	<ul style="list-style-type: none"> • Recently done at the Bamburi cement facility at Denyenye. All parameters were found to be compliant (See appendix 16)

6.8.1 Conclusion from the baseline Survey findings.

Following an analysis from the baseline survey, we highlighted some of the associated key points. The key points suggest both the positive and negative aspects to be put into consideration during the project implantation phase:

Negative aspects

- Increased traffic hence associated safety and health impacts
- The poor roads will get further dilapidated
- There will be potential property destruction by virtue of running the facility
- The community may eventually get disillusioned by the project due to potential negative ethical practices when issuing jobs, acquiring resources, and failed delivery of promised CSR projects
- Failed negotiation between the company and the community
- Failed Fair/Equitable distribution of resources and tenders for service provision
- Air pollution leading to infertility of land and health issues
- Destruction of earth resources amounting to poverty
- Cultural erosion

Positive Impacts

- Improved Business
- Improved livelihood
- Improved Infrastructure
- Improved Local and County Economy

6.8.2 Consultative meeting with Bamburi Cement Management

Bamburi cement run an operational cement processing facility located in Bamburi suburb of Mombasa. This is about 40 kilometers by road from the current proposed shale mineral

mining location and 30 kilometers from the proposed new clinker manufacturing plant. The facility was established in 1951 and commenced operations in 1954. Over the years the facility has seasoned with the surrounding community, developing through numerous successes and challenges. The facility commenced with old design equipment for its production unit and has managed to develop with trending social and environmental developments, pausing challenges, successes and progressive transformation to cope with existing standards. The community there has been transformed by the presence of the factory and are consistently involved in development matters in a stakeholder involvement capacity. The same environmental and social issues associated with the facility are likely to compare with the proposed plant in Kwale County, as well as the shale mining and transportation aspect. The following are characteristics which were considered and prompted the research to seek for consultation from the Bamburi cement management located at Bamburi, Mombasa: (Note that the shale mining process is covered in a separate ESIA report from the Processing facility and Limestone mining development at Kwale County (Magandia - in Waa Location, Matuga sub-location).

- Similar Community at the operating facility location to those at the proposed location (differences may be associated with certain surrogates highlighted in this report).
- Easily accessible distance from the site.
- The environment is geographically similar to where a Cement Processing plant has been proposed at Kwale County.
- Similar industrial activities expected with the proposed facility (resources and processes).
- Industrial, Environmental and Social, Safety and health informational challenges and successes from establishment to current day.
- The same management is in charge of the proposed clinker processing location at kwale County and thus they are aware of the project design, timelines and other certain useful details pertaining to the proposed project.

The Bamburi Cement Limited company representatives met for the discussions are in charge of the following plant sectors: **1)**. The Environment Health and Safety representative, **2)**. The company Geologist, **3)**. The Plant Manager and the **4)**. Continours update from the Project Manager & Bamburi streategy director. The following key points came out of discussions;

6.8.3 Bamburi Cement Environment Safety and health

- The new plant planned for South-Coast (Magandia - Kwale County) is scheduled to be implemented about mid-2021, and will take about 8 months to complete.
- The major environmental, social, safety and health impacts from the plant include: Dust and particulate emission, Fatigue, Material spillage, Complaints from the public and statutory offices, Infrequent failed filters.
- Improvements on plant will involve plant upgrade to match contemporary global standards
- Wind direction is a key factor in the placement of cement factories.
- Recommendations for duct control include: Paving of roads, use of water boozer (sprinklers), Tree planting along perimeter and within the mining facility where permissible, Road diversions across the perimeter instead of along perimeters, Strategic placement of the plant to prevent wind path dust from settling in habitable areas.

- Vibrations from mines is a public issue. Measurements are frequently taken to control the impacts on surrounding areas.
- Bamburi Cement are normally informed when vibrations are high and they respond through remedial measures and feedback.
- As a marine wildlife conservation measure, Bamburi cement collaborates with turtle culturing initiatives.
- Cement processing is an intensive energy utility process consuming both electricity and fuels. Electricity supply is from Kenya Power and coal is sources from South Africa via ship, and ferried on land by trucks. Heavy fuel is used to heat the coal.
- Alternative fuels consumed include waste from steel industry, aflatoxins, Pyre-diesel oil (used tires).
- At plant level, community engagement is supported by four pillars, namely: Environmental Management, Health management, Education and Infrastructure.
- CSR are key interventions by Bamburi Cement.

6.8.4 Bamburi Cement Geology Department

- The type of mining conducted by Bamburi cement is open-cast mining (uncovering, removing the mineral and then covering).
- The process sequence includes: Bush Clearing, Stripping (drilling, casting), Crushing, Load materials and transporting
- Machinery and materials include a variety of mining machines, drilling machines, excavators and trucks.
- After the above (mining) process, is the material preparation process
- Waste from the process include scrapes, oil, containers, filters, spares, paint, oils, etc
- Other wastes include biological waste from growth, soils and debris which are not required. These are returned, buried or mulched where mine extracts are exhausted.
- Quarry rehabilitation is determined by the mining plan which is developed before commencement. The rehabilitation contains short term and long-term interventions.
- Biodiversity studies are very important during the process considering restoration requirements stipulated in the environmental regulations. The biodiversity development plan is developed by the Bamburi cement in conjunction with statutory lead institutions as well as local based stakeholders.
- Environmental impacts realized from the mining process include vibrations, truck and machinery (equipment) noise.
- The mining processes near the sea normally leave an altitude clearance of about 2 meters above high tide sea level beacon to prevent backwash effects. Personal (physical) checks are additionally useful.
- To mitigate air pollution, the size of blast is controlled. The explosives are also confined. Their storage is approved by the mines and geology department.
- Roads are placed across the plant instead of having them along the perimeter fence.
- Marine life has never been encountered near sites of interest that are close to the sea, studies are facilitated to ascertain the same.

- The regulation states that the closest distance to the sea that Bamburi Cement can venture into the mining is not less than 50 meters from high tide (with a logical due diligence consideration based on site conditions).
- Lafarge ecosystems is a limited company which manages the biodiversity component.
- Quarry staffing includes outsourced and in-house staffs.
- The processes subsequent to the crusher include stockpile and site management.
- Crusher to raw mill - Raw mill Preparation - Raw mill production - Clinker Production - Product realization.
- Current production is at about 3,000tons per day, the new plant will produce an estimate of about 5,000tons per day at optimal production.

6.8.5 Bamburi Cement - Plant Mngr., (Clinker Plant Operations & management)

- The operation cycles as well as some key materials were highlighted. These are highlighted in detail under appendix 13.
- Emissions from the furnace will include CO₂.
- Community engagements are conducted to help regulate the pollutants.
- Lafarge ecosystems associates with the production process to reduce carbon foot prints
- The challenges associated with the facility compared to recent plants is that the plant was established in 1956, thus the technology is old. Improvements have been partially made due to non comparability of new technological equipment with the old facility.
- The upcoming Denyenye plant will be fully contemporary and this will be a major improvement to the existing plant
- The cement processing cycle bears no major hazardous emissions
- Reverse osmosis technology is available for cooling the chemicals before releasing the potential pollutants (Brime is a waste here). The Brime concentrations are checked and then injected in bore holes. The Lafarge ecosystem group dealing with rehabilitation plays a major role in assisting and pure responsible for eco balancing and system. Once the quarry process is done, the ecosystem team takes up the process scientifically.

The Denyenye site issues

- Design of the plant layout to anticipate stakeholder involvement
- Boundary and ownership challenges are pending from the community side
- Illegal miners from neighbouring properties have died due to attempts of carrying out directional mining into Bamburi cement farm, causing fatal underground collapses
- BCL site is advised to develop a higher water consumption cap for the sake of the community

Skills based challenges

- Hard skills such as technicians and handy work personnel are fading off in the region
- The technical institutions have not sufficiently addressed issues to do with lack of skills required by such industries.
- The company had 1000 employs but currently at 160 at 16% employment rate. This is because much of the manual work have been substituted by technology.

6.8.6 Bamburi Cement - Project Manager

The following statistics were provided as baseline performance indicators for the current operating cement processing company at Bamburi cement.

Table 31: BCL Key Industrial Performance Indicators and Skill sets Profile

	Field	Estimate Value
1	Estimate monthly or annual water bills and KPLC power bills(plus energy options)	Water consumption is approx 30,000 m ³ /month.
		Power consumption from KPLC 8,000 MWh/month
2	Estimate number of employees in plant production	80pax
3	Skills set profile for the proposed plant (Staff category, levels of education and section of production)	Managers - BSc in i/ Engineering - Process, Production, Maintenance ii/ Industrial Chemistry - Quality, Production
		Supervisors - BSc in i/ Engineering - Process, Production, Maintenance ii/ Industrial Chemistry - Quality, Production
		Technicians - Diploma in i/ Engineering - Process, Production, Maintenance ii/ Industrial Chemistry - Quality, Production
		Control Room operator - Diploma in engineering, industrial chemistry, environmental science
4	Skills set profile for the a typical Quarry applicable to both limestone and shale mining.(Staff category, levels of education and section of production)	Manager - BSc in Geology / Mining engineering
		Supervisors - BSc Geology/Engineering - Quarry (Diploma with 5year experience in engineering can be considered)
		Technicians - Diploma in Engineering - Quarry
		Control Room operator - Certificate in engineering,

6.8.7 Summary from Bamburi cement Visit

- The plant will incorporate contemporary designs built with considerations of trending effective pollution abatement measures.
- Bamburi cement incorporates biodiversity quality improvement measures through her sister company Lafarge limited. The same will be factored in the upcoming facility to ensure that most stringent pollution control measures are incorporated.
- In addition to compliance to the Local Content statutory requirements through adherence to CDA regulations, Bamburi cement will influence a number of CSR projects which will be beneficial to the community.
- From the community survey, County Planning Documents, Statutory and private institution respondents it is evident that the county local community suffers majorly from lack of employment. Bamburi cement will play a major role in creating direct as well as indirect employment.

The full Bamburi cement Visit report is appended under appendix 13.

7. IDENTIFICATION OF THE PROPOSED IMPACTS

7.1 Introduction impacts

This chapter focuses on the positive and negative impacts that are likely to occur as a result of the proposed Project Development and mining activities. These were identified according to the proposed project phases namely: Construction (Setting Up of facilities) Phase, Operational (Mineral extraction and transportation) Phase, and the Decommissioning Phase. For ease of reference, the impacts due to or affecting certain elements during construction and operation are presented in matrix form in the Environmental and Social Management and Monitoring Plan. The table below provides a snapshot view of the anticipated impacts (both positive and negative) of the proposed project:

Table 32: Impacts of the proposed project

Environmental & Social Impact	+Ve or -Ve	Direct/ Indirect	Temporary/ Permanent	Major/ Minor	Occurrence		
					Constructi on	Operati on	Decommiss ioning
Socioeconomic Impacts							
Electricity supply	+Ve	Direct	Permanent	Major	x	√	x
Creation of employment	+Ve	Direct & indirect	Temporary/ Permanent	Major	√	√	√ x
Security	+Ve	Direct	Permanent/ Temporary	Major	√	√	x
Revenues to Government	+Ve	Direct	Permanent	Major	√	√	x
Development of Business opportunities	+Ve	Direct	Temporary/ Permanent	Major	√	√	x
Growth of associated industries	+Ve	indirect	Temporary/ Permanent	Major	√	√	x
Interference with natural flora and fauna	-Ve	Direct	Permanent	Minor/ Major	√	√	x
Interference with socioeconomic activities due to relocation & resettlement	-Ve	Direct & indirect	Temporary/ Permanent	Major/ Minor	√	√	√
Interference with cultural and social practices	+Ve	indirect	Temporary/ Permanent	Major	x	√	x
Employment Opportunities	+Ve	Direct	Permanent/ Temporary	Major	√	√	√
Gains in the Local and National Economy	+Ve	Direct	Permanent	Major	√	√	x
Interference with infrastructure	-Ve	Direct	Temporary/ Permanent	Major/ Minor	√	√	x

Impacts associated with CSR and CDA Initiatives (development of education, health care system, local industries, etc)	+Ve	Direct	Permanent/Temporary	Major/Minor	x	v	x
Visual Impact	-Ve	Direct	Temporary/Permanent	Major/Minor	v	v	x
Biophysical Impacts							
Clearance of vegetation cover	-Ve /+ve	Direct	Temporary	Major	v	v	v
Increased solid waste	-Ve	Direct	Temporary	Minor	v	v	v
Interference with water quality	-Ve	Direct	Temporary	Minor	v	x	v
Increased demand of sanitation	-Ve	Direct	Temporary	Major	v	x	v
Contamination of soils with oils, chemicals and foul effluent	-ve	Direct	Temporary	Minor	v	v	v
Natural habitats	-Ve	Direct	Permanent/Temporary	Minor	v	v	v
Health and Safety Impacts							
Air pollution GHG	-Ve	Direct	Temporary	Major/Minor	v	v	v
Noise and Vibrations	-Ve	Direct	Temporary	Major/Minor	v	v	v
Dust	-Ve	Direct	Temporary	Minor	v	v	v
Increase in social vices	-Ve	Direct	Permanent/Temporary	Major/Minor	v	v	v
Injuries and accidents to animals and workers	-Ve	Direct	Temporary/Permanent	Major	v	v	v
Light Intrusions into public space							

Summary of activities: Apart from the transportation of minerals into the Denyenye from Kundutsi, the setting up of the mining and Clinker facility will be on private land owned by Bamburi Cement Limited. In a nutshell, the entire process will include Transportation of minerals on tipper lorries, hauling equipment to the facility, adequate securing of the perimeter fence with a more permanent design, ground clearance, setting up offices and operation area, opening up unwanted cover layers and cutting mineral occupied ground by ripping and bulldozers to the required depth. The factory will be set up following standard civil engineering processes including excavations, laying foundation and pillars, construction of floors and walling, roofing and setting up of go Down industrial facilities which will house line equipment such as conveyor belts, Crushing machines, raw milling and grinding machines, heating and pre-caking machines, rotary kiln and cooling with pre-storing units, blenders, cement grinders and cement silos, as

well as particulate suction vacuums, wiring and water systems see sections 2.3.3 and 2.4). Usually, visual impacts may be an eyesore and very little may be done to avoid this particular impact. When a mine section is exhausted, the next in-tangent mine section is opened up and the previous is restored and rehabilitated.

The following are some of the potential positive impacts that could result from the proposed mining;

- The major impacts of the proposed project will be reduced poverty and improved living standards within the locality and the county. These will result from employment creation (direct and indirect) and increased investments especially in value addition processing of primary products.
- Improved incomes and poverty reduction will also occur through provision of opportunities to facilitate direct and indirect employment.
- Job creation for both skilled and unskilled labour to work during prospecting and Mining activities.
- Boost the economy through investment and expansion of businesses and income generation opportunities. This will increase productivity and competition.
- Households and institutions can be connected to electricity thereby providing household level lighting system. This will in effect create market for electronic goods.
- Improve security in the beneficiary communities through better lighting.

The potentially adverse impacts have been discussed in greater detail the following section:

7.2 Impacts on the Biophysical Environment

7.2.1 Terrestrial Habitat Alteration

Terrestrial habitats are ones that are found on land, like forests, grasslands, deserts, shorelines, and wetlands. Terrestrial habitats also include man made habitats, like farms, towns, and cities, and habitats that are under the earth, like caves and mines.

i. Setting up and Mineral Extraction phase

If proper care is not observed, the process will result in alteration and disruption to terrestrial habitat, including impacts to avian species. Clearing activities will transform habitats, depending on the characteristics of existing vegetation, topographic features lines. Examples of habitat alteration from these activities includes fragmentation of vegetation; loss of wildlife habitat, including for nesting; establishment of non-native invasive plant species; and visual and auditory disturbance due to the presence of machinery, Movement of personnel and vehicles. The construction phase is also expected to be associated with woody species removal along the proposed area resulting in destruction of species habitat or its simplification.

Terrestrial Habitat Alteration will be limited to a degree within the project location where the processing plant and offices will be set up and where the mining operation will be taking place. This will occupy just a small portion of land at a time. Thus, only those points will suffer the

impacts. Remedial measures applied before opening up an area will include biodiversity studies with an objective of integrating relocation of animal species that will need assistance where necessary (I.e reptiles and certain birds), and recovery of plant species for transplant (only those which may need scientific assistance to regenerate efficiently). Therefore, an ecological study with emphasis on biodiversity will aid the process as well as engineering approached such as exploiting a small section at a time to exhaustion before moving to the next portion and at the same time rehabilitating and re-vegetation enhancement where the resource is diminished. Vegetation clearing should be done manually by use of pangas and slashers. Where there are big trees, portable power saw mills (petrol powered) will be used. The monitoring parameter should be the deforested location and area, major species affected, major species transplanted or replanted and resulting forest cover. By so doing, the proposed project will not affect the integrity and ecological functions of the habitats of the project the client will be dealing with section of the site to extract the resource.

7.2.2 Alteration of Aquatic Habitats

i. Setting up and Mineral Extraction phase

Noise and vibrations, Soil erosion from the Mining activities, road development and transportation may result in siltation of watercourses. There are no major rivers because the site is in tangent to the ocean shore, and so, storm water if not well management may have a direct impact on the Indian Ocean. Transportation of fugitive materials on account of the project activities may occur if mismanaged. This will define the health of the coastal and mangrove habitat as well as their ecology. This impact is however expected to be minimal if properly managed. At the proposed site there will be Mining, transportation and operation of a clinker facility as well as other works involved in this project.

7.2.3 Wildlife Species

i. Setting up and Mineral Extraction phase

The wildlife seen in the area include squirrels, moles, bush rats, hare, small reptiles such as the agama lizard, common lizards, small snakes, and millipedes, scorpions, spiders and small insects. Among larger animals are the dik-dik, stray antelopes, and rare forest wildlife. Setting up and extraction is not expected to have significant negative impact on wildlife owing to the area where the site is has low wildlife density. The behavior of wildlife species in this area precludes any significant negative impacts although some species may be affected during the construction phase (see appendix 8 - wildlife and forest species found in the area)

7.2.4 Soil

i. Setting up Clinker plant and Mineral Extraction phase

During the process, some dust will be generated from the few project vehicles as they make their way through the mainly murram roads leading to project sites. This dust may not be significant in the low population density areas, but may become a nuisance as the vehicles transport the material from the mines to the processing plant. Fugitive dust may be measured

periodically using particulate samplers. The top soil accumulated aside to expose the limestone for mining may also pose risks of mechanical or hydrological migration into the Indian ocean causing ecological changes at the coastal waters. This may destroy marine and coastline habitat.

7.2.5 Air Pollution

Air pollution will be triggered as an inherent factor, particularly during dry seasons. The following aspects of air pollution may be associated;

i. Transportation, Setting up and mineral Extraction Phase

- Old smoky transport vessels which are poorly maintained
- Transporting of mineral soils on tippers at high speeds and without tarpaulin covers
- Dry dusty grounds at work areas

ii. Operation of the Clinker Plant Facility

- Stack emission not meeting requisite industrial standards and limits provided in the air Quality regulations 2014, as well as international standards where applicable.
- Lack of a periodic monitoring program to scope for pollution impact feedback from the community and from scientific measurements.

7.2.6 Water Quality

i. Setting up and Mineral Extraction phase

There is a risk of pollution of permanent and seasonal wetland resources, as well as water ways and potentially ground water if the safeguards are not well observed. Surface water resources may be polluted on account of stock piling loose top soils without compacting and vegetating it during the setting up and mining operations. The loose material may migrate into water bodies through wind action, mechanical or hydrology action. All nearby community water resource points should be marked and frequently monitored for potential pollution impacts.

Ground water may be polluted on account of extreme depth excavations to interfere with high tidal limits or exposure of the lower fresh water aquifers to the upper salty water aquifers hence triggering change of natural ground water quality. This may occur when sinking boreholes.

7.2.7 Hazardous Substances

i. Setting up and Mineral Extraction phase

Use of engines (Mining vehicles and equipment vehicles) on site has the potential to lead to spillage of petroleum products. It is however worth noting that the risks of a major oil spillages occurring are minimal because major maintenance on site will not be encouraged. Besides this, only perfectly functioning vehicles will be registered on site. The impact during setting up and mining will not be significant. However, emergency remedial measures must not be ignored considering that as much as accidents may be minimal, they may as well be unavoidable.

ii. Decommissioning

The machines on site are built with moving parts, which will require continuous oiling to minimize the usual corrosion or wear and tear. Possibilities of such oils spilling and contaminating the soil and water on the site are likely to occur. The workers will be required to undergo through pollution abatement measures to keep the possibilities as low as reasonably possible. These dangers can be contained by maintaining the machinery in specific designated areas designed for this purpose. Part of decommissioning should consider remediation measures of the contaminated soils.

7.2.8 Loss of plant species and communities

i. Mineral Extraction Phase

Direct impact results from disturbances that cause changes in temperature, light, moisture and nutrient levels; removal activities (e.g. clear-cutting, bulldozing); impacts resulting from air and water pollution (e.g. turbidity, eutrophication). Indirect impacts result from changes in natural community processes or invasion (or subsequent re-introduction) of non-native plant species. Loss of plant communities also results in decreased water quality, increased erosion because of unstable soil, nutrient imbalances in the soil, and/or compaction of soil. However, this facility already had disturbed vegetation cover owing to the introduced forest, enhanced by human influence.

In order to minimize the environmental impacts, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation. It is important to note that vegetation clearance in protected areas will be done through acquisition of the necessary permits and supervised by the relevant authorities (also refer to section 7.2.1.).

7.3 Impacts on Health and Safety

The health and safety impacts of the proposed project are detailed briefly in the following sections.

7.3.1 Noise

i. Setting up, Transportation and operation phase

There will be noise and vibrations generated during the setting up, operation of the plant and associated Transportation phase. The noise impact during setting up is expected to be negative and short-term during hauling in of equipment and machinery. The major receptors are expected to be the workers as well as any immediate neighboring residential premises as well as those along the transport corridor. Sources of noise will be trucks and the off-road vehicles in transit, use of compressor/Excavator to break hard ground, the use of motorized chain saws for vegetation clearing and heavy equipment from the plant.

The noise from the project vehicles is only significant in areas where the setting up of site will be taking place and trucks passing through dense settlements, for example, close to the towns' neighborhoods, institutions and schools. The noise from compressors/excavator will only be

significant where hard ground breaking is carried out. Noise from the motorized chain saws will only be experienced in the wooded areas but it will not be a significant impact since the density of settlements is not very high. Operation of the clinker processing facility may be a nuisance to a neighbouring facility (Kwale eye Clinic), but this will be controllable depending on initiated mitigation measures. Impacts of noise include noise-induced hearing loss for the project employees and nuisance for the affected settlements.

The audio disturbances can be controlled by application in accordance to agreed parameters such as time and duration with the community as well as measuring by decibel meters in accordance to the provisions of Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

ii. Mineral Extraction and Transportation phase

Sources of noise during extraction of limestone and transportation will be from crushing, and vehicular engines. Crushing would be continuous for about 8 hours per day Monday to Saturday. Large trucks would move to and from the site anytime during daylight hours. This would normally be limited to 12 hours per day and would be intermittent. Sources of noise at the site would include noisy equipment such as the crusher, heavy mining equipment and compressors.

iii. Operation of Clinker facility

Sources of noise at the Clinker plant will include heavy equipment at the production lines, heavy vehicles hauling raw materials and compressors.

iv. Site Decommissioning

The decommissioning works will most likely be a noisy operation due to the moving machines, communication of workers and outgoing vehicles transporting project materials and workers to and out of the proposed site. However, it will also be a source of disturbance in populated areas. The immediate surrounding will experience an increase in human traffic and noise during ground preparation. In the decommissioning site, noise is likely to be produced by the decommissioning machinery. To prevent this, machine operators and workers who will be in close proximity to the machinery will be required to wear protective gears such as earmuffs. The prevalence of acute noise damages occurs when the ear is exposed to a single or relatively few exposures of sound at threshold levels of 100-120 dB and these damages to the ear can be either temporary or permanent. However, during the decommissioning phase measures will be put in place to ensure the exposure level is within the permissible limits.

7.3.2 Possible exposure of workers to diseases

i. Mineral Extraction, Operation of the Clinker plant and Site Decommissioning phase

During the extraction and decommissioning phase, workers are likely to be exposed to diseases enhanced by inherent project materials and geographic location attributes. It is therefore recommended that before the Mine Operation commences, there is need for the materials to be well inspected according to the occupational health and safety standards. Other concerns will include incidences of vector borne and water borne disease. When solid wastes are not well

managed there is potential of disease outbreak due to suitable breeding conditions for vectors of cholera and typhoid. If the wastes find their way to a water body its quality may be lowered. Malaria outbreak could also be exacerbated by the presence of open water ditches particularly those enhanced by the project activities for breeding of anopheles mosquitoes. The most vulnerable groups are children who could be exposed to these conditions. Long exposure to suspended particulates may also result upper and lower respiratory disease incidences.

7.3.3 Physical Hazards

i. Setting up, Mineral Extraction and Site Decommissioning phase

Exposure Hazards: The main aspects to be considered in site preparation activities include manual clearing of bushes (using slashers and machetes) for access to proposed site, use of dozers and graders to clear the road and mine sites, and breaking of hard ground using compressors and heavy earth movers and other machinery, as well as driving. Physical hazards are also inherent during construction of the production plant (heights, design of facility, access ramps, lighting, etc) and will require Occupational Safety and Health interventions to mitigate.

During the manual clearing of vegetation using slashers and machetes, excessive or prolonged use leads to 'white hand syndrome' which affects the palms of the worker to an extent that they are unable to engage in further physical tasks involving the hands. Prolonged manual handling activities and overexertion will lead to ergonomic issues relating to pains in the lower back and in the joints (of legs and hands/arms). Potential injuries may result from slips and falls from material left on walk ways in the project site. Such falls will cause fractures that could lead to loss of ability to use limbs normally and in extreme cases fatalities. The use of vibrating equipment, will subject the project employees to Whole-body vibrations that may impair functions of the chest, abdominal organs, and musculoskeletal systems, contribute to fatigue and decrease concentration. Prolonged exposure to noisy environment may result to health conditions, to worse extents, permanent physical impacts.

Accidental Hazards: Potential accidents around mines may include caught between moving parts, crushed under heavy loads during lifting, Vehicle accidents affecting the operator and passengers. Site precautionary measures need to be established and put into self-controlled practical action with adequate monitoring interventions. At the factory level may include fall from heights, caught between moving parts, burns, etc.

Community Safety: Around community areas, health hazards include exposure to vehicular noise particularly where frequent in populated areas, accidents on roads on account of careless driving, fly rocks during ripping and rock breaking using hammers etc. Impacts on community from pooling grounds as discussed above and pollution of community water sources particularly dams and poorly discarded waste which may attract deadly scavengers such as wild dogs into the area are considered safety hazards. Child labor may expose safety breaches if proper measures are not taken.

7.4 Socio-Cultural and Economic Impacts

7.4.1 Spread of Disease

i. Mineral Extraction Phase, Clinker Plant Operation Phase

During the Mineral Extraction and operation of clinker facility phase of the project, Mining personnel brought in from outside the community may be infected with HIV/AIDS and other sexually transmitted diseases, and could introduce these diseases to the community members they interact with. Communicable diseases (skin diseases, airborne diseases, diseases spread by agents such as insects and pathogens) within the work areas exposed to community members interacted with are also not spared as hazards.

7.4.2 Alteration of Settlement

i. Mineral Extraction and Clinker Plant Operation Phase

Pressure from Induced Settlement: During Mineral Extraction and Clinker plant operation Phase, there will be some direct employment opportunities for both skilled and unskilled labour. Furthermore, indirect employment opportunities are bound to arise from the provision of services to the mining teams. The community may move to settle within centers near the facility increasing population pressures and certain service demands, hence increasing the pressure into micro economy of the location, including needs for service provision.

7.4.3 Employment creation

i. Setting Up and Mineral Extraction and Clinker Plant Operation Phase

Employment opportunities are one of the long-term major impacts of the setting up and mineral extraction and Clinker Plant Operation Phase of the project that will be realized during setting up, mineral extraction and maintenance of the project components. These will involve security personnel, operators, drivers, waste management staff and creation of businesses that will be located within the project sites. The job opportunities will also include management level jobs.

7.4.4 Increased Revenue

i. Mineral Extraction and Clinker Plant Operation Phase

There will be positive gain from the revenue obtained through sale of cement to consumers and this adds revenue base for the Company and the Government (GOK) at national and local levels.

8. MITIGATION OF THE PROPOSED IMPACTS

This chapter focuses on measures that can be incorporated into the design, and taken during the improvement works and operation stages of the project in order to mitigate the negative environmental impacts and enhance the positive ones highlighted in chapter 7.

8.1 MITIGATION MEASURES: BIOPHYSICAL ENVIRONMENT

8.1.1 Terrestrial Habitat Alteration

This is in consideration that the private facility which covers about 1,500 acres has transformed into the general environment to accommodate local biodiversity such as rodents, some reptiles, avian fauna and other occasional animals. The environment also contains some biodiversity species which are native to the natural environment. In addition, the target area relates with other habitat which are not necessarily within the premise. I.e., marine habitat and other environmental areas which may be connected by virtue of shifting fauna species.

i. Project Setting up Phase

- Use human labour as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion.
- Give the community priority on use of the removed vegetation for construction or any other purpose.
- Undertake selective (or periodic-limited) clearance by clearing demarcated areas for Mine Operation, Offices and for Extraction of Limestone Mineral.
- The demarcated section for limestone mining should be exhausted before opening a new section, and should also be rehabilitated as the newly demarcated section is extracted.
- Create buffer zone with vegetation.

ii. Mineral Extraction, Clinker plant Operation and Maintenance Phase

- Implementation of an integrated vegetation management approach. The selective removal of tall growing tree species and the encouragement of low-growing grasses and shrubs is the common approach to vegetation management in site;
- Vegetation management should not eradicate all vegetation; excessive vegetation maintenance may remove unnecessary amounts of vegetation resulting in the continual replacement of successional species and an increased likelihood of the establishment of invasive species.
- Monitor associated development.

8.1.2 Alteration of Aquatic Habitat

i. Setting Up, Operation of Clinker Plant and mineral Extraction

- Establish a monitoring formulae for marine performance with an objective of scoping for community feedback, visual indications of coastal forest health and water quality, clinker

Plant and mines storm water flow characteristics, vibration levels and develop response measures for associated negative impacts

ii. Decommissioning phase

- Develop a separate ESIA for the project decommissioning or change of use accordingly. Emphasis should be on identification of foot prints, mitigating and restoration of the environment to better than was met before purchase of the facility.

8.1.3 Wildlife Species

i. Through out the project Cycle

- Conduct internal studies of the ecology and biodiversity of target areas with an objective of establishing species statistics and their conservation status.
- Avoid unnecessary harming of fauna species. Relocate where necessary and if harmful, liaise with the Kenya Wildlife Service (KWS) for assistance.

8.1.4 Soil

i. Transportation, Setting up Clinker and Mine Equipment and Mineral Extraction Phase

- Soils excavated from the project area should be used for re-filling and should not be left exposed to wind or water for long periods. Stabilization may be done using rapid grasses.
- The contractor should avoid steep terrain during the transportation of material by using alternative routes or use light vehicles where appropriate.
- Vegetation should be minimally disturbed during the Mining phase to reduce soil erosion.
- Re-plant degraded areas with local species common in the area to complement natural vegetation regeneration to improve ground cover.
- The project should monitor for potential fugitive mechanical or hydrology aided migration as a result of operation of the project or maintenance of roads.

ii. Project Decommissioning

During the decommissioning phase, the contractor is expected to loosen the soil along the project site for the purpose of accessing limestone which may lead to soil erosion. Similarly, the road to transport decommissioning materials from the proposed project sites. The exposed soil will be prone to wind and water erosion during the decommissioning phase. The soil problems may be exacerbated by topography of some areas, especially across riverine and dry river-beds, mainly during the wet season. This phase will require a separate ESIA process.

8.1.5 Air Pollution

i. Transportation, Setting up and mineral Extraction Phase

- Transport vessels should be well maintained to minimize exhaust fume emissions. Old malfunctioning vehicles should be prohibited from BCL business
- Transporting of minerals in tippers should be under tarpaulin covers to eliminate wind-blown fugitive dust from the load
- Speed limits for vehicles should be observed

- Wetting of work areas and selected road sections should be a responsibility of BCL and the contractor associated with the transportation of the material
- ii. Operation of the Clinker Plant Facility**
- Stack emission should be limited as per the requisite industrial standards and limits provided in the air Quality regulations 2014, and international standards where applicable. Good industrial practice should be considered in the design
 - BCL should develop a periodic monitoring program to scope for pollution impact feedback from the community and from scientific measurements. Necessary adjustments should be carried out to mitigate negative impacts
- iii. Decommissioning phase**
- i. Impacts realized during decommissioning will likely be similar to those noted during setting up and operation activities, and these will be covered in a similar ESIA reporting.

8.1.6 Water Quality

- i. Setting up, operation of Clinker facility, Mineral Extraction and Decommissioning Phase**
- Location of the mines should be at a safe distance from Community Water-point Facilities and should bear adequate barriers to prevent hydraulic migration.
 - The depth of the mines should be controlled as per the hydrological report limits provided in this report.
 - Construction of a borehole on or near the facility should be subjected to a separate Environmental Impact Assessment (EIA) report with an additional objective of clarifying measures in place to prevent contamination of the fresh ground water aquifer located below saline waters.
 - Stock piling of mining equipment and spares for unnecessarily long periods and unprotected from weather should be avoided.
 - Water points near the proposed facilities should be monitored periodically and whenever necessary.

8.1.7 Hazardous Substances

- i. Setting up, operation of Clinker facility, Mineral Extraction and Decommissioning Phase**
- Any substance declared as hazardous on site must be handled as per its accompanying Material Safety Data Sheet (MSDS) which should be familiar to each and every user
 - Remedial equipment for potential spillages must be stored on site and at all times, a user familiar with relevant remedial measures should be in place
 - Inspect and audit the facility on use and safety as well as functionality of all emergency equipment particularly those associated with relevant hazardous materials in place
 - Use of designated areas for repair and maintenance of vehicles (e.g. local licensed garages) and powered machinery to avoid fuel and lubricant spills at the site.
 - Segregating waste and assigning appropriately licensed waste handlers.

- During decommissioning, a site audit should emphasize on identifying related footprints and conducting remedial measures.

8.1.8 Solid Waste

i. Setting up, Clinker Plant Operation, Mineral Extraction and Transportation Phase

- The project engineer should ensure that the contractor disposes any remaining solid wastes such as metals, paper, plastics, etc. away from the site to an approved disposal site.
- Segregation of waste must be practiced.
- Employ a NEMA certified waste handler to collect the waste.

8.1.9 Fire Risk

i. Setting up, Clinker Plant Operation, Mineral Extraction and Transportation Phase

- Carry out routine thinning, slashing, and other maintenance activities, within and adjacent to Rights-of-way in order to minimize the risk of fire.
- Install appropriate classes of fire extinguishers at strategic positions of the facility, as well as fire detection system at key points of the facility.
- Each assigned heavy vehicle to have at least 5kgs of fire extinguisher.
- A trained fire marshal to be employed on site at all times.

8.2 MITIGATION MEASURES: HEALTH AND SAFETY

8.2.1 Noise

i. Setting up, Clinker Plant Operation, Mineral Extraction and Transportation Phase

- Noise reduction technologies - silencers/mufflers and provision of hearing protection devices for workers using equipment such as power saws (for vegetation clearing) and compressors.
- Implement an excessive Noise management programme to worker who are exposed to Noise.
- Install contemporary equipment that will assure noise reduction as per manufactures lowest declared limits.
- Carry out periodic medical examination to worker exposed to Noise.
- Monitor and record noise performance to establish operation norms and mitigate outlier situations, as the Noise regulation Parameters are being observed.

8.2.2 Slips and Falls

i. Setting up, Clinker Plant Operation, Mineral Extraction and Transportation Phase

- Testing structures for integrity prior to undertaking work;
- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures;

- Inspection, maintenance, and replacement of fall protection equipment;
- Hazard identification in the project site to avoid slips and trip hazards.
- Avoid working alone where hazards are potential or high.
- Open quarry facilities should be restricted and covered as soon as they are done with
- Carry out pre-task briefs to discuss on work-day hazards before occupying the workplace.

8.2.3 Physical Hazards

i. Setting up, Clinker Plant Operation, Mineral Extraction and Transportation Phase

- Appropriate hand and foot protection (PPE) during clearing of vegetation.
- Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa while maintaining a balance with productivity.
- Training of workers on how to identify and report on dangerous vibrations of the equipment.
- Accident sites should be immediately attended to, secured and associated incident investigations must accompany the same with an objective of learning the causation and prevention of repeat. (enforcement of Incident Investigation Procedures)
- Regular audits and Community involvement should be triggered with an objective of fostering safety and health signals, learning form the same and mitigating community based safety and health concerns emanating from the mining, mineral transportation and Clinker plant installation and operation.

8.3 MITIGATION MEASURES: SOCIO-CULTURAL

8.3.1 Visual Impact from dust storms

i. Setting up and Mineral Extraction Phase

- To mitigate the visual impact of projects, the following mitigation measures should be implemented:
- Extensive public consultation during the planning of project;
- Erecting tarpaulin buffers, re-vegetation, wetting the ground, avoiding high wind area and during dry period, limiting high-speed of vehicles,
- The facilities should be within closed fences where necessary

ii. Visual impacts from the Plant facility - Operation of clinker plant

- The design of the plant itself should be appealing to the eye
- Pollution control measures from fugitive dust and stack emissions should be developed
- Extrusive Lighting from the facility should be well beamed to avoid intrusions of neighbouring facilities or points of interest

iii. Decommissioning phase of the Clinker Plant and Mined grounds

- The open mines should be rehabilitated to statuses declared equal or better than when occupied by the developer.

8.3.2 Spread of Disease

i. Mineral Extraction and Clinker operation Phase

- All communicable diseases should be acknowledged and control measures put in place.
- Rules should be put in place to highlight means through which diseases can be triggered by virtue of setting up the mines and preventive measures communicated to avoid such.
- Provide counseling and testing for HIV/AIDS to incoming exploration personnel.
- Strengthen advocacy through awareness training in HIV/AIDS and other STDs; encourage the use of preventive measures like condoms.
- Avail condom dispensers to staff.

8.3.3 Alteration of Settlement

i. Setting up, Clinker Plant Operation and Mineral Extraction Phase

Induced settlement Pressures:

- Settlements must be well observed and planned to avoid emerging shanty structures on the roadside.
- Logistic approaches should be applied to respond to informal settlements triggered by the presence of the industry in order to safeguard the aesthetics of the surrounding environment.

9. ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of siting of the project, route options, and handling of an existing tenant (Miyanji dairy Farm limited).

9.1 Land Use Options

During the public consultative meeting the community was given a chance to air their view on their preferred options regarding if the project should go on or not and if it should go on, then what are the preferred options regarding various project aspects. A mixed reaction was realized as demonstrated in chapter 6 of these report. We analyzed these options with technical applications which led the developer to see potential for this particular location and not any other. The considered options, public opinion and remarks made are as presented below:

Table 33: Regarding Land Use Options

	Alternatives	Public Opinion	Remarks
1	No Project Option	From the HH survey, 9% of the general respondents opposed the project. However, on a follow-up question prompting the respondents to elaborate their individual thoughts on the project, most (58%) sited air pollution leading to compromised health (22%), and noise generation from transportation and operation of the facility. Almost 7% feared being sidelined through tribalism and corruption. Others sited displacement	Sub-Section 9.1.1 elaborates this option. It was our view that the highlighted issues can be mitigated to elimination or reduction of intensity. 15% of the community said that they should be involved in the project development process in order to address the issues raised through involvement
2	Implement at a different location	Existence of Limestone Mineral is site specific. Besides this point, the land which contains adequate amounts of the mineral already belongs to BCL, thus is private land. With adequate implementation of suggested mitigation measures, the risks will be manageable.	This was found uneconomically favourable to the proposed project considering several aspects described under sub-section 9.1.2 below
3	Project to be Implemented at the propose site as planned	This means that the developer occupies the land and implements the project as proposed.	All matters at hand will need to be settled amicably, all statutory laws considered and all stakeholders involved (see section 9.3 below)

9.1.1 No Project Option

The *No Project option* in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental conservation perspective as it ensures non-interference with the existing conditions. This option will however, involve several losses both to the proponent, government and the society as a

whole. The *No Project Option* is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- There will be no added values to the reference plot.
- There will be no added value to other establishments in the neighbourhood.
- The proponent will not benefit from the revenue expected from the facility.
- The government kitty will not benefit from the revenue to be earned due to the establishment of the proposed project.
- The economic status of the Kenyans and the local people would remain unchanged.
- The local skills would remain under-utilized.
- Reduced interaction both at local, national and international levels.
- No employment opportunities will be created for thousands of Kenyans who will work in the project.
- Increased urban and rural poverty and crime in Kenya.
- Discouragement for investors to produce this level of affordable facility to the public.
- Development of infrastructural facilities (roads, electrical etc. will not be undertaken).

From the analysis above, it becomes apparent that the No Project Option is no alternative to the proponent, local people, Kenyans, and the government of Kenya.

9.1.2 Limestone Mining and Operation of Clinker plant at a different location

Bamburi Cement Limited already owns the land which covers about 1,500 acres. Relocation option to a different site will be a wasteful option considering that resource studies have already been done, minor infrastructure already set up and planning for the mineral extraction and plant development has already been done. Further, the alternative site will not be spared from the associated inherent risks that would be the reason for suggesting a relocation. In addition, the available limestone mineral at the site would go to waste when the county is considering optimization of mineral resource use in the area.

9.2 Transportation (Routing)

The project area can be accessed through several roads which consist a mix of seasonal, compacted earth and tarmac roads. The transport corridor is divided in two sections. One section covers transportation between Matuga centre and the Shale mining area and the other covers transportation between Matuga and the Bamburi cement Denyenye site where the Clinker processing plant will be constructed. The rationale is to separate the roads according to the two separate ESIA projects (Shale mining at Matuga /Kundutsi and Limestone at Ng'ombeni) as illustrated below:

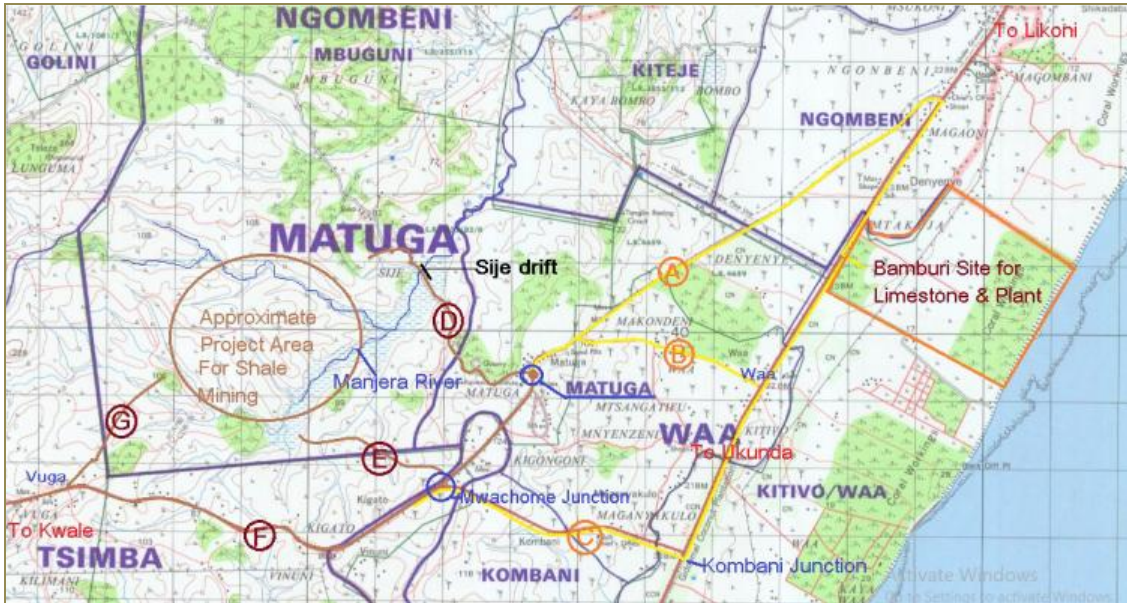


Figure 41: Alternatives to Transport Corridor options.

The brown roads (D, E, F and G) will be covered within the Shale mineral mining area at Matuga and Kundutsi Sub-Locations ESIA report, while the yellow roads (A, B and C) are covered in this current report on mining of Ng’ombeni Limestone and Clinker plant as indicated on the map above. The following factors characterize the transport corridors:

- All route options pass through relatively busy centres and community areas.
- Majority of the routes are characterized with overloaded motorbikes which over-speed.
- There are power lines on some routes which are very close to the road.
- Some community household structures are right next to the roads.
- Heavily meandering corners and high gradients through seasonal and permanent river valleys, some dilapidated, breaking roads and long overhead (hanging tree branches) characterize the area.

Table 34: Suggested routing options

Route Option	Considerations
Option 1	● The first option is the Ng'ombeni- Matuga-GTI junction- through Ganze –Mtsarani into the Quarry site about 20 Kilometers to the quarry site, accessing it from the North East. It will require road upgrading, and a 200m bridge when crossing river Mwachome.
Option 2	● The second option is Ng'ombeni-Waa- Matuga-GTI junction- through Ganze-Mtsarani into the Quarry site about 15 Kilometers to the site accessing it from the North East.
Option 3	● The third option is Ng'ombeni-Waa- Matuga—Vuga-Mtsarani- into the Quarry site about 18km Kilometers to the site accessing it from the South.

Option 4	<ul style="list-style-type: none"> ● The fourth option is Ng'ombeni-Waa-Kombani-Vuga-Mtsarani- into the Quarry site about 18.5km Kilometers to the site accessing it from the South, which is tarmacked all the way to Vuga before turning right on a marrum road which is about 3 kilometers from Vuga junction- Mtsarani) into the project area accessing it from the Southern extent. The 3km road is having 12 meanders, 4 andulating hills before running on a ridge to the project site. It will require approximately 5 mini-bridges or weirs of 10-30m length to allow water flow during heavy rains.
Option 5	<ul style="list-style-type: none"> ● The fifth option is Ng'ombeni-Waa- Matuga-Kigato-Mwauchi-Mwachome via the valley into the Quarry site about 12km Kilometers to the site accessing it from the West.This will mean a new road to be done through Kigato area to Mwauchi-Mwachome, for approximately 3Km. This will be subject to company resources as well as need to erect 2-3 bridges crossing river Mwachome.
Option 6	<ul style="list-style-type: none"> ● The sixth option is Ng'ombeni-Waa- Kombani-Mwachome via the valley into the Quarry site about 13km Kilometers to the site accessing it from the West.This will follow mainly along the exisiting tarmac, then off onto a murrum road 2-3Km onto valley of Mwachome river overlooking the site. This will be subject to company resources as well as need to erect 1 major bridge crossing river Mwachome to the tip if the quarry area

With the above alternatives, the proponent has a freedom of deliberating on the most appropriate choice, but with considerations on the highlighted factors from this report as a base to establish his rationale. The sixth option is our recommendation for the client. However a roads engineer and project manager needs to visit the site and make informed opinion and options for the company to assess and make choices based on the resources (CAPEx) available for the project.

9.3 The following are the suggested routing options covered in this report:

Handling of Mianju Dairy Farm as a tenant

The two options in consideration and yet to be discussed in detail are;

- i. Co-existence with the project facility and operations, and
- ii. Relocation to new site within Bamburi
- iii. Closing the contract to permit he proponent to search for another farm to practice the dairy farming.

These options are still under consideration and discussions with the proponent are underway

9.4 The Proposed Development Option

Under the Proposed Development Option, the developer of the proposed project would be issued with an EIA License. In issuing the license, NEMA would approve the proponent's proposed development of the Project, provided all environmental measures are complied with during the project area occupation, setting up, Mineral extraction, Clinker plant facility and site handling, transportation and Decommissioning phases. This alternative consists of the applicant's final proposal with the inclusion of the NEMA regulations and procedures as stipulated in the environmental impacts to the maximum extent practicable.

10. ENVIRONMENTAL SOCIAL MANAGEMENT PLAN AND MONITORING

10.1 Environmental and social management

Following the desk studies, field investigations and public consultations undertaken in this study, an Environmental and Social Management Plan (ESMP) has subsequently been developed. The ESMP provides a general outlay of the environmental and social aspects, potential impacts, mitigation measures, performance indicators, monitoring means and frequency, responsibility for monitoring and associated [estimate] costs.

The responsibility for the incorporation of mitigation measures for the project implementation lies with the Environment, Health and Safety department, who must ensure that the Contractor implements all specified mitigation measures. In order for the Contractor to carry out environmental management activities during exploration, the proponent should draw up an environmental management plan of his own to show how he will address the mitigation measures during the exploration period. The Health safety and environment department is responsible for assessing the Contractor's environmental management plan.

10.2 Monitoring Environmental and Social Performance

Monitoring is a long-term process, which should begin the start of exploration of the project and should continue throughout the life of the project (Exploration, Mining, Clinker Plant operation and decommissioning). Its purpose is to establish benchmarks so that the nature and magnitude of anticipated environmental and social impacts can be continually assessed. Monitoring involves the continuous or periodic review of exploration, operation and maintenance activities to determine the effectiveness of recommended mitigation measures. Consequently, trends in environmental degradation or improvement can be established, and previously unforeseen impacts can be identified or preempted.

Simple monitoring systems should be set up during the entire project cycle by the Health safety and environment department and more during operation by the Proponent, so that potentially environmentally problematic areas can be detected well in advance and the appropriate remedial action taken. This could simply be a checklist of items that need to be inspected as a matter of routine, or periodically, depending on the nature of the aspect. The types of parameters that can be monitored may include mitigation measures or Extraction, clinker facility and camp operation processes, driving, health performance or development of actual impacts. In some cases, monitoring is fairly straightforward and can be done as part of routine or periodic maintenance. However, other parameters, particularly those related to socio-economic and ecological issues can only be effectively assessed over a more prolonged period of say 3 to 5 years.

The tables below overleaf summarize the Environmental and Social Management Plan (ESMP) for the proposed project. It describes parameters that can be monitored, and suggests how

monitoring should be done, how frequently, and who should be responsible for monitoring and action.

10.3 Mineral Extraction, Plant Operation & Transportation & decommissioning Phase

The necessary objectives, activities, mitigation measures and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and optimization of positive impacts associated with the project equipment installation and operational phases. Major risks and mitigation include:

1. Risk of breaking quarry cliffs and banks where deep excavations exist. Such elevations should be secured and not kept open for long after extraction.
2. Stray wildlife such as elephants which infrequently may breach boundaries to roam the area. Any incident should be reported in good time. The proponent should liaise with the Kenya Wildlife Service to manage unusual occasions.
3. The existing high-power transmission line which traverses the project area. This requires an adequate way-leave and could affect a significant portion of the target area and is suggested for relocation into Calcium Quarry side along Magandia road. Exploitation of such areas or vicinities should be with consultation with KETRACO or KPLC who manage the power lines and affected corridors.
4. Storm water discharge points as it flows into the nearest channel connecting the ocean. The discharge point may experience heavy siltation depending on mining and quarry management, integrated with season. There should be periodic monitoring of water ways through the operation phase. Monitoring should be done with coordination of the Kenya Maritime Authority at the ocean, Water Resources Authority at the riverine areas and NEMA.
5. Junctions linking the highway to the interior where the resources are found. These junctions are hazards to fast moving vehicles plying the area. There should be clear vision of both sides of the highway when driving out of the access roads. Signage should be well placed. The County government should coordinate with the contractor to manage road safety at major junctions and interior sections of the project area.
6. Operation of the Clinker Plant facility with the associated inherent risks related to air pollution, noise emission and Safety and health related issues
7. Wind storms from fast blowing winds. Erect buffers in form of tarpaulin or tree planting, wetting the ground and reduced speed of Lorries.

The table below has provided a more detailed outline of proposed mitigation measures.

Table 35 : Environmental management plan for the Mine and Clinker facility Setup Phase

Potential Impact	Proposed Mitigation	Monitoring Means and frequency	Responsibility for Monitoring	Performance Indicator	Cost (Ksh)
Terrestrial Habitat Alteration	<ul style="list-style-type: none"> • Ecological & biodiversity studies of target areas with an objective of establishing statistics. • Use human labour as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion. • Undertake selective (or periodic-limited) clearance by clearing demarcated areas for Mine Operation, Offices and for Extraction of Limestone Mineral. • The demarcated section for limestone mining should be exhausted before opening a new section, and should also be rehabilitated as the newly demarcated section is extracted. • Create buffer zone with vegetation. 	<p>Continuous</p> <p>Routine inspection</p>	Supervising Engineer and Contractor	<p>Re-vegetation of disturbed areas</p> <p>Fauna Specie Counts</p>	<p>Re vegetation approx. 1000 per sq m.</p> <p>2,550,000</p>
Aquatic habitat alteration	<ul style="list-style-type: none"> • Minimizing clearing and disruption to riparian vegetation. 	Inspection, routine	Design Engineer and Contractor	<p>-Siltation of soil in rivers from exploration activities.</p> <p>-Physical water Quality</p> <p>-Reports from the community</p>	<p>Routine Inspection</p> <p>Internal cost</p>
Interference with Wildlife	<ul style="list-style-type: none"> • Conduct internal studies of the ecology and biodiversity of target areas with an 	On commencement	Safety health and Environment officer	Species statistics	Contract a local based expert for

Potential Impact	Proposed Mitigation	Monitoring Means and frequency	Responsibility for Monitoring	Performance Indicator	Cost (Ksh)
	<p>objective of establishing species statistics and their conservation status.</p> <ul style="list-style-type: none"> • Avoid unnecessary harming of fauna species. Relocate where necessary and if harmful, liaise with the Kenya Wildlife Service (KWS) for assistance. • 				the study 100,000
Soil erosion	<ul style="list-style-type: none"> • Soils excavated from the project area should be used for re-filling and should not be left exposed to wind or water for long periods. Stabilization may be done using rapid grasses. • The contractor should avoid steep terrain during the transportation of material by using alternative routes or use light vehicles where appropriate. • Vegetation should be minimally disturbed during the Mining phase to reduce soil erosion. • Re-plant degraded areas with local species common in the area to complement natural vegetation regeneration to improve ground cover. • The project should monitor for potential fugitive mechanical or hydrology aided migration as a result of operation of the project or maintenance of roads • 	<p>Inspection Routine Maintenance</p> <p>Monitoring Interventions</p>	<p>Contractor Supervising Engineer</p> <p>Project Environmentalist</p>	<p>Status of ground cover in constructed Areas</p> <p>Turbidity in Water Bodies</p>	<p>Re-vegetation approx. 1000/- per sq m.</p> <p>30,000 Weekly</p>
Noise Emissions	<ul style="list-style-type: none"> • Noise reduction technologies - silencers/mufflers and provision of hearing protection devices for workers using equipment such as power saws (for 	Frequent Noise level studies	EHS Manager	<p>Complaints from the public</p> <p>Indications of noise</p>	250,000

Potential Impact	Proposed Mitigation	Monitoring Means and frequency	Responsibility for Monitoring	Performance Indicator	Cost (Ksh)
	<p>vegetation clearing) and compressors.</p> <ul style="list-style-type: none"> • Implement an excessive Noise management programme to worker who are exposed to Noise. • Install contemporary equipment that will assure noise reduction as per manufactures lowest declared limits. • Carry out periodic medical examination to worker exposed to Noise. • Monitor and record noise performance to establish operation norms and mitigate outlier situations, as the Noise regulation Parameters are being observed. • 			and vibration performance levels	
Air Pollution (dust, fuel emissions)	<ul style="list-style-type: none"> • Transport vessels should be well maintained to minimize exhaust fume emissions. Old malfunctioning vehicles should be prohibited from BCL business • Transporting of minerals in tippers should be under tarpaulin covers to eliminate wind -blown fugitive dust from the load • Speed limits for vehicles should be observed • Wetting of work areas and selected road sections should be a responsibility of BCL and the contractor associated with the transportation of the material • Provision of dust masks for use when working in dusty conditions 	Daily inspection	Design Engineer, Supervising Engineer and Contractor	<p>visible particulate matter in the air Increase in upper respiratory tract ailments Number and status of PPE Vehicle service Tags</p> <p>Compliance statistics</p>	<p>Respiratory protection devices @ 600-200</p> <p>Vehicle service @ 30,000-100,000</p>
Water Pollution	<ul style="list-style-type: none"> • Location of the mines should be at a safe distance from Community Water-point 	Routine inspection, Maintenance records	Supervising Engineer and	Water quality	Routine inspection -

Potential Impact	Proposed Mitigation	Monitoring Means and frequency	Responsibility for Monitoring	Performance Indicator	Cost (Ksh)
	<p>Facilities and should bear adequate barriers to prevent hydraulic migration.</p> <ul style="list-style-type: none"> • The depth of the mines should be controlled as per the hydrological report limits provided in this report. • Construction of a borehole on or near the facility should be subjected to a separate Environmental Impact Assessment (EIA) report with an additional objective of clarifying measures in place to prevent contamination of the fresh ground water aquifer located below saline waters. • Stock piling of mining equipment and spares for unnecessarily long periods and unprotected from weather should be avoided. • Water points near the proposed facilities should be monitored periodically and whenever necessary. 		Contractor	Turbidity levels Ground water studies	Internal cost
Management of Solid waste	<ul style="list-style-type: none"> • A NEMA certified Contractor must dispose solid wastes away from the site to an approved disposal site. • The project engineer should ensure that the contractor disposes any remaining solid wastes such as metals, paper, plastics, etc. away from the site to an approved disposal site. • Segregation of waste must be practiced. 	<p>Solid waste management statistics</p> <p>Routine Maintenance</p>	Contractor, Supervising Engineer	<p>Nil visible solid waste heaps on Site</p> <p>Records of generated waste</p>	Routine maintenance - Internal cost
Management of Hazardous	<ul style="list-style-type: none"> • Any substance declared as hazardous on site must be handled as per its 	Routine Maintenance Monitoring of storage	Contractor, Supervising	Records of storage, use and disposal	Not estimated depends on

Potential Impact	Proposed Mitigation	Monitoring Means and frequency	Responsibility for Monitoring	Performance Indicator	Cost (Ksh)
substances	<p>accompanying Material Safety Data Sheet (MSDS) which should be familiar to each and every user</p> <ul style="list-style-type: none"> • Remedial equipment for potential spillages must be stored on site and at all times, a user familiar with relevant remedial measures should be in place • Inspect and audit the facility on use and safety as well as functionality of all emergency equipment particularly those associated with relevant hazardous materials in place • Use of designated areas for repair and maintenance of vehicles (e.g. local licensed garages) and powered machinery to avoid fuel and lubricant spills at the site. • Segregating waste and assigning appropriately licensed waste handlers. • During decommissioning, a site audit should emphasize on identifying related footprints and conducting remedial measures. 	and use of hazardous substances, and disposal,	Engineer		vehicle service and repair requirements
Physical Hazards	<ul style="list-style-type: none"> • Appropriate hand and foot protection (PPE) during clearing of vegetation. • Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa while maintaining a balance with productivity. • Training of workers on how to identify and report on dangerous vibrations of the 	<p>Implementation of a Safety and health management system and monitoring plan</p> <p>Daily, weekly, monthly, quarterly and annual reporting</p>	EHS manager	Environment, Safety and health performance	800,000

Potential Impact	Proposed Mitigation	Monitoring Means and frequency	Responsibility for Monitoring	Performance Indicator	Cost (Ksh)
	<p>equipment.</p> <ul style="list-style-type: none"> • Accident sites should be immediately attended to, secured and associated incident Investigations must accompany the same with an objective of learning the causation and prevention of repeat. (enforcement of Incident Investigation Procedures) • Regular audits and Community involvement should be triggered with an objective of fostering safety and health signals, learning from the same and mitigating community based safety and health concerns emanating from the mining, mineral transportation and Clinker plant installation and operation. 				
Risk of fire	<ul style="list-style-type: none"> • Carry out routine thinning, slashing, and other maintenance activities, within and adjacent to Rights-of-way in order to minimize the risk of fire. • Install appropriate classes of fire extinguishers at strategic positions of the facility • Each assigned heavy vehicle to have at least 5kgs of fire extinguisher • A trained fire marshal to be employed on site at all times • Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow firefighting access. 	Routine maintenance and periodic Inspections	Contractor, Supervising Engineer	<p>Monitoring Records</p> <p>Number of functioning fire extinguishers</p> <p>Presence of a fire marshal at all times</p>	Routine maintenance - Internal cost

Potential Impact	Proposed Mitigation	Monitoring Means and frequency	Responsibility for Monitoring	Performance Indicator	Cost (Ksh)
	<ul style="list-style-type: none"> Deploy use of PPEs 				
Spread of Diseases	<ul style="list-style-type: none"> All communicable diseases should be acknowledged and control measures put in place. Rules should be put in place to highlight means through which diseases can be triggered by virtue of setting up the mines and preventive measures communicated to avoid such. Provide counseling and testing for HIV/AIDS to incoming exploration personnel. Strengthen advocacy through awareness training in HIV/AIDS and other STDs; encourage the use of preventive measures like condoms. Avail condom dispensers to staff. COVID-19 regulations and compliance 	<p>Routine examination Records</p> <p>Sensitization frequency</p>	Contractor Supervising Engineer OHS Manager	<p>Medical Records</p> <p>Reports on sensitization</p>	<p>screening approx. 1000</p> <p>Education – approx. 2,000</p> <p>Use of Masks costing @10/-</p>
Visual impact	<ul style="list-style-type: none"> Extensive public consultation during the planning of project Tree planting and erection of buffers Limited speed of vehicles The design of the plant itself should be appealing to the eye Pollution control measures from fugitive dust and stack emissions should be developed Extrusive Lighting from the facility should be well beamed to avoid intrusions of neighbouring facilities or points of 	<p>Visual Indications, particulate measurements</p> <p>Feedback from associated stakeholders</p>	Environmental and Social Manager	<p>Complaints</p> <p>Outcomes of Public Consultation</p> <p>Visual dust levels</p>	Kshs.400,000

Potential Impact	Proposed Mitigation	Monitoring Means and frequency	Responsibility for Monitoring	Performance Indicator	Cost (Ksh)
	interest				
Alteration of Settlement	<ul style="list-style-type: none"> • Settlements must be well observed and planned to avoid emerging shanty structures on the roadside. • Logistic approaches should be applied to respond to informal settlements triggered by the presence of the industry in order to safeguard the aesthetics of the surrounding environment. 	Routine inspection, emergence of shanty structures	Environmental and Social Manager	<p>New Development of shanty structures around the facility</p> <p>Complaints from the public</p>	10,000

Table 36: Operations/Development Phase

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Monitoring Responsibility	Performance indicator	Cost (KSh)
Terrestrial habitat alteration	<ul style="list-style-type: none"> • Maintenance of ecological records • The selective removal of tall-growing tree species and the encouragement of low growing grasses and shrubs in project site. • Removal of alien invasive plant species, • Cultivating native plant species; • Avoiding clearing in riparian areas; • Vegetation management should not eradicate all vegetation • Protection of important wildlife 	<p>Quarterly internal audits</p> <p>Annual statutory auditing</p>	Environmental Manager	Vegetation cover	Audit cost approx. 500,000
Alteration of aquatic habitat	<ul style="list-style-type: none"> • Establish a monitoring formulae for marine performance with an objective of scoping for community feedback, visual indications of coastal forest health and water quality, clinker Plant and mines storm water flow characteristics, vibration levels and develop response measures for associated negative impacts 	<p>Effluent and coastline studies</p> <p>Reports from the community</p>	EHS Manger	<p>Contaminated silt accumulation on storm water drains</p> <p>Visual indications at the shoreline</p>	400,000
Wildlife Species	<ul style="list-style-type: none"> • Conduct internal studies of the ecology and biodiversity of target areas with an objective of establishing species statistics and their conservation status. • Avoid unnecessary harming of fauna species. Relocate where necessary and if harmful, liaise with the Kenya Wildlife Service (KWS) for assistance. 	<p>Reports from the field inspections</p> <p>Reports from the community</p> <p>Observations</p>	EHS Manager	<p>Wildlife development statistics</p> <p>Unusual reports from workers and the community</p>	200,000
Noise, Dust and Vibrations	<ul style="list-style-type: none"> • Use of correct PPEs such as ear muffs, dust coats, gloves, masks for the operators • Periodic Workers Medical examination 	Health and Safety Audits	Environmental Manager	Work Safety Health Records	Safety Audit cost approx. 450,000

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Monitoring Responsibility	Performance indicator	Cost (KSh)
	<ul style="list-style-type: none"> Avoid working in hanging areas with high potential for soil collapsing Public awareness Erection of security tapes 			Complaints from the workers and public -Noise and vibration measurements	
Air Pollution	<ul style="list-style-type: none"> Stack emission should be limited as per the requisite industrial standards and limits provided in the air Quality regulations 2014, and international standards where applicable. Good industrial practice should be considered in the design BCL should develop a periodic monitoring program to scope for pollution impact feedback from the community and from scientific measurements. Necessary adjustments should be carried out to mitigate negative impacts 	Air pollution studies (Internal and external)	EHS Manager	Particulate levels Complaints from the public	500,000
Soil Erosion	<ul style="list-style-type: none"> Back-filling of excavated soils Use of liners to cover the shale materials soils to avoid wind blowing away Ensure proper drainage around the working environment 	Environmental Audits	Environmental Manager	Soil Conservation	Audit cost approx. 450,000
Siltation on the road	<ul style="list-style-type: none"> Avoid spillages on the road during transportation of shale Cover with liner to avoid wind effect while in motion Establish mini weirs on trenches draining the mining sites and de-silt appropriately 	Road Maintenance Visual indicators De-silting Records	Site Engineer	Road Maintenance De-silted trenches	Internal road maintenance costs
Spread of COVID-19 Disease	<ul style="list-style-type: none"> Use of PPE, Sanitizers, Water and Soap all time as per MOH guidelines Avoid congestion Ensure all staff o visitors are tested against COVID or have undergone medical check 	COVID-19 Emergency Preparedness	Site Manager, SHE Officer	Records	Health Emergency Budget costs

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Monitoring Responsibility	Performance indicator	Cost (KSh)
	<ul style="list-style-type: none"> • Avoid Public gathering and adhered to social distancing 				
Groundwater levels interference in boreholes and water wells	<ul style="list-style-type: none"> • Avoid groundwater contamination • Back-filling on all excavations • The depth of the mines should be controlled as per the hydrological report limits provided in this report. • Construction of a borehole on or near the facility should be subjected to a separate Environmental Impact Assessment (EIA) report with an additional objective of clarifying measures in place to prevent contamination of the fresh ground water aquifer located below saline waters. • Stock piling of mining equipment and spares for unnecessarily long periods and unprotected from weather should be avoided. • Water points near the proposed facilities should be monitored periodically and whenever necessary. 	<p>Ground water level monitoring</p> <p>Yields of ground water</p> <p>Ground water quality analysis</p>	Site Manager	Ground water quality Records	Maintenance costs
Solid waste from vehicles and machines	<ul style="list-style-type: none"> • Proper waste management • Use of sanitary dust bins color coded • Proper storage and Waste Disposal 	Routine waste collection	Site Manager	Records	None
Risk of Fire	<ul style="list-style-type: none"> • Install appropriate classes of fire extinguishers at strategic positions of the facility • Each assigned heavy vehicle to have at least 5kgs of fire extinguisher • A trained fire marshal to be employed on site at all times 	Routine maintenance	Maintenance Engineer	Records	<p>Routine maintenance Internal cost</p> <p>Fire drills carried out</p>

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Monitoring Responsibility	Performance indicator	Cost (KSh)
	<ul style="list-style-type: none"> Controlled burning of vegetation, fire suppression equipment requirements, and typically must be monitored Appropriate hand and foot protection (PPE) during clearing of vegetation. 				
General Hazards	<ul style="list-style-type: none"> Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa while maintaining a balance with productivity. Training of workers on how to identify and report on identified hazards Accident sites should be immediately secured and associated incident Investigations must accompany the same with an objective of learning the causation and prevention of repeat. (enforcement of Incident Investigation Procedures) Regular audits and Community involvement should be triggered with an objective of fostering safety and health signals, learning from the same and mitigating community based safety and health concerns emanating from the project. 	Periodic EHS audits	EHS Manager	Environmental safety and health performance	100,000
Safeguarding special Equipment	<ul style="list-style-type: none"> Conduct separate EIA and Environmental Audits for each special facility installed to support the operating project system 	Conduct Internal and statutory audits	EHS Manager	EIA Licenses and EA certificates	300,000

Table 37: Decommissioning Phase

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Performance indicator	Cost (KSh)
Noise					
Vehicular	<ul style="list-style-type: none"> Control of speed 	Random checks	Health safety and Environment Department	Number of Public complaints	Nil
Compressor	<ul style="list-style-type: none"> Provision of hearing protection devices 	Regular inspection	Health safety and Environment Department	Number of Public complaints	Nil
Physical Hazards					
Physical Hazards	<ul style="list-style-type: none"> adopting ergonomic work flow designs that tend to fit the physical tasks to the workers and not vice-versa while maintaining a balance with expected productivity 	Regular inspection and redesign of work flow	Health safety and Environment Department	Number of ergonomic-related complaints	Nil
AIR POLLUTION					
Shale and Limestone Dust	Provide appropriate hand, respiratory and body protective devices Avoid working while winds are very low or blow low towards residential households	Periodic inventory of personal protective equipment	Health safety and Environment Department	Number and status of existing PPE	@600 – 200 each for hand, respiratory & body protection devices for each worker
Vehicular	Proper service of project vehicles	Service schedules e.g. every 5,000 km for off-road vehicles and every 3,000 km for truck	Health safety and Environment Department	Service tags	@ 5,000 and 10,000 for off-road vehicles and trucks respectively

SOIL CONTAMINATION					
Contamination and foot prints	Identify all contaminated spots such as material storage areas, oil spillages, foreign soils, etc and conduct appropriate remediation actions	Site inspections	Site engineer	Visual indications, growth and generations, reports from the public	80,000
GENERAL ACTION					
On Site Due diligence	New decommissioning phase ESIA to be conducted	Inspection Records of identified mitigation areas	Site Engineer and EHS manager	Availability of remediation measures Availability of restoration funds	500,000

10.4 Decommissioning Phase

The decommissioning phase also known as the “deconstruction,” is part of the (eventual/ultimate) reversal phase, which has the additional and often dominant risk factors associated with the materials processed/produced during the life of the project (e.g., toxic and/or explosive chemicals, etc), as well as the potentially decreased structural integrity due to renovations and/or wear and tear.

Similar impacts encountered during the mine set-up phase will be experienced in much the same way when the reverse process is set in motion. The table below gives an analysis of the decommissioning impacts expected in the proposed prospecting and Exploration project:

Table 38: Impact Analysis – Decommissioning Phase

Aspect	Health and Safety Impact	Significance Level
Noise	Reduced hearing due to high noise from decommissioning activities – deconstruction such as vehicular noise and site remediation noises	Low
Air Pollutants	Acute/chronic respiratory disease caused by CO ₂ , CO, NO _x , and VOCs released by combustion engines during transportation and by obnoxious respirable particles released by speeding trucks during transportation of debris	Low
	Acute/chronic respiratory disease caused by pollutants (cement, caustics, isocyanates – lung sensitizers) released during deconstruction of storage facilities and disassembly of superstructures	Low
Water Pollutants	Public health problems as a result of consuming heavy metal contaminated drinking well water from oils, greases, hydrocarbons deposited on roads sides and leached into drinking water wells by rain water	Low
	Public health problems due to decommissioning activities that pollute potential drinking water wells	Low
Traffic Accidents	Traffic related mortality and morbidity from transportation activities	Low
Physical Hazards	Injuries resulting from physical hazards such as slips, trips, and falls from a tall cabin, Injuries due to accidental bumping into unguarded rigid parts of truck or cargo; Injuries while performing field repair-work, tire change, unfastening tight bands and ropes, etc.)	Low
	Injuries resulting from physical hazards encountered by truck drivers such as chemical corrosion by dangerous chemicals such as transformer oil	Low
	Injuries resulting from physical hazards encountered by truck drivers such as explosion of over-inflated tires or car battery	Low
Ergonomic Hazards	Injuries due to poor ergonomic considerations such as pains in the low back and in the joints caused by prolonged driving; Over-exertion while moving or otherwise handling bulky and heavy loads/equipment; visual discomfort and eye problems caused by inadequate illumination and eyestrain; development of lumbago due to poor vehicle suspension/ uncomfortable seat, etc.	Low

10.5 Capacity building and training

The effective implementation of the Environmental Management Plan of the project will require capacity and awareness building. While the Proponent must ensure that capacity and awareness building, mitigation measures and monitoring concerns are implemented, actual training activities should be the responsibility of the health safety and environment department, who may have to commission external consultants to carry out the training component. This can be achieved by targeting specific groups for the necessary training.

Table 39: Target Groups

Target Group	Description
Group A	Plant Workers: These are those located under line production in the clinker Plant and may include process managers.
Group B	Mine Workers: This group consists of Engineers (Resident, Provincial, Project,) Contractors, Supervisors, Site Agents, Site Managers and the Environmental department. These are the top management staff concerned with the project exploration and maintenance.
Group C	Mine Workers: Foremen, headmen, skilled and unskilled laborers.
Group D	Maintenance team: For this group of people, working on the mine equipment as their core activity.
Group E	Project Affected People (PAP): area residents, farmers, people who have businesses that can potentially be affected by the mining activities, or they live close by the line route.

10.6 Training Objectives

Training will be based on modules aimed at:

- Developing awareness of the need to consider environmental issues during Mineral extraction, Processing and Transportation, operation and maintenance of the project.
- Creating awareness and understanding of the environmental legal framework pertaining to exploration, mining and plant operation activities.
- Developing skills for identification and assessment of environmental, social, safety and health impacts of project.
- Incorporation of mitigation measures at all stages of development.
- Reviewing ESIA and Audit reports and incorporating measures into decision making.

Arrangements for training in environmental and social awareness should be initiated as soon as operations commence. The Client will either have to commission a consultant to carry out this training on site, at the Head Office, or personnel could undertake the environmental training and then in turn he/she trains other personnel.

The table below presents the recommended topic modules and costs for each of the four target groups necessary to implement the Environmental Management Plan.

Table 40: Topic Modules and Costs

Topic modules	Target Group	Estimated Cost per person, per unit (KShs)
<ul style="list-style-type: none"> This group is key to the entire running of the project cycle and should be able to understand each and every aspect trained under groups B to E. Project management training with emphasis on the training modules below are desirable 	Group A	15,000
<ul style="list-style-type: none"> Understanding of legislation in Kenya, as relevant to the project Understanding of the project cycle and how the EIA/incorporation of mitigation measures fits into the cycle Develop awareness of the environmental implications of exploration and maintenance activities and procedures for assessing them Develop awareness and understanding of the human resource and institutional arrangements for pre-empting and managing environmental impacts Importance of incorporating mitigation measures during planning and design and implementing an environmental monitoring programme Impart skills on environmental monitoring and auditing during exploration and maintenance Need for gender balance during recruitment of laborer's Cultural aspects of target groups 	Group B Mine Workers	7,500
<ul style="list-style-type: none"> General understanding of legislation in Kenya as relevant to the project Sensitization on health (STDs including HIV/AIDS), littering, solid and liquid waste management Types of environmental, social, occupational safety and health impacts that could be generated by these target groups Cultural aspects of target groups 	Group C / D Technical Workers / Maintenance Team	5,500
<ul style="list-style-type: none"> Brief overview of the project cycle Understanding of EMCA 1999 and the EIA process Legal implications of encroachment onto the TL reserve Process for compensation and relocation/resettlement if necessary, (eligibility for compensation, compensation valuation and payment procedures; grievance redress mechanisms) 	Group E PAP	2,500

11. CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

11.1 Introduction

As a result of the ESIA scoping and assessment of field data, potentially significant environmental and social impacts have been identified. During the mineral resource extraction, transportation and clinker plant development and operation, all guidelines provided in the ESMP should be adhered to protect the environment and the people.

11.2 General mitigation and intervention measures

11.2.1 General Conclusions

- The proposed project is expected to have impacts on various aspects of the environment as well as the socio-cultural/economic status of the project affected parties. These anticipated impacts are discussed in Chapter 6.
- Mitigation of potential impacts (environmental and social) as described in Chapter 7 and 8, and implementation of the ESMP presented in Chapter 10 of this report, will help to prevent or avert negative impacts, and enhance the positive outcomes of the project. This will help to achieve project sustainability.
- Chapter 9 has discussed project alternative options and had included alternatives to transport routes which the contractor will have to assess and declare a project route
- The responsibility for the incorporation of mitigation measures for the project implementation lies with the Supervising Geological Engineer, who must ensure that the Contractor implements all specified mitigation measures.
- Community participation in planning and implementing resettlement will be encouraged;
- Diligence on the part of the contractor and proper supervision by the Supervising Engineer during the project implementation and decommissioning cycle and the initial operation period is crucial for mitigating impacts.
- **Note That: *Separate Environmental Impact Assessment reports for facilities such as bore holes, incinerators, Boilers and power converter stations (if any) should be carried out and submitted separately as per the relevant regulatory requirements of the project.*** Such facilities bear specific Environmental attributes which require individual licensing and auditing.

11.3 General Recommendations

Avoidance of negative environmental impacts should be the Proponent's priority. Impacts can be avoided completely by a "no-project" alternative, but it should be recognized that all existing mining activities elsewhere have impacts on their surrounding environment; these impacts can increase over time with economic growth and development, however their effect on the environment may be reduced by maintenance, rehabilitation, design and construction actions.

11.3.1 Mitigation

Mitigation is the lessening of negative environmental impacts through:

- Changes in the design, construction practices, maintenance, and operation of a project; and

- Additional actions taken to protect the biophysical and social environment, as well as individuals who have been impacted adversely by a project.

The extent and timing of mitigative actions should be based on the significance of the predicted impacts. Some aspects of impact mitigation can be incorporated into project design and can largely resolve the threat of impacts before construction commences.

However, many measures require an ongoing implementation plan to ensure that proposed actions are carried out at the correct times, that environmental measures such as planting vegetation and slope protection are maintained, and that prompt remedial actions are taken when the initial measures are not fully successful.

Some measures may not be the exclusive domain of the Proponent; Government departments, local authorities, neighbouring communities, businesses, non-governmental organizations, and the legal system may all be involved in their design and implementation of these mitigation measures. Clear definition of responsibilities, funding, and reporting requirements can help to ensure the success of such measures.

11.3.2 Compliance Monitoring

During construction, project operation and decommissioning, all mitigation measures designed to reduce the impact of the project activities should be monitored and enforced by the environmental monitoring authorities. This requires:

- Defining the proposed mitigation and compensatory measures;
- Specifying who is responsible for the monitoring activity;
- Including implementation of mitigation measures in contract specifications;
- Making environmental competence one of the selection criteria for contractors; and briefing, educating, and training contractors in environmental protection methods.

Compliance monitoring should not be confined to the right-of-way, but should cover all sites affected by the project, including disposal sites, materials treatment areas, access roads, and work camps.

11.3.3 Effects Monitoring (Evaluation)

After mitigation measures are implemented, effects monitoring or evaluation can test the validity of hypotheses formulated in the environmental impact study; they can also determine if the mitigation measures have achieved their expected results. Evaluation is necessary not only for individual projects, but also to advance methodology, assist in designing future studies, and through lessons learned -contribute to the relevance and cost-effectiveness of environmental protection measures. Responsibility for corrective action to be taken in the event of mitigation failure should be defined clearly within the Proponent's organization.

11.3.4 Monitoring Guidelines

Continuous observations and assessment is essential for identification of impacts unforeseen during the ESIA of the project. To ensure success of the project adequate consultation should be undertaken in the project area with the community members.

Monitoring parameters/indicators should be identified and programmes developed for their observation and action. When developing a monitoring programme the following should be considered:

- Frequency of monitoring
- Required personnel -Monitoring should be conducted by trained personnel
- Methods of record keeping
- Availability of calibrated and maintained equipment
- Existence of baseline information
- Data analysis and review

The environmental indicators to be monitored during the project phases namely the construction; operation and decommissioning include those listed in the table below. The monitoring parameters can be revised as the project development proceeds to enable incorporate and foreseen indicators.

Table 41: Monitoring Parameters

Indicator	Parameter to Monitor	Source of data
Occupational Health and Safety	-Threshold limits Values	• Recorded audit reports
	-Biological Exposure Indices (disease incidences)	• Clinics (Public Health)
	-Minimum safe working distance	• Work site audit reports
	-Number of occupational diseases and accidents	• Worksite Audit Reports, health clinics
	-Complaints from the public	• Institutions, Chiefs, main project office
	-General Rules	• Code of Practice on OSH Auditing, DOSH, Min. Labour & Human Res. Dvt. 2005 Edition
Socio-Economic Environment	-Impact on local markets	• Subsequent Audits
	-Development Projects	• CSR Reports
	-Trend of infectious diseases for example: HIV/AIDS, STI's	• Reports from Clinics and Administration
	-Correlation between project team and local community	• Subsequent Audits
Air Quality	-Industrial and Vehicular Noise	• Environmental Audits
	-Suspended Particulate Matter	• Environmental Audits
	-Visual Indications	• Frequency and source observation
	-Complaints from the public	• Administration and received reports
Fire	-Source, Frequency and scope	• Reports from work or community
	-Fire fighting Equipment	• Inspection reports
Aquatic habitat Alteration	-Existence of vegetation	• Reports from Authority, Community, Clinics, other institutions
	Water quality and quantity	• Observed damaged infrastructure
	Water Borne Diseases	• Industrial Audits
	Complaint from community members	
	Marine water Turbidity	
Vegetation Cover	-Invasive vegetation	• National Museums of Kenya
	-Loss of Important Species	• Community Leaders information
	-Health of nearby Kayas (Teleza & Bombo)	• Company Audits

	-Encroachment into Forests	
Resident Birds	-Presence of resident birds	<ul style="list-style-type: none"> • Site audits • Reports from Birdlife International (Diani)
	-Mortality rate	
	-Existence of nesting sites	
Waste Management	-Existence of solid waste	<ul style="list-style-type: none"> • Community through Administrative offices • Subsequent Audits
	-Complaint from community members	
	-Frequency of waste Collection	
Soil Erosion	-Gulley formation	<ul style="list-style-type: none"> • Field Audits • Administrative offices • Field office
	-Increased sediments in water courses	
	-Complaint from community members	
Infrastructure	-Roads, Power lines, houses and institutions	<ul style="list-style-type: none"> • Facility owners, administrative offices
Statutory Compliance	-Associated Industrial Based Breaches (Supplied within this report, and others)	<ul style="list-style-type: none"> • Administrative offices • Lead stakeholders

The list of the environmental parameters and their measurable indicators will guide the proponent access the effective level of the EMP and need to modify it for appropriate action.

11.3.5 Reporting

Constant reporting by the site mine engineer and the plant engineer to the proponent is necessary to ensure the project is executed as per the plans. The safety officer/environment officer should always be available at the site to report any concerns for urgent mitigation. The officer should also ensure enforcement of Environment, Health and Safety requirements as per the relevant legislations. The mine engineer should always consult the project manager/engineer to maintain a clear understanding of all the project aspects and their mitigation measures. All mining and plant operation methods to be adopted must be done in compliance to guidelines with ministry of mining and the engineering department.

12. ENVIRONMENTAL MANAGEMENT/MONITORING PLAN

12.1 Introduction to ESMP

This section presents the ESMP that will need to be implemented by client to prevent or reduce significant negative impacts to acceptable levels. Environmental and Social Management Plan (ESMP) for development projects provides a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition, the ESMP assigns responsibilities of actions to various actors and provides a time-frame within which mitigation measures and monitoring can be done.

ESMP is a vital output of an Environmental and Social Impact Assessment as it provides a checklist for project monitoring and evaluation. The ESMP outlined in the sections below has addressed the identified potential negative impacts and mitigation measures of the proposed project cycle, based on the Chapters of Environmental Impacts and Mitigation Measures (expected Negative Impacts).

**Table 42: Environmental Management & Monitoring Plan
During Mineral Extraction, Plant Operation and Process Management**

Monitoring Issue	Parameter	Monitoring Method	Indicator	Frequency of Measurement	Responsibility
Air Emissions/ Ambient Air quality	Dust	-Visual Inspection Feedback from the community -Particulate Count	Airborne particles/accumulations	Continuous	Main contractor, NEMA, Local Authority, Community
	Engine exhaust smoke	Ditto	Colour of exhaust smoke/accumulation	Ditto	Main Contractor, NEMA, Local Authority Community
Noise	Noise Level	-Auditory impacts Feedback from the community -Noise measurements	-Complaints	Ditto	Main Contractor, NEMA, Local Authority Community
Waste Management	Amount of Solid waste produced (sediments and wastes from secondary projects)	Measurement of silt level at the base of dam Visual impacts in drain ways	-Silt level in the dam base and at the weir -Sediment and bio-wastes accumulated	Ditto	Main contractor, NEMA, Local Authority Community
Health and Safety	Occupational Health and Safety monitoring	Reporting of accident and incidents, safety breaches and damage to the facility	Statistical records and safety reports	Ditto	Main contractor NEMA Community
Environmental Quality	Aesthetics, registered complaints, Soil measurements,	Comparative pictorials, visual impacts, recording, photography, lab analysis, Community liaison	Number of complaints and nature of complaints, parametric and qualitative, pictorials, registers	Bi, annual	Mine Operator, Community County Govt NEMA, Mines & Geology
Community Welfare	Community Health	Community Liaison and meetings	Feedback and records	Annual	Mine Operator, Community County Govt NEMA, Gender and Social Department

Table 43 : After decommissioning

Monitoring Issue	Parameter	Monitoring Method	Indicator	Frequency of Measurement	Responsibility
Waste Management	Solid waste	Tracking the volume of solid waste generated and establishing the treatment, recovery, transport and disposal methods	Waste streams per mine and volumes generated	Continuous	Mine Operator, Community County Govt NEMA, Mines & Geology
Health and Safety	Community Health and Safety monitoring	Reporting of accident and incidents, safety breaches and damage to infrastructure and related diseases.	Statistical records and safety reports	Continuous	Mine Operator, Health department, NEMA, Community, Mines & Geology
Water Quality	Water quality /quantity parameter	Flow rate from main streams, Qualitative parameters, quantitative parameters	Flow in cubic meters per sec.	Annual Audits	WRMA, Community, NEMA Mine Operator, Mines & Geology
Environmental Quality	Aesthetics, registered complaints, Soil measurements,	Comparative pictorials, visual impacts, recording, photography, lab analysis, Community liaison	Number of complaints and nature of complaints, parametric and qualitative, pictorials, registers	Bi, annual	Mine Operator, Community County Govt NEMA, Mines & Geology
Community Welfare	Community Health	Community Liaison and meetings	Feedback and records	Annual	Mine Operator, Community County Govt NEMA, Gender and Social Department

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