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# ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED SAVANNAH CLINKER PLANT IN MWINGI NORTH, KITUI COUNTY



## FINAL REPORT

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**PREPARED BY**

**January, 2020**



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## **LIST OF ABBREVIATIONS**

CIDP	County Integrated Development Plan
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
GOK	Government of Kenya
NEMA	National Environment Management Authority
RFP	Request for Proposal
TOR	Terms of Reference
OP	Operational Policies
BP	Bank Procedures
ESMP	Environmental and Social Management Plan
WBG	World Bank Group

## EXECUTIVE SUMMARY

Cement by far is the most popular and important construction material in the country yet its consumption demand has been decreasing due to low demand in the construction sector as a result of high import prices. The proposed clinker plant will therefore increase local production of the cement material, consequently facilitating local construction, creation of quality jobs for the locals through the expansion of the manufacturing sector and reduction of cement prices in the country. The project will involve seven key phases and processes including: raw material extraction/ quarry, grinding, proportioning and blending, pre-heater phase, kiln phase, cooling and final grinding and packing and dispatch.

The Government through the National Environment Management Authority (NEMA) requires that projects which are likely to have significant impacts on the environment undertake an environmental impact assessment so as to incorporate and integrate environmental concerns into development plans and policies. NEMA is mandated to receive and review EIA reports and make informed decisions in regard to project approval and licensing as per EMCA cap 387.

The process of undertaking this project has both positive and negative environmental implications. In this regard the project proponent, Savannah Cement, has appointed Geoplan Associates to carry out an Environmental and Social Impact Assessment (ESIA) to identify potential environmental impacts of the projects, establish mitigation measures against anticipated negative impacts and provide a practical and effective Environmental Management Plan (EMP). The EMP will allow for implementation of the assessment results into the project during the construction, operation and decommissioning phases.

The ESIA process involves screening of project to determine the nature and level of environmental impacts, scoping to establish the environmental impacts, review of the legal and policy framework governing clinker production and value chain, public participation which will seek to incorporate the concerns of the key stakeholders and the project affected persons (PAPs), analysis of project and activity alternatives and development of management plan. In addition to the national policy, laws and regulations, the ESIA process will be carried out in line with other stakeholders' guidelines such as the World Bank's environmental assessment procedures<sup>1</sup> and Savannah Cement environmental policy and practices<sup>2</sup>

The objective of the ESIA study report is to ensure that the proposed development identify possible impacts, both positive and negative impacts of the likely project during the construction, operational and decommissioning phases and take into consideration appropriate mitigation measures to prevent or reduce the adverse impacts on the environment. It will also ensure that the related operations fall within the full compliance of EMCA cap 387.

Based on the outcomes of the screening and scoping stages, key environmental impacts have been identified. Further assessment of these impacts will be undertaken during the full study stage.

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1 Operational Manual OP 4.01 - Environmental Assessment

2 <http://savannahcement.com/sustainable-practises/>



## Anticipated impacts during construction stage

Positive	Negative
Creation of employment opportunity especially to the local communities	Increased demand for water and energy
Improvement of the current infrastructure-access roads etc	Dust emission
Improved security	Noise pollution-excavation blasting and drilling machines
Enhanced local economic development from multiple economic activities & employment	High generation of solid wastes
Population influx leading to local economic development	Traffic incidences during delivery of construction materials
	Population influx-negative social culture influence
	Devegetation
	Occupational health and safety concerns s outlines by the World Bank OP4.0

## Anticipated impacts during the operation phase

Positive	Negative
Improved infrastructure through construction of access roads	Dust emission
Employment creation and income generation	Increased production of waste water
Provision of auxiliary services (e.g banking, insurance services)	Increased energy needs
Improved security within the area	Increased solid waste production
Increased supply of cement locally	Increased traffic incidences
	Noise pollution-machines/vehicles
	Population influx
	Conflict over labour and other benefit sharing mechanisms
	Occupational health and safety concerns outlined by the World Bank OP4.0

## Anticipated impacts during decommissioning phase

Positive	Negative
Reduced use of water resources and energy consumption	Demolition works will expose workers and the public to occupational health and public safety risks
Create of seasonal employment to local workers	Air pollution during decommissioning activities
Environmental restoration	Unemployment
Environmental conservation through reuse of generated waste materials for other construction processes	Increased solid waste production from the site

# 1 INTRODUCTION

## 1.1 Project Background

The proposed project aims at establishing a clinker plant in Mwingi North, Kitui County. The project involves undertaking a detailed feasibility assessment of the geological, hydrological, environmental and social implications of the proposed plant; construction based on feasibility results; operation and decommissioning of the plant. This Environmental Social Impact Assessment (ESIA) is part of the detailed feasibility assessment of the proposed project. It will provide the background to the proposed project, a description of the project design; an assessment of the physical and social baseline conditions, an analysis of the policy and legal framework; environmental impacts and mitigation measures against anticipated negative project impacts.

The environmental and social impact assessment takes cognizance of the Kenyan Constitution provision of a right to a clean and healthy environment for all citizens. This calls for collective responsibility in environmental management. Specifically, the EMCA cap 387 provides for consideration of environmental impacts of all development projects and promotion of safety in the spheres of protection of environmental balance, prevention of harmful impacts of industrial and other workings on natural environmental systems, preservation of biological diversities and organized productive use of the nature.

The EMCA (Cap 387) requires that an Environmental Impact Assessment Study is undertaken for proposed activities that bear significant impact on the environment. It requires a broad public participation and in-depth impact analysis. The EMCA regulations of 2003 (and *subsequent amendments*) provide a schedule of projects that must undergo EIA subject to agreement of the approach with the National Authority. The proposed clinker plant establishment falls within this category.

In addition to the Kenyan regulations, this environmental assessment takes into consideration international guidelines on ESIA particularly those provided by International Finance Corporation (IFC); World Bank (WB) and Africa Development Bank (AfDB). The key highlights on the World Bank guidelines that inform this assessment.

**Table 1-1 World Bank ESIA operational procedures**

Environmental Assessment (OP/BP 4.01)	Indigenous people (OP/BP 4.10),
Natural habitat environment (OP/BP 4.04)	Forests (OP/BP 4.36),
Cultural heritage (OP/BP 4.11)	Projects in conflict areas (OP/BP 7.60)
Internally displacement/resettlement (OP/BP 4.12)	

The ESIA report has put into consideration all the operational policies with the exception of requirements; Security of dam (OP/BP 4.37) because there are neither dam in the proposed area

and also the requirement on Projects located on international water roads (OP/BP 7.50)] because the proposed plant site area is not located on international water road.

The IFC provides specific guidelines for assessing environmental environmental, health, and safety guidelines for cement and lime manufacturing<sup>3</sup>. The AfDB also provides operational safeguards to promote sustainability in development activities.

**Table 1-2: AfDB environmental assessment safeguards**

Operational safeguard 1 – Environmental and social assessment

Operational safeguard 2 – Involuntary resettlement: land acquisition, population displacement and compensation

Operational safeguard 3 – Biodiversity, renewable resources and ecosystem services

Operational safeguard 4 – Pollution prevention and control, hazardous materials and resource efficiency

Operational safeguard 5 – Labour conditions, health and safety

## **1.2 Scope of the assignment**

The scope of the work will involve the following:

- Undertaking a scoping study on social and environmental implications of proposed clinker plant
- Developing an Environmental and Social Impacts Assessment (ESIA) for the proposed project

## **1.3 Methodology**

### **1.3.1 Environmental Screening**

Environmental screening was carried out to determine whether an EIA study is necessary for this project and at what level of evaluation s required. This took into consideration the requirements of the Environmental Management and Coordination Act CAP 387, and specifically the second schedule of the same act and the international guidelines on ESIA. From the screening process, it was established that this project requires an environmental and social impact assessment.

### **1.3.2 Environmental Scoping**

Scoping was done to establish key environmental, social, economic and safety variables of consideration. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects. Impacts were also classified as immediate and long-term impacts. It also sought to establish parties affected by the project and all the other relevant stakeholders.

## **1.4 Desktop Study**

This involved review of project documents, architectural drawings, past EIA related to clinker plant establishment, relevant policy, legal and institutional frameworks.

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<sup>3</sup> IFC & WB, 2007: Environmental, Health, and Safety Guidelines for Cement and Lime Manufacturing

## 1.5 Site Visit

Field visits were conducted to allow for delineation of the project area, scoping of proposed project impacts, identification of project affected persons (PAPs), and community and other stakeholder mapping (see Annex 1 for reconnaissance schedule). A reconnaissance visit whose output was a scoping report was conducted between 20<sup>th</sup> to 21<sup>st</sup> November, 2018.



*Plate 1-1: Reconnaissance site visit by team members*



*Plate 1-2: Existing semi-permanent house structures on the proposed site*



*Plate 1-3: Typical vegetation cover /type on proposed site*



*Plate 1-4: Existing permanent house structures on the proposed site*





*Plate 1-5: Section of the grazing area within the proposed site*



*Plate 1-6: Section of a gully commonly sighted in the project area*



*Plate 1-7: Section of cultivated land in proposed site*



*Plate 1-8: Meeting with the area Sub chief –Kyuso Location*

## **1.6 Public Participation**

The study public opinion/views through a rigorous Consultation & Public Participation (CPP) exercise. The same commenced on 21<sup>st</sup> November 2018. A community public baraza was held on 15<sup>th</sup> November 2018, at Kimu Sub location, Assistant Chief Office; questionnaires were administered to the public and interviews held with host communities. The questionnaires have been included in this report. Interviews were also conducted with government agencies at the national, regional and county level.

## **2 PROJECT DESCRIPTION**

### **2.1 Introduction**

The objective of the project is to conduct an environmental and social impact assessment study that will contribute towards the overall project feasibility assessment. The ESIA study for the proposed plant took into account operational, social, cultural, economic, legal and administrative considerations. The study included but was not limited to the following:

- Identifying the anticipated environmental impacts of the proposed project and the scale of the impacts around neighbouring communities of the site area
- Identifying and analysing alternative methods or technologies for implementing the proposed project
- Proposing mitigation measures to be undertaken during and after the implementation of the proposed project;
- Developing an Environmental Management Plan (EMP), with mechanisms for monitoring and evaluating the compliance and environmental performance, cost for mitigation and time frame of implementing the measures

### **2.2 Scope of the Project**

The proposed project will entail extraction of raw materials and construction of a clinker plant. The mining process will involve the following processes; raw material extraction, grinding, proportioning and blending, pre-heater phase, kiln phase, cooling and final grinding and packing and dispatch. The project cycle activities are described below:

#### ***a) Project inception***

There proponent identified a prevailing demand for clinker and the potential for sustainable production of this raw material in Mwingi, Kitui County. It involved exploration activities which were conducted by the proponent for a span of three years to adequately ascertain the extent of these limestone deposits and their economic value. A prospecting license was issued by the Ministry of Petroleum and Mining. The exploration established that the limestone deposit bands have large proportions of fairly pure marble, which appears, however, to have variable magnesia content. The characteristics of the reserves are such that a top soil of about 0.3 m and little overburden of about 0.5 – 1 m. In most places, there is no overburden hence the exposed weathered limestone rocks. The reserves run over 50 metres in depth.



**Plate 2-1: Limestone exploration and prospecting license**

**b) Land acquisition**

Following the identification of clinker deposits in Mwingi, the proponent initiated a process of land acquisition and amalgamation of the land parcels. A compensation action plan was developed entailing identification of land owners, land valuation, negotiation with the land owners and cash compensation was developed. This was a highly participatory process including local leaders and government agencies.

**c) Site preparation**

This will involve clearing of vegetation in the project area, demolition of temporary structures and security of the site. The vegetation in the project site includes

- a. *Acacia Meliffella*
- b. *Acacia Polyacantha*
- c. *Erythna Bunii*,
- d. *Grevil/ea Robusta*

Other vegetation which will be cleared include: millet, sorghum and green grams.

**Equipment Mobilization**

This will involve setting up machinery and equipment and securing the site for mining activities. The machines to be used include:

Equipment	Size	Capacity
Limestone Crusher	Strike Bar 200 x 300	1250 TPH*
Raw mill	ATOX 50	460 TPH
Preheater	2 string ILC 5 stage	6000 TPD
Rotary Kiln	ROTAX 2 / 5.25 x 62 m	6000 TPD
Clinker Cooler	CB 16 x 50	6000 TPD
Coal Mill	ATOX 20	30 TPH

\*Tonnes Per Hour

**d) Construction of storage area and axillary facilities (open areas/Silos)**



This will include construction of storage area for materials extracts and provision of open spaces for the same.

Storage Area	Capacity	Description
Limestone/Clay mix	1 x 20500 t	Circular
HG Limestone	2 x 3000 t	Longitudinal
Iron Ore	650 t	Open area
Sand	2000 t	Open area
Raw meal	15000 t	Silo
Raw Coal	4600 t	Open area
Fine Coal	110 t	Bin
Clinker	59600 t	Silo

#### *e) Mineral Extraction*

The project proposes to extract **limestone, clay and silica sand** from the deposit. Each of these extractions will be done in a separate location within the project site (*See attached site map*). **Open-pit mining (sink holes, loss of biodiversity, and contamination of soil, groundwater, and surface water by chemicals from mining processes)** method is proposed for mining the deposit. The selection of the equipment for the pit is based on the principle that equipment should have good availability in the terrain, able to withstand expected weather conditions and able to execute an efficient truck cycle time. Some of the expected equipment to be used on the mine includes:

- Flexi ROC D65 Atlas Copco Surface drill
- Air Compressor D40
- Dump Trucks/Haulage trucks
- Tracked Dozer
- Excavators 320 D
- Wheel loaders 960 CAT

#### *f) Limestone Processing*

The proposed clinker processing plant for the project is an ultra-modern integrated cement processing plant that has the following features:

- i. Jaw crusher;
- ii. Hammer Mill
- iii. Semi autogenous mill;
- iv. Hydro cyclones;
- v. Ball mill;
- vi. Static separators
- vii. PID control of solid flow meter and weigh bin dosing valves
- viii. Preheater/Pre-calcines



- ix. Kiln
- x. cooler system

### ***Grinding of crude limestone***

The Run-of-Mine (ROM) limestone is to be delivered to the coarse ore bin at the plant by rear-dump trucks. Shale, iron ore, pozzolana and gypsum from other mines will be delivered at the plant stockpiles for crushing. Crushing is the main stage in the comminution process of the limestone to liberate the valuable calcium carbonate  $\text{CaCO}_3$ , clay minerals and iron ore and separate it from the gangue in the run off mine material. The plant will employ a dry operation system. At the plant the trucks are weighed and then proceed to offload directly into crusher.

The limestone from the plant stock piles is to be discharged from the coarse limestone bin onto the vibrating grizzly feeder. The undersize material passes through the grizzly onto a conveyor belt. Oversize ore moves across the grizzly bars into a jaw crusher where it is reduced in size to - 150 mm before passing on to the hammer crusher will crush the limestone to about 20-30mm. The hammer crusher at the plant is expected to work as the secondary crusher, an impact crusher will be employed as the tertiary crusher.

### ***Raw milling***

From the impact crusher the grinding unit is to be equipped with a ball and a semi autogenous (SAG) mill. The crushed limestone will then be blended and directed by a conveyor belt for raw milling in the SAG mill together with shale and iron for further size reduction.

### ***Clinker production***

The SAG mill is to be equipped at its discharge end with rotating screen which removes oversize material and grinding ball chips. These will be recycled through a reclaim hopper. The raw meal is then blended and homogenized before being fed into the coal fired kiln for pyro processing (calcination) to produce clinker. The clinker will then be cooled and stored and then milled and processed with gypsum and pozzolana additives to produce two types of cement for release into the market. The two types of cements to be produced at the plant are: OPC Ordinary Portland Cement (Clinker + Gypsum) and PPC Portland Pozzolana Cement (Clinker + Gypsum + Pozzolana).

### ***Product Management***

Operations in the plant to support product development will include:

- Cement packaging
- Bulk dispatch
- Oil intake and storage
- Product Quality assessment
- Administration (Human resource management, sales, occupational safety)

### ***Project Amenities***

The project proposes to establish social amenities to support plant operations including staff housing; health facility and school.

### 2.3 Location of the Project

The proposed project is located in Kyuso Location, Mwingi North Sub County, Kitui County.

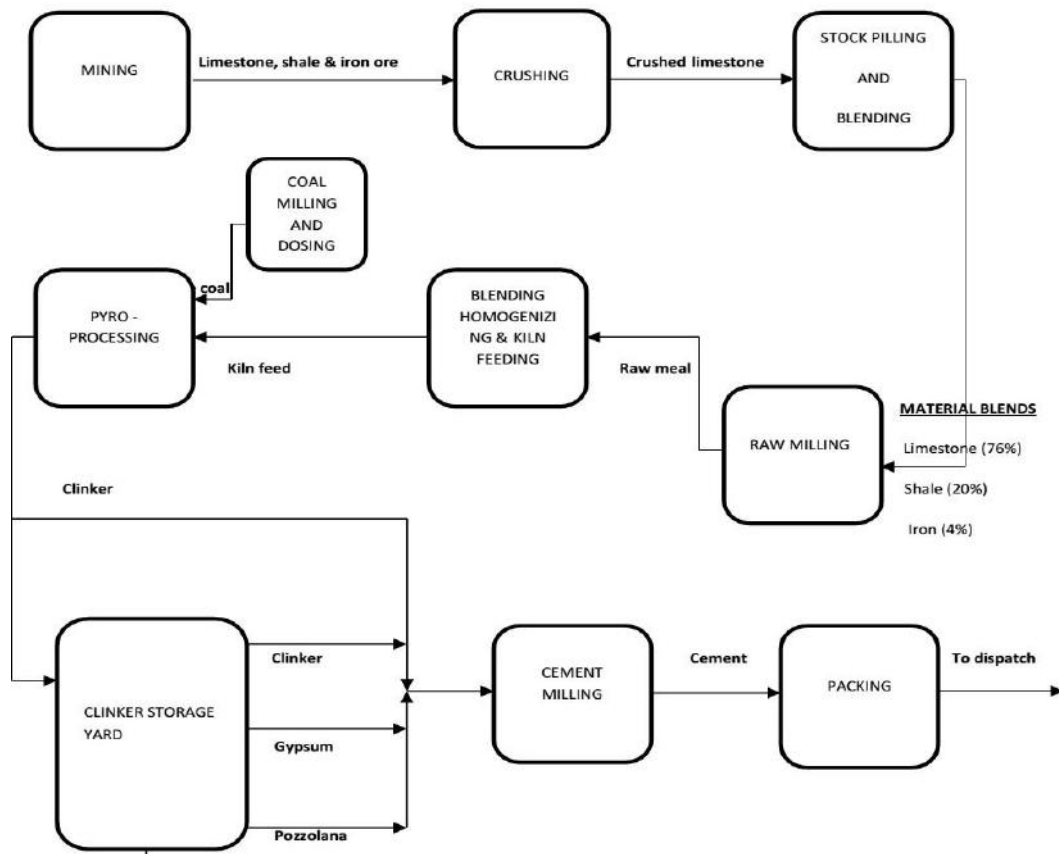


*Plate 2-1: Entrance to the proposed*



*Plate2-2: Neighbouring assistant chief camp*

**Clinker and Cement Process flow chart**



*Figure 2-1: Proposed processing plant flowsheet*

### 3 BASELINE CONDITIONS

#### 3.1 Location and Area

The proposed project site is located in Kyuso ward, Mwingi North Sub County, Kitui County and measures approximately 4000 acres. The County has eight (8) sub-counties namely; Kitui Central, Kitui West, Kitui East, Kitui South, Kitui Rural, Mwingi North, Mwingi Central and Mwingi West.

*Table 3-1: Administrative boundaries within the project area*

(actual project location in the project area needed from client)

#### 3.2 Physical Environment

##### 2.2.1 Climate characteristics

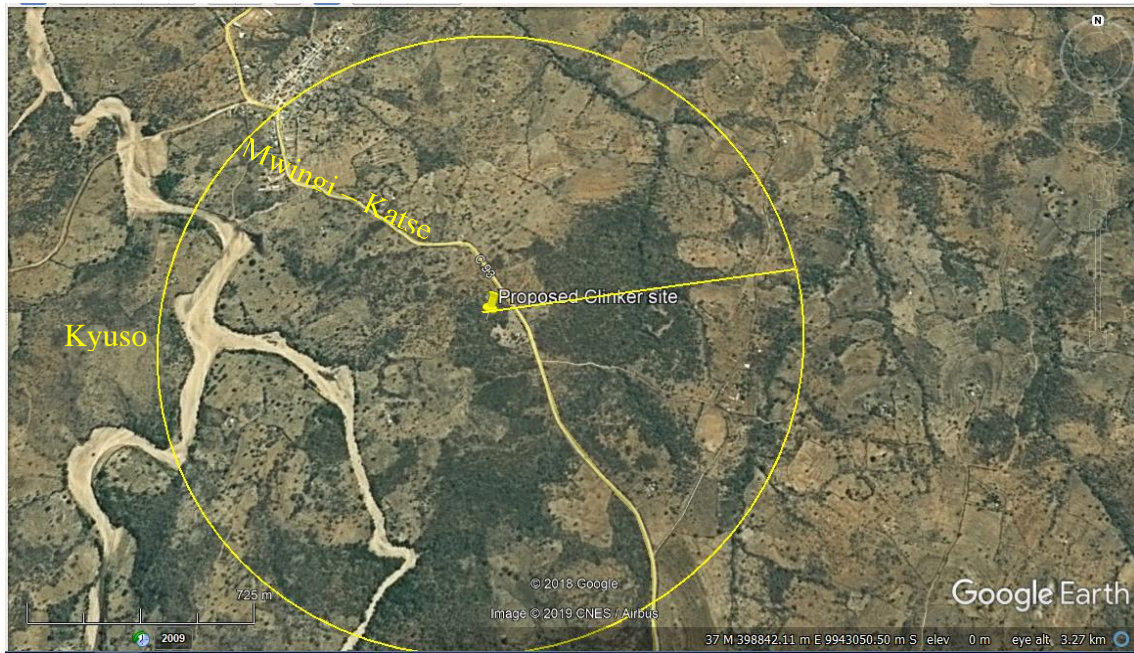
The project area lies in an arid and semi-arid area with low erratic, unpredictable and unreliable rainfall. The rainfall pattern is bi-modal with two rainy seasons annually. The long rains fall in the months of March to May. These are usually very erratic and unreliable. The short rains which form the second rainy season fall between October and December and are more reliable. The rest of the year is dry and the annual rainfall ranges between 250mm-1050 mm per annum with 40% reliability for the long rains and 66% reliability for the short rains. Rainfall is highly unpredictable from year to year.

The area receives high temperatures in February and September ranging between 26<sup>0</sup>C to 34<sup>0</sup>C. The minimum temperatures range between 14<sup>0</sup>C to 22<sup>0</sup>C with temperatures as high as 34<sup>0</sup>C during the hot periods and 16<sup>0</sup>c during the cold seasons.

##### 3.2.2 Water resources

Kitui County has scarce water resources due to the inadequate and unreliable rainfall and limited surface water sources. The major sources of surface water are seasonal rivers that form during the rainy seasons and dry up immediately after the rains. The Athi and Tana Rivers are the only perennial rivers in the County, and form the borders with neighbouring counties. The drainage system of the Kitui County is largely comprised of the Athi and Tana River catchments. The seasonal rivers within the County flow in a general north, north-west direction and drain into Tana River. Seasonal rivers include Rivers Nzeeu, Tiva, Mwitwa Syano and Thua in Kitui while in Mwingi there is Tyaa, Enziu, Kamuwongo, Katse, and Muoo.

The County has two commercial water supply schemes namely; Kiambere-Mwingi (KIMWASCO) and Kitui Masinga (KITWASCO) serving urban and rural water schemes operating under Tanathi Water Services Board. There are also two water resource user associations serving rural communities of the County. The County has a water supply scheme, the Tana and Athi Rivers Development Authority (TARDA) scheme, which supplies Kitui and Mwingi towns. *The proposed project is approximately 5 kilometres from the nearest River Kyuso.*



**Figure 3-1: Water resources in the proposed project location**

### 3.2.3 Ecological Conditions

Kitui county is divided into nine Agro Ecological Zones<sup>2</sup> which include: UM3, which is very small (in pockets), and semi-arid farming zones which include; UM3-4 the transitional marginal coffee zone around Migwani and Kitui Central. The UM4 is considered as the sunflower-maize zone or Pigeon peas-maize zone. LM3 is the cotton zone, which is very small and has many steep slopes mainly within forest reserves, while LM4 is a marginal cotton zone. LM5 is the livestock-millet zone which is suitable for livestock and millet production, while LM6 and IL6 are the ranching zones; here no rain-fed agriculture is suitable unless runoff-catching techniques are used. IL5 is suitable for both livestock and millet production. These semi-arid zones have good potential for agricultural development and are currently either cultivated or lying fallow under woodland. Due to population pressure the less fertile semi-arid ranching areas are currently used for food crops production and livestock keeping which leads to frequent crop failures as these areas are not suitable for growing of certain crops under rain-fed agriculture.

#### Forests

Kitui County has **14 gazetted and 15 ungazetted forests**. Taking all forms of forests into account, there are about 35,592.6 Ha of forest cover in Kitui County, under different forms of ownership. The forest cover is crucial for climate change mitigation, water resource management, control of soil erosion and boosting of agriculture in the County. **None of the gazetted forest is within the project area** as indicated in the map below.



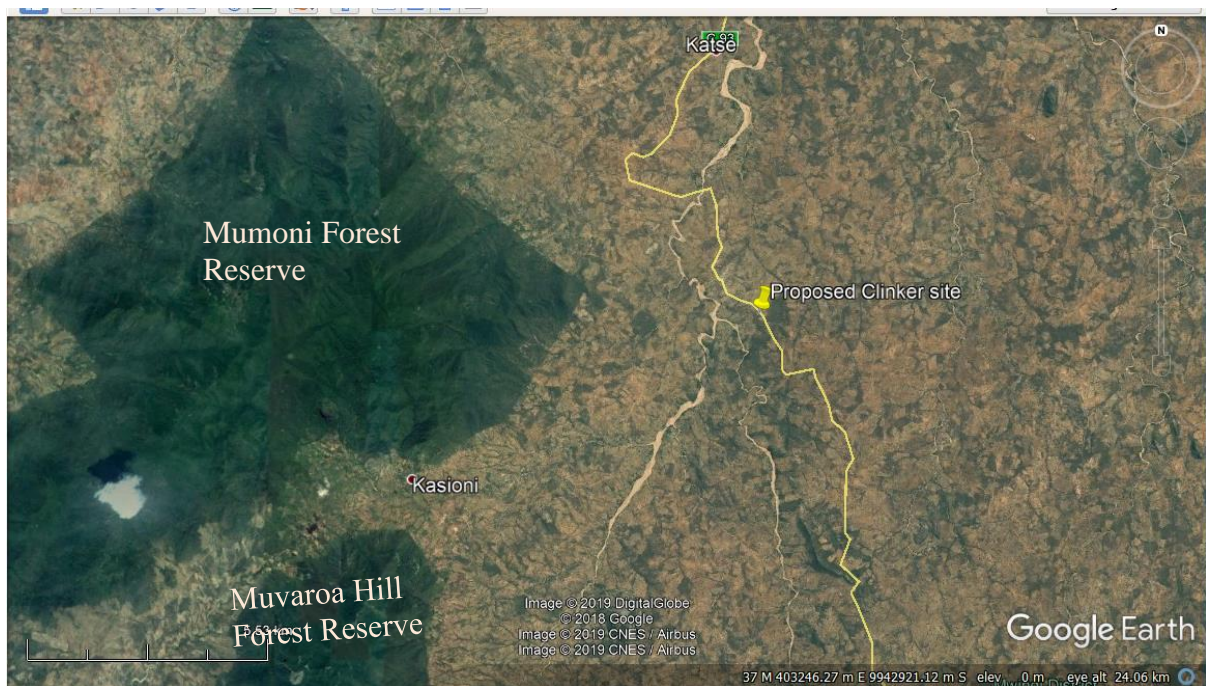


Figure 3-2: Protected areas/ forests in Kyuso Location

### 3.2.4 Physical and Topographic Features

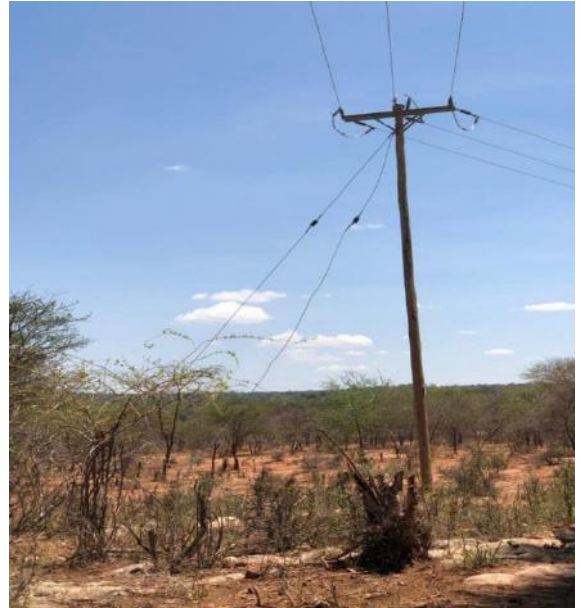
The County has a low lying topography with altitude ranging between 400m and 1800m above sea level. The topography of the county is divided into hilly rugged uplands and lowlands. The general landscape is flat hence it provides an opportunity for low cost of installing/building of infrastructure such as roads and power lines and putting up buildings is relatively cheaper due to low landscaping costs as compared to counties that have steep slopes and unstable soils

The central part of the county is characterised by hilly ridges separated by wide low lying areas and has slightly lower elevation of between 600m and 900m above sea level to the eastern side of the county. To the western side of the county, the main relief feature is the Yatta Plateau, which stretches from the north to the south of the county and lies between Rivers Athi and Tiva. The plateau is characterised by plain, wide, shallow-spaced valleys.

Apart from the Yatta Plateau and the range of hills in the central part of the county, the topography is undulating, and gives way to plains toward the east. A few hills in the plains rise to an altitude of 1,747 metres above sea level. These isolated hills usually affect communication within the county.



*Plate 2-1: Low lying topography of the project area*



*Plate 2-2: Existing power transmission lines on the proposed site*

### **3.2.5 Geology**

The geological assessment report established the existence of vast succession of crystalline limestones and marbles, heterogeneous para-gneisses, quartzites, calc-silicates, granitoid rocks, amphibolites, and graphitic gneisses invaded by minor acid and basic intrusives. The limestone is coarse to very coarse grained, having grains of calcite up to 2.5cm in diameter. Colour ranges from pure white to pink and shades of grey. The bands form sub-hills at some points, and there is a clear indication of being tens of meters extending underneath the surface.

Geologically, the marble units at Mwingi-Kyuso area are intercalated within a succession of strongly metamorphosed paragneisses that are mainly hornblendic and granitic in character. On the prominent ridges, pure and hard quartzites are exposed. Around the Kyuso market town, marbles are generally widely spread as separate layers within the paragneisses and in zones where marble layers /beds are exposed, they run more than 200 m wide across the strike.



Plate 2-3: Well exposed coarse grained crystalline marbles in project site

### **3.3 Social Cultural Environment**

#### **3.3.1 Population**

The county's population was 1,012,709 according to the Population and Household Census report of 2009. The report showed that 531,427 were females while 481,282 were males and this was projected to grow to 1,065,330 by 2013. The population growth rate of the county at 2.1% is slightly lower than the national rate of 2.6%. The population patterns and distribution in the county are largely influenced by landholding and ownership, availability and accessibility of water, and fertility of soils. The current trend in the county is that more people tend to concentrate on foot hills and plateaus where agriculture is possible. Other settlements are concentrated near towns due to the availability of reliable social amenities and employment opportunities. Climatic conditions have also influenced the settlement patterns, and the majority of people live in scattered settlements with only 5% living in an urban environment.

#### **3.3.2 Land Use**

The county has a total area of 30,496.5 km<sup>2</sup> of which 6,302.7 km<sup>2</sup> of the County land consists of the Tsavo East National Park and is not available for agriculture, 14,137.2 km<sup>2</sup> is arable agricultural land and 6,364.4 km<sup>2</sup> non-arable land. Over 85% of the county's population lives in rural areas. The average population density is 44 persons/km<sup>2</sup>.

The average size of land holding in the County is 0.12 km<sup>2</sup> per person (12 ha per person). Percentage of Land with Title Deeds Over 46% of the County land falls in the arable category with 83% of the inhabitants lacking title deeds because most of the land has not been adjudicated. Only about 17% of land owners in the County have title deeds. The process of land adjudication and registration has been particularly slow. *This has bad implication on the land acquisition process in this proposed project. However, other process which is in the final stages has been participatory and voluntary.*

#### **3.3.3 Economic Activities**

The farm types in the county are either mixed or monoculture farming. Small scale farming is practised in the entire county while large scale farming is emerging with regard to Sorghum and



green grams in Mwingi North, Kitui Rural and Kitui South, Kitui East and Kitui West where the average large scale farm size is estimated to be 60 acres. Beef farming of the indigenous (Zebu) breeds is practiced in all the rangelands within the county. Beef rearing is practiced under pastoralism and free range systems. In most households young bulls are reared for ploughing purposes and later fattened before disposal.

**3.3.4 Mining**

Kitui County has several minerals deposits such as *coal, limestone, granite, gypsum, vermiculte, sand and gemstones* in most of its sub counties Exploration and excavation of some of the minerals has started while for some it’s yet to start. *Excavation of limestone has commenced at Mui and Kyuso, while gypsum is currently being mined at Mwingi South, and gemstone at Tharaka and Tseikuru.* Sand harvesting and mining of gemstones is done primarily by the local artisans. The key challenge with artisanal mining is that it is uncontrolled and environmentally degrading. *The proposed project is therefore not out of character with the areas’ mining activities.*

**3.3.5 Employment**

Wage Earners

The county has approximately 18,228 wage earners most of whom are from the public sector.

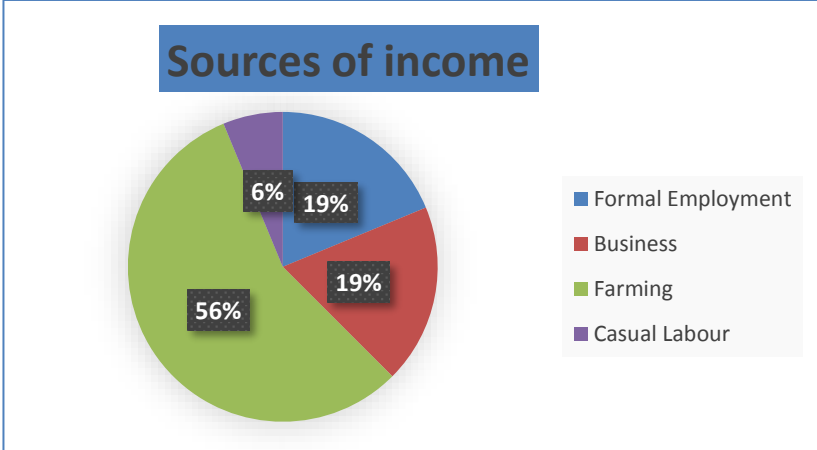
Self-Employed

The approximate number of self-employed people in Kitui County is around 388,431 of which the largest proportion do farming.

Labour Force

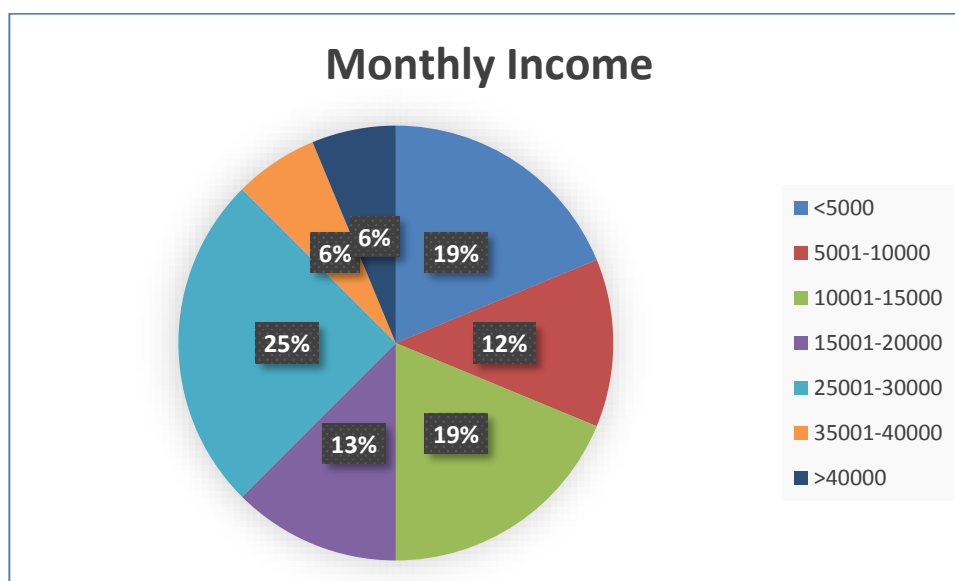
The total labour force available in kitui county 514,133 of which their age range between 15 – 64 years.

Based on the household survey undertaken, the main sources of income in the project area are farming (56%), trading (19%) and formal employment (19%). The proposed project is likely to increase the proportion of residents engaged in formal employment.



### Average Household Incomes

Majority of the households have a monthly income of less than Kshs.20,000 per month.



### 3.3.6 Tourism and Wildlife

The County has a number of potential tourist attractions which have for many years remained unexploited. The main attractions in the Kitui County include Nzambani Rock, Ikoo Valley, Ngomeni Rock Catchment and Conservancy, Tsavo East National Park in Mutomo, and 3 National Reserves namely South Kitui, Kora and Mwingi.

Table 2-2: Main tourist attractions

Attraction	Name
National Parks	Tsavo east
Game reserves	South Kitui , Kora, Mwingi National Game Reserve
Other tourists attractions	Nzambani rock Ngomeni rock catchment Kibuka Grand Falls Kalimbui rock

### Wildlife

Some of the wildlife species in the County include, elephants, baboons, buffaloes, hippos, velvet and sykes monkeys which account for the dominant species. These wildlife species are found in Tsavo East, Kora and Mwingi National Game reserves. Elephants, leopards, buffalos, lions and hyenas are found in South Kitui Game Reserve and Mwingi Game Reserve which borders Meru and Kora reserves. Other wildlife includes hippos and crocodiles in Tana River, and various bird species. The flora in the County includes aloe vera, baobab, and Melia Volkensii (Mukau).

### 3.3.7 Health Access

Kitui County has several hospitals and health centers to meet the health needs of residents, among them Kitui County Referral Hospital, Mwingi Sub-County General Hospital, Kitui

Nursing Home, Neema Hospital, Jordan Hospital, mission-run hospitals such as Muthale Mission hospital and some private health centers. Kitui County has commissioned 23 new health facilities to reduce the distance, time and cost to accessing healthcare services.

There are 240 functional public health facilities in the County, accounting for 6% of the country’s 4,000 public health facilities. This exceeds the national average of 85 health facilities per County by 145 (63%) facilities. However, a health facility distribution analysis conducted by the former Commission for Implementation of the Constitution (CIC) showed that the 230 health facilities were unevenly and inequitably distributed in the County. In three Sub-Counties, Kitui 43 Central, Kitui West and Mwingi West, over 95% of the residents live within an average distance of 5 kilometres from their homes to the nearest health facility. (County Integrated Development Plan, 2018-2022)

### 3.3.8 Road Network

Most of the county’s roads are in poor condition and rendered impassable during the rainy season, which hinders development, access to market centres, schools and health facilities and connectivity across the county.



*Plate 2-4: A section of the road serving the proposed project site*

### 3.3.9 Energy Access

The main sources of energy for lighting are paraffin lantern, paraffin tin lamp, electricity connection from mains, solar energy and battery lamp. About 33.4 percent of households use paraffin lanterns compared to a national average of about 15.7 percent. Electricity connections remain below the national average.

*Table 2-3: Percentage distribution of households by source of lighting fuel*

	Main Electricity	Generator	Solar	Paraffin Lanterns	Paraffin Tins	Pressure Lamps	Fuel Wood	Battery Lamps	Candle
National	41.1	0.5	14.1	15.7	19.3	0.2	1.6	4.8	0.9
Kitui	18.2	0.0	17.0	33.4	18.7	0.0	0.2	11.1	0.7

Source: Kenya National Bureau of Statistics: KIHBS 2016

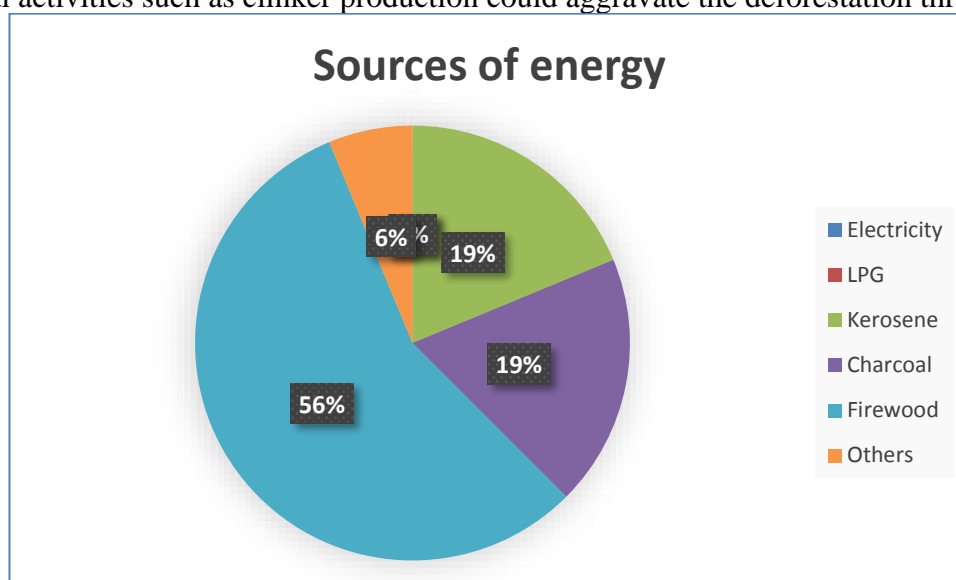
The main source of cooking fuel is firewood with 79.5 percent of the households using firewood compared to the national average of 54.6 percent. The use of Liquefied Petroleum Gas (LPG), Kerosene and charcoal for cooking is low in the County compared to the national average. At the County, nationally, 76.4 percent of the households use traditional stone fire as a primary cooking appliance, compared to a national average of 46.4 per cent.

Table 2-4: Percentage distribution of households by main source of cooking fuel

	Firewood	Electricity	LPG	BIO	Kerosene	Charcoal	Others	Dung	Crops Residue
National	41.1	0.5	14.1	15.7	19.3	0.2	1.6	4.8	0.9
Kitui	18.2	0.0	17.0	33.4	18.7	0.0	0.2	11.1	0.7

Source: Kenya National Bureau of Statistics: KIHBS 2016

The household survey established that woodfuel is the most common source of energy (75%) in the project area. Though this presents a threat to forest conservation and increased on farm tree cover, alternatives sources are either inaccessible or unaffordable. Additional woodfuel demand from industrial activities such as clinker production could aggravate the deforestation threat.



### 3.3.10 Housing: Types

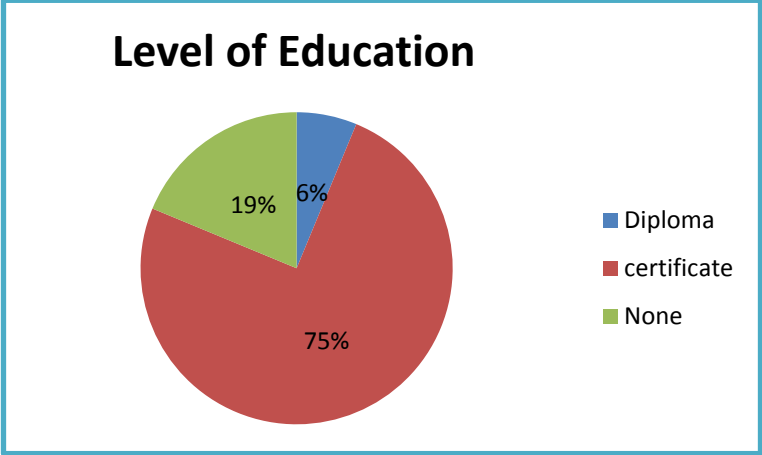
The main types of houses are classified in terms of the different materials used in construction. Roofing materials in the County are mainly Corrugated Iron sheets roofs at 94.5 percent. A large percentage of households use earth/sand, and cement as floor material at 58.6 percent and 40.4 percent, respectively. Walling of houses also varies with 33 percent having cement finish, 25.8 percent with bricks, and 23.5 percent with bamboo with mud/cow-dung.

### 3.3.11 Educational Institutions

Kitui County has 1,336 ECD centres; 1,264 primary schools; 314 secondary schools; 76 youth polytechnics and 15 commercial colleges and four universities: South Eastern Kenya University (SEKU), Kenyatta University, Africa Nazarene University, and University of Nairobi. The

average distance to the nearest primary school is between 1 to 4.9 Km with the road network being poor in most parts of the county.

The project catchment area is characterized by high literacy levels as only 19% of the residents do not have basic education. *This implies that the community can comprehend proposed project activities and raise logical concerns over anticipated project impacts.*



### 3.3.12 Markets and Urban centres

The County has two major urban centres, Kitui and Mwingi, and eight town centres: Migwani, Kabati, Mutomo, Zombe, Mutitu, Kisasi, Kyuso and Nguni. There are 13 modern markets structures and 26 open air markets. However, poor physical and industrial infrastructure is a challenge in Kitui County, which makes accessing key markets difficult.

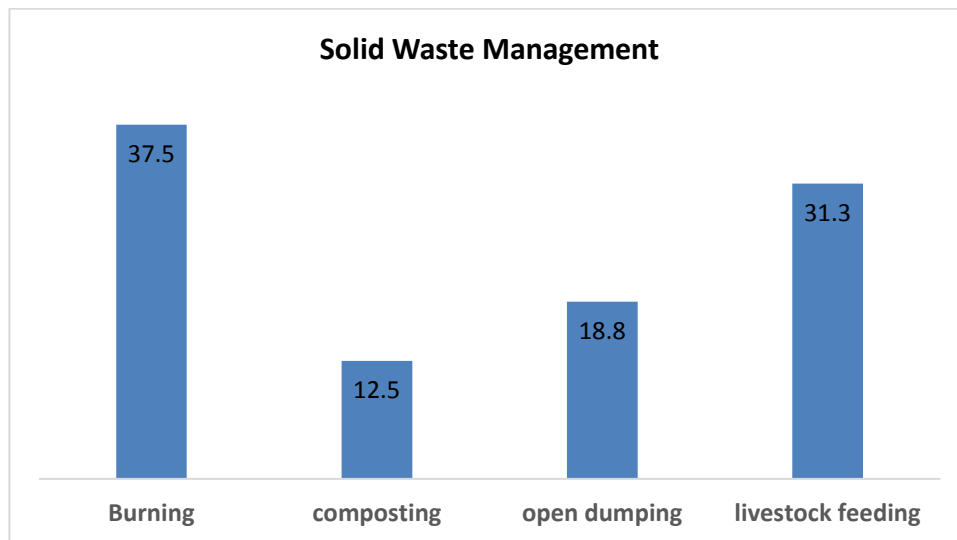
### 3.3.13 Environmental Issues

The natural resource base in Kitui County is broad and comprises of water, soil, livestock, forest, pasture, land, wildlife, minerals, solar energy and wind energy. The County economy primarily depends on natural resources as majority of the population lives in rural areas and derives their livelihood mainly from these resources. These economic activities include agriculture, small-scale industry, energy, water, trade and mining. The environment and natural resources have in the recent years been under threat due to increased dependence on natural resources to meet basic needs. The situation is aggravated by the rising poverty levels, high population growth rate, poor land use and agricultural practices, and over utilization of fragile ecosystems. In the marginal areas of the County, resource scarcity has often contributed to resource use conflicts especially over water and pasture.

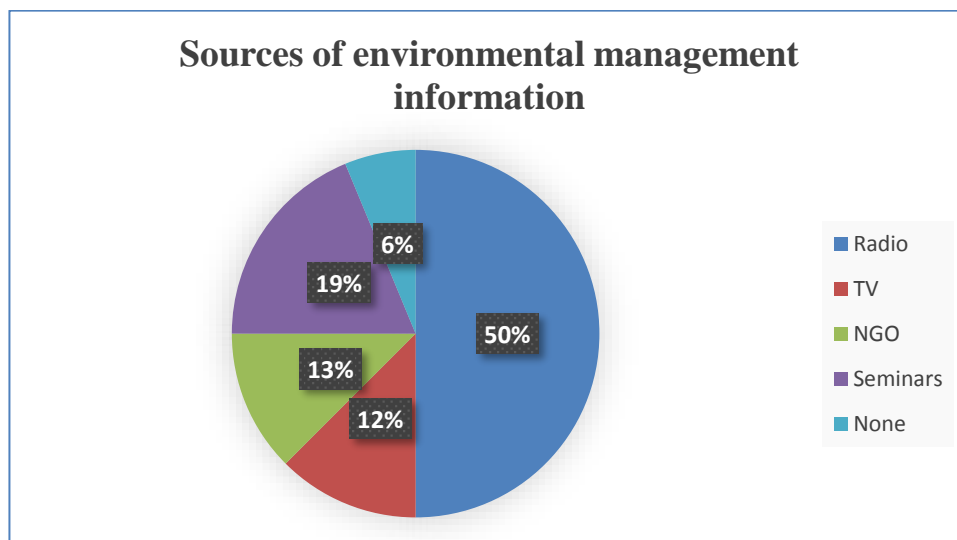
Major environmental issues in the County are **land degradation** as a result of soil erosion, unsustainable and uncontrolled sand harvesting in most rivers, **overgrazing** and **overstocking**, reduction of forest cover, high rates of **deforestation** for fuel wood for domestic use, charcoal production, firewood production and **sound pollution** from public vehicles.

The household survey established key environmental issues of consideration including:

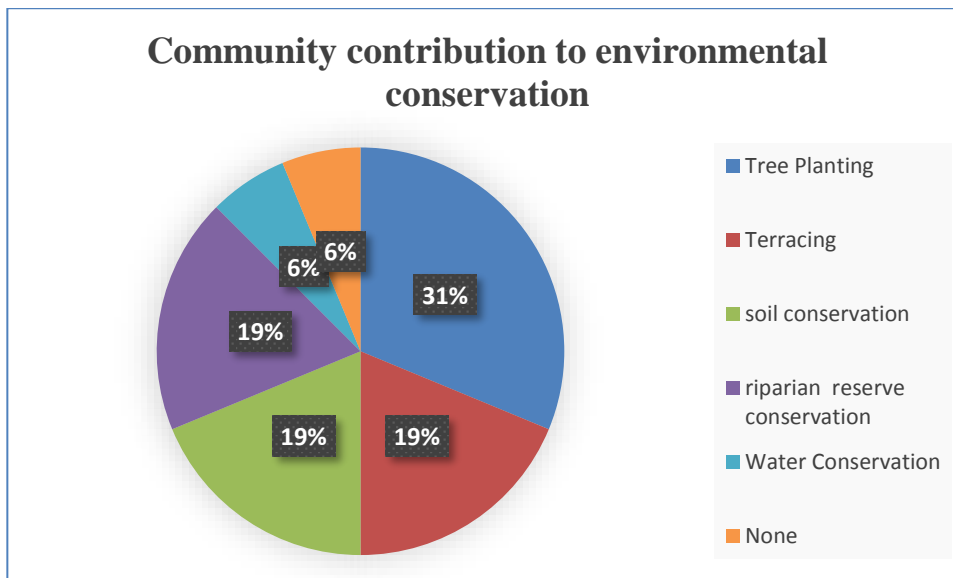
- a) Waste management: Burning and using waste as feedstock are the most common methods of waste disposal in this area.



- b) Radio is the main source of environmental education in the community. This implies that it can be used as an effective avenue to inform, clarify and sensitize the community regarding project implementation and operation matters.



- c) Most of the community members are actively involved in environmental management activities particularly tree planting (31%), terracing (19%) and riparian reserve conservation (19%).



**d) Ecological and cultural sites**

- Kakoto rocks for building
- River Muten used as water point for cattle and domestic use
- Kyamutwaliu rock used for water harvesting
- Kathula Hill acting as water catchment area
- Kathula Hill Forest for grazing of cattle
- Kandauni Hill for grazing
- Mukau Tree for timber
- Kanzou River for domestic water supply
- Muaa for firewood and building
- Kathula Shrine for rain sacrifice
- Kanzou valley for sand mining
- Waguta river for fetching water for domestic use
- Syukondo Hill for grazing

None of these cultural and ecological sites is located within the proposed project area.

**Climate Change and its Effects in the County**

There are numerous effects in the County brought about by climate change. These include unreliable, erratic and inadequate rainfall, persistent and more frequent drought and imminent famine leading to food insecurity, and high and increasing temperatures. All these effects of climate change have aggravated incidences and levels of poverty in the County. Climatic vulnerability further reduces the capacity of land to support existing and emerging livelihoods thus further aggravating environmental degradation. This is evidenced by increased reduction in pasture and vegetation cover, soil erosion, food insecurity, increased conflicts and insecurity. All contributing to increased poverty.





## 4 Policy, Legal and Administrative Framework

### General Overview

Environmental and Social Impact Assessment (ESIA) is an environmental management tool that seeks to mainstream policy and legal provisions into proposed development projects. This section highlights key guidelines in relevant international, regional, national and county policies that the Proponent will consider during the planning, implementation, operation and decommissioning of the proposed savannah cement clinker plant.

### 4.1 Policy Framework

#### World Bank Guidelines on Environmental Assessment

##### *Environmental Assessment (OP/BP 4.01)*

Proposed projects are classified into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. The categories include:

Category A which includes projects that are likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. EA for a Category A project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the "without project" situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

Category B which entails projects with potential adverse environmental impacts on human populations or environmentally important areas--including wetlands, forests, grasslands, and other natural habitats--are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects. The scope of EA for a Category B project may vary from project to project, but it is narrower than that of Category A

Category C covers proposed projects which are likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project

Category FI entails proposed projects which involve investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

*Based on the potential project impacts identified during screening, the proposed clinker project fall within Category A. The proponent will be therefore be required to assess potential environmental impacts and develop mitigation and management measures*

##### *Natural habitat environment (OP/BP 4.04)*

This policy prohibits Bank support for projects that would lead to the significant loss or degradation of any Critical Natural Habitats, whose definition includes those natural habitats that are: legally protected; officially proposed for protection; or unprotected but of known high

conservation value. The policy is “triggered” if a subproject could result in any one or more of the following four events:

- a. Loss of natural habitats
- b. Construction of “linear features” (e.g., roads, transmission lines, pipelines) that might cut through natural habitats
- c. An effect on the water supply to or drainage from natural habitats
- d. Direct or indirect result in resettlement or migration of people in a way that would adversely affect natural habitats

If, as part of the EA process described above and/or discussions with the Regional Safeguards Coordinator, the potential for significant conversion or degradation of critical or other natural habitats is identified (in accordance with one or more of the indicated criteria), the subproject is classified as Category A; projects otherwise involving natural habitats are classified as Category A or B, depending on the degree of their ecological impacts. If natural habitats are involved, the manner in which the issue would be addressed should be described in the EA documentation.

#### ***Cultural heritage (OP/BP 4.11)***

This policy addresses cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Their cultural interest may be at the local, provincial, or national level, or within the international community. If the EA process described above or discussions with the Regional Safeguards Coordinator indicate a subproject (1) will involve significant excavations, demolition, movement of earth, flooding, or other environmental changes; or (2) will be located in, or in the vicinity of, a physical cultural resources site recognized by competent authorities of the borrower, the policy would be tentatively considered “triggered.”

During the combined preparation-appraisal mission, the Task Team Safeguard Specialist should meet with government competent authorities and verify whether physical cultural resources would be affected by the project. If it is verified that the project has any of the characteristics set out in (1) or (2) above, the policy is triggered and assigned to either Category A or B. The manner in which the issue would be addressed should be described in the EA documentation.

#### ***Internally displacement (OP/BP 4.12)***

This policy covers direct economic and social impacts that both result from Bank-assisted investment projects and are caused by:

- a. the involuntary taking of land resulting in: n relocation or loss of shelter; n loss of assets or access to assets;
- b. loss of income sources or means of livelihood, whether or not the affected persons must move to another location;
- c. the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

This policy applies to all components of the project that result in involuntary resettlement, regardless of the source of financing. It also applies to other activities resulting in involuntary resettlement that in the judgment of the Bank, are:

- directly and significantly related to the Bank-assisted project;
- necessary to achieve its objectives as set forth in the project documents; and
- carried out, or planned to be carried out, contemporaneously with the project.

To address the impacts above, the borrower ordinarily prepares a resettlement plan or a resettlement policy framework that covers the following: Measures to ensure that the displaced persons are informed about their options and rights; consulted on, offered choices among, and provided with technically and economically feasible resettlement alternatives; and provided prompt and effective compensation at full replacement cost for losses of assets. If the impacts

include physical relocation, measures to ensure that the displaced persons are provided assistance (such as moving allowances) during relocation; and provided with residential housing, or housing sites, or, as required, agricultural sites for which a combination of productive potential, locational advantages, and other factors is at least equivalent to the advantages of the old site. Where necessary to achieve the objectives of the policy, measures to ensure that displaced persons are offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living; and provided with development assistance in addition to compensation measures, such as land preparation, credit facilities, training, or job opportunities

*A resettlement action plan has been prepared in accordance to the guidelines provided in this OP*

***Indigenous people (OP/BP 4.10)***

This policy contributes to the Bank’s mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of indigenous peoples. For all projects that are proposed for Bank financing and affect indigenous peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation.

*There screening and scoping process did not identify any indigenous communities or groups in the project area.*

***Forests (OP/BP 4.36)***

This policy applies to the following types of Bank-financed investment projects:

- a. Projects that have or may have impacts on the health and quality of forests
- b. Projects that affect the rights and welfare of people and their level of dependence on or interaction with forests
- c. Projects that aim to bring about changes in the management, protection, or utilization of natural forests or plantations, whether publicly-, privately-, or communally-owned.

The Bank does not finance projects that, in its opinion, would involve significant conversion or degradation of critical forest areas or related Critical Natural Habitats. If a project involves the significant conversion or degradation of natural forests or related natural habitats that the Bank determines are not critical, and the Bank determines that there are no feasible alternatives to the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs, the Bank may finance the project, provided that it incorporates appropriate mitigation measures.

The policy is “triggered” if any one of the following criteria is applicable:

- a. The project could result in direct or indirect loss of forests of high ecological value (e.g., through improving access for logging).
- b. The project would finance commercial logging operations or purchase of logging equipment.
- c. The host country is committed to sustainable management of forests.

Early in project processing, the Task Team consults with the Regional Safeguards Coordinator and, as necessary, with Environmentally and Socially Sustainable Development (ESSD) and other networks to determine if any forest issues are likely to arise during the project. For each project covered under the scope of the policy, World Bank staff ensure that an EA category is assigned in accordance with the requirements of OP/BP 4.01, Environmental Assessment. A project that is likely to have significant adverse environmental impacts with potential for conversion or degradation of natural forests or other natural habitats that that are sensitive, diverse, or unprecedented is classified as Category A; projects otherwise involving forests or

other natural habitats are classified as Category B, C, or FI, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its environmental impacts.

Projects in conflict areas (OP/BP 7.60)

#### **4.1.1 National Policy on Water Resources Management and Development (1999)**

This policy enhances a systematic development of water facilities in all sectors of the country's socio-economic progress and recognizes the by-products of the process as wastewater. It calls for development of appropriate sanitation systems to protect people's health and water resources from pollution.

Development activities should be accompanied by corresponding waste management systems to handle any waste emanating there from. The same policy requires that projects undergo comprehensive EIAs that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighbourhood and further downstream are not negatively impacted by the emissions. As a follow-up to this, EMCA, 1999 requires annual environmental audits to be conducted in order to ensure that mitigation measures and other improvements identified during EIAs are implemented.

*The project will ensure appropriate measures are taken to protect the water resource from pollution and wastage for example recycling wastewater where applicable, using water sparingly by; using/installing automatic water pipes and taps to reduce water consumption.*

*Sustainable waste management will be adopted to protect the workers, locals and the environment for example through the installation of sanitation systems which will manage, reuse or dispose the different waste flows from the site area.*

#### **4.1.2 National Environment Action Plan (NEAP, 1994)**

The Government through the NEAP 1994 recognized the negative impacts on ecosystems originating from industrial, economic and social development programs that disregarded environmental sustainability. Following on this, 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 Environmental Impact Assessments were introduced targeting the industrialists, business community and local authorities.

#### **Relevance of NEAP to the cement plant construction project**

*The proponent will submit a comprehensive report to the relevant authority for approval and licensing explaining explicitly on the prevention and mitigation measures to be followed on the adverse impacts that will arise from the implementation of the project and also follow to the letter the guidelines that will be put in place by the authority after approving the project.*

#### **4.1.3 Policy Guidelines on Environment and Development (Sessional Paper No. 6 of 1999)**

The key objectives that arise from the policy include;

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

Other issues covered in the sessional paper include, issues related 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 rising and appreciation of a clean environment. It also encourages participation of stakeholders in the management of wastes within their localities.

*The proponent has put in place pertinent measures to ensure the proposed project comply to the laid down guidelines.*

## **4.2 Legal Framework**

### **4.2.1 The Land Planning Act (Cap 303)**

Section 9 of the subsidiary legislation (The development and use of land regulations 1961) under this Act requires that before the local authorities submit any development plans to the Minister for approval, steps should be taken as may be necessary to acquaint the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should also be submitted. This is intended to reduce potential conflict between the interests of the authorities and those of landowners in respect of settlement, social and economic activities.

*Views, objections and concerns from the locals and key stakeholders in the proposed area will be garnered and put into consideration before the project is implemented and a consensus reached so that conflict does not arise.*

### **4.2.2 The Land Acquisition Act (Cap 295)**

The Act provides for the acquisition of land for public benefit. The project is under the provision of the Act. *The proponent shall commit to compensate fairly all persons whose land will be acquired during implementation of this project.*

### **4.2.3 The Occupational Health and Safety Act, 2007**

This is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The Act has the following functions among others:

- Secures safety and health for people legally in all workplaces by minimization of exposure of workers to hazards (gases, fumes & vapors, energies, dangerous machinery/equipment, temperatures, and biological agents) at their workplaces.
- Prevents employment of children in workplaces where their safety and health is at risk.
- Encourages entrepreneurs to set achievable safety targets for their enterprises.

- Promotes reporting of work-place accidents, dangerous occurrences and ill health with a
- View to finding out their causes and preventing of similar occurrences in future.
- Promotes creation of a safety culture at workplaces through education and training in occupational safety and health.

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.

*This Act will be applicable during the entire project cycle because the proponent has explicitly outlined the safety measures that will be followed once the project commences.*

#### **4.2.4 The Water Act, 2016**

Section 73 of the Act allows a person with license (licensee) to supply water to make regulations for purposes of protecting against degradation of water sources. Section 75 and sub-section 1 allows the licensee to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.

Section 76 states that no person shall discharge any trade effluent from any trade premises into sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of the effluent, maximum quantity anticipated, flow rate of the effluent and any other information deemed necessary. The consent shall be issued on conditions including payment of rates for the discharge as may be provided under section 77 of the same Act.

Section 94 of the Act makes it an offence to throw or convey or cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near to water resource in such a manner as to cause, or be likely to cause pollution of the water resource.

*Compliance to the law will be safeguarded through monitoring activities to ensure the water resource is not degraded, polluted or misused.*

#### **4.2.5 EMCA (CAP 387)**

Part II of the Environment Management & Coordination Act states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. According to section 58 of the Act an Environmental impact assessment study needs to be carried out on projects specified in the second schedule of the Act that are likely to have a significant impact on the environment. This project is considered to fall under the second schedule of the Act.

Part VIII section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radioactive or any other pollutants into aquatic environment. Section 73 requires that operators of projects which discharges effluent or other pollutants to submit to NEMA accurate information about the quantity and quality of the effluent. Section 74 demands

that all effluent generated from point sources are discharged only into the existing sewerage system upon issuance of prescribed permit from the local authorities.

The Proponent shall ensure that all activities during the construction and operation phase do not degrade the physical, biological and social environment.

*Since the project is likely to have significant negative impacts to the environment from its onset an EIA will be carried by the relevant authority to ensure the project outlines prevention and mitigation measures on the negative impacts.*

*The report will also put into consideration waste management systems for managing, reusing and disposing wastes to safeguard human health and the environment.*

#### **4.2.6 The Environmental Management and Coordination (Water Quality) Regulations, 2006**

The regulations provide for the management of activities that may result in water resources pollution. The proponent is required to comply with Regulation 8 which provides for compliance with water quality standards. It requires all operators and suppliers of treated water, containerized water and all water vendors to comply with the relevant quality standards in force as may be prescribed by the relevant lead agencies.

The regulations are meant for pollution control and prevention and provides for protection of water sources.

The proposed project shall be built alongside a sanitation system for onsite management of wastewater generated from the proposed development.

*The proponent will ensure compliance to the water pollution control measures by setting up water management systems for recycling or reusing and managing water and its wastes.*

#### **4.2.7 The Environmental Management and Coordination (Waste Management) Regulations, 2006**

The law stipulates:

- All waste generator to collect, segregate and dispose such waste in a manner provided for under these regulations;
- All waste generators to minimize waste generated by adopting cleaner production methods;
- All waste transporters to be licensed according to the act;
- All vehicles used to transport waste to be labelled in such a manner as may be directed by the Authority;
- Collection and transportation of the waste to be done in such a manner no to cause scattering of the waste;
- The vehicle and equipment for waste transportation to be in such a manner not to cause scattering of or flowing out of waste; and
- The vehicles for transportation and other means of conveyance of waste to follow the scheduled routes approved by the authority from the point of collection to the disposal site.

- Prohibition of any waste disposal on a public highway, street, road, recreation area or in any public place except in designated waste receptacle

*The proponent will put in place mitigation measures on handling solid wastes by;*

- *Ensuring solid wastes are put in a designated area for appropriate disposal*
- *Ensuring all wastes will transported by licensed waste handlers and to be disposed in licensed disposal sites.*
- *Providing proper solid waste collection and disposal amenities*

#### **4.2.8 The Mining Act, Cap 306**

This is an Act of parliament that consolidates the law relating to mining. The Act spells out licensing conditions set by the government and duties of the owner of the license. This Act will specifically apply to the clinker plant because of mining the raw materials.

*The proponent and mineworkers will adhere to the provisions herein.*

#### **4.2.9 The County Governments Act, 2012**

The act makes various provisions on matters related to devolution, governance and development of counties and their sub-regions. Clauses of particular interest to the proposed cement plant include section 48 (1a) on the functions and provisions for development of urban areas and cities; section 87, which makes provisions and defines modalities for citizen participation and protection of community interests; and section 102, which defines principles of planning and facilitation of county development in line with local and national interests, as well as on the protection and development of natural resources.

*Full compliance to this act will be adhered to through involving, acquainting and consulting the affected and interested stakeholders in the proposed area to ensure their views, concerns and complaints are looked into before the implementation of the project and also throughout the project cycle.*

#### **4.2.10 The Building Code 2009**

Section 194 requires that where a sewer exists, the occupants of the nearby premises shall apply to the county government for a permit to connect to the sewer line and that all wastewater must be discharged into the sewers. The code also prohibits construction of structures or buildings on sewer lines.



## 5 Public Participation

This Environmental and Social Impact Assessment will be highly participatory. The nature and level of community and other stakeholder participation is as per the EMCA (CAP 387) guidelines and World Bank OPs. The Study Team conducted community consultations in the target communities using household questionnaires with community members and interview guides with County government, non-governmental and other local institutions. The process is still ongoing with respect to County Government authorities and the Non-governmental authorities. (*Annex 2-stakeholder consultation schedule*).

The objectives of the community consultations include:

- To identify potential negative and positive impacts of the Project at the level of community groups as well as the associated appropriate remedial measures that could be found through participation of the community members.
- To take into account the opinion of the communities that may be affected by the Project so that their views and proposals could be considered in development of mitigation and benefit enhancement measures.
- To increase public awareness and understanding of the Project and promote its acceptance.



*Plate 5-1: Preliminary Consultation with the area sub chief –Kyuso Sub location*



*Plate 5-2: ESIA Project team addressing the community in a Baraza*



Community engagement meeting at the chiefs office in Kimu location



Community engagement meeting at the chiefs office in Mbagwani location

### 5.1 Community concerns regarding the proposed project

The community participation meetings, barazas and household questionnaires established the following anticipated project impacts during construction and operation of the project.

#### Benefits of the project

- Improved social amenities such as schools and hospitals
- Creation of employment to the local community
- Infrastructural development and improvement
- Improved security in the area
- Overall local economic development in the areas

#### Anticipated negative impacts

- Air Pollution
- Earthquakes
- Emergence of airborne ailments
- Vegetation clearance
- Soil degradation
- Emission of harmful carbon to the atmosphere
- Noise pollution
- Water Pollution
- During blasting some rocks can break loose and hit animals or people leading to their death
- Displacement of people
- Pits left behind after excavation dangerous for animals and people

#### Proposed impact mitigation measures

- Avoid poor workmanship so as to prevent risks and hazardous conditions
- Area under construction should be demarcated and the community informed to keep off
- Contractor to deploy mechanisms for air pollution reduction during construction

- The leftover pits should be refilled to avoid accidents
- Construction of a health facility to curb the sickness related to the project
- Training the community on how to mitigate the health issues related to the project
- Installation of dust proof barriers

## **6 PROJECT ALTERNATIVES & JUSTIFICATION**

During ESIA study, it is important to consider project alternatives in reference to the environmental as well as economic relevance of the project. Careful review of the proposed project in relation to location, other options to the area of influence, economic considerations, and budget for the proposed construction works were considered.

### **Option 1 - Alternative site**

Under this alternative, the proponent could consider purchasing or leasing land at different sites, either within Mwingi North or another site outside its premises to construct the proposed project. No alternative sites have been proposed for the proposed project which is appropriate for the project. An alternative sites would also require; the identification of a suitable area, additional budget for its purchase, preliminary site reports and exploration to establish occurrence of limestone. Therefore, adopting this alternative will delay the implementation of the proposed development or it might not even be attainable in the long term, thereby failing to achieve the project objectives.

### **Option 2: - No Action Option**

The second alternative to the project is to retain the status quo, and not undertake the project. This alternative describes a situation where the proposed development fails to be implemented. If this option is taken, the positive impacts associated with the proposed developments will not accrue. The short and long term economic and social benefits that will accrue to the proponent, the local community, the Kitui county and the country will also not be achieved. However, from an environmental and social management perspective, this alternative will be beneficial in the sense that any potential negative impacts associated with the project will be avoided. The "No Action Option" should not be adopted, because the proposed development of the facilities will encourage increased production of cement, creation of employment, development of the area as long as it is undertaken on an environmental and social sustainable basis.

From these options, it is obvious that the immediate construction of the proposed project at its proposed location offers the best social and economic benefit to the company, and should be the one adopted. Since the environmental loads generated by the construction and operation activities of the proposed project can be mitigated, it can be concluded that that there is no other feasible and economical alternative to the proposed project and its location.

## **PROJECT JUSTIFICATION**

The government recently announced the 'Big Four' Plan for development, which by 2022 is expected to: boost manufacturing activity and increase the sector's GDP contribution to 15%; enhance food and nutrition security through large-scale production; achieve universal and affordable health coverage to all Kenyans and support the construction of at least 500,000 affordable houses. These initiatives will intensify construction activities which will increase cement consumption in the country. The proponent therefore seeks to increase the production of cement to support these development activities by utilizing available mineral resources. In addition, recent climatic changes have adversely affected communities in the arid and semi arid

areas who depend on rainfed agriculture. Mineral extraction in this area provides an alternative climate resilient livelihood for the ASAL community in Mwingi. The plant will be implemented against the backdrop of emerging environmental sustainability technologies that will effectively mitigate emissions and environmental pollution. The country has also developed laws and regulations to govern mining operations including the Mining Act, 2016; Climate Change Act, 2016 and Air Quality regulations 2014. The devolved structure provides a framework within which government agencies can monitor the implementation of the Environmental and Social Management Plan and establishment of public grievances and redress mechanisms.

## 7 Potential Environmental Impacts and Mitigation Measures

### 7.1 Prediction of Impacts

#### Introduction

This section identifies and discusses both the positive and negative impacts associated with the proposed development. These impacts have been identified according to the three phases of any new project i.e. construction, operation and de-commissioning stages and each has different types and levels of impacts on the environment. The impacts of each are as outlined below;

#### 7.1.1 Positive Impacts during Construction Phase

##### Employment Creation

Construction works will provide both direct and indirect employment opportunities for both skilled and unskilled labour. Several workers including casual labourers and masons are to work during the project construction stages.

##### Capacity building

This will be achieved through training and awareness campaigns on Occupational Health and Safety issues for workers, local residents, and any other affected stakeholders within the site area.

##### Growth of Informal Business

During construction period the informal sector will profit from the operations. This will involve Jua Kali operators selling their products to be used on site. Such a move shall promote Jua Kali sector in the local areas. Food business will also develop as most of the workers who will be working on the proposed project site will be buying food from the informal business owners who shall be operating in the locality.

#### 7.1.2 Negative Impacts during Construction Phase (Site preparation & construction of mining facilities)

##### Land acquisition

Acquisition of land for mineral extraction is likely to cause socio economic disruptions to the local inhabitants. This may result to loss of livelihoods, community conflicts and increased socio economic vulnerability.

##### Noise Pollution

The main contributor to noise in such a construction area would be moving trucks, excavation & construction equipment and by the normal construction activities which is unavoidable but can be reduced to manageable levels by use of well-maintained equipment.



## **Dusts Emissions**

Dust pollution is likely to occur during the site clearance, excavations and vehicle movements in and out of the construction site. Dust becomes a nuisance to the pedestrians, motorist and also is a health hazard to all in contact with it. Heavy-duty vehicles and other machinery also generate exhaust fumes, which pollute the air. This impact can in turn affect the health of those operating the machinery if they are continuously exposed to these conditions.

## **Vegetation Clearance**

Development and construction activities will require land clearing for the mine as well as for the process plant, waste and stockpile areas, and infrastructure such as buildings, roads, construction camps, water management structures, power plant, transmission lines and access corridors to the mine site. The vegetation to be cleared on site include: *Acacia Meliffella*; *Acacia Polyacantha*; *Erythna Bunii*; *Grevil/ea Robust* and food crops such as millet, sorghum and green grams. However, no critical natural habitat in the form of a forest, wetland, riparian zone or wildlife corridor will be disturbed.

## **Workers Health and Safety**

During construction workers are likely to be affected by accidents (falling objects and accidents involving working machines), inhaling of dust and fumes. Due to the intensive masonry works, workers will be exposed to risks of accidents and injuries.

## **Increased Consumption for Water**

The construction workers and the construction work will create an additional demand for water in addition to the existing demand. Water will be mostly used in the creation of concrete for construction works and for wetting surfaces.

### **7.1.3 Positive Impacts during Operation Phase**

#### **Creation of employment**

Employment opportunities are one of the long-term major impacts of the proposed project that will be realized. This will be through the employment of local workers in proposed cement factory.

#### **Increased Revenue**

There will be positive gain for the revenue system arising from the processing of the building materials to the proposed commercial development to the Kitui town and the whole country.

The proponent will also benefit directly from the proposed project through revenue because of selling of the cement materials.

#### **Improve Access to Services**

The operation of the proposed factory will facilitate access to services such as health care facilities, banking services and movement of the local people through improved access roads.

### **Market for Supply of Local Cement**

Inexpensive building will easily be accessed by the local constructors and home builders consequently facilitating decent housing and secure homes.

## **7.1.4 Negative Impacts during Operation Phase (Limestone extraction & processing)**

### **Dust Emission**

The principal sources of dust emissions include blasting, exposed surfaces such as tailings facilities, stockpiles, waste dumps and haul roads and infrastructure.

### **Gaseous Emissions**

The main sources of gaseous emissions are from combustion of fuels in power generation installations, mobile emissions and from drying and heating operations. The production of clinker from limestone releases greenhouse gas emissions both directly and indirectly: the heating of limestone releases CO<sub>2</sub> directly, while the burning of fossil fuels to heat the kiln indirectly results in CO<sub>2</sub> emissions. It is estimated that producing a tonne of cement generates nearly a tonne of CO<sub>2</sub>. This has can significantly increase a country's GHG contribution if not controlled.

### **Increased Water Demand**

Increased water demand due to limestone processing activities and population influx in the area may affect surface and groundwater availability hence affecting the socio economic livelihoods of the local communities in Kyuso. This is particularly a major concern since the area is semi arid is therefore a water stressed region.

### **Water pollution**

Potential contamination of water sources may occur from seepage of effluent water from the processing units into underground water. Run off from the site containing effluent water is a potential and significant source of stream and river pollution.

### **Storm water management**

Key issues associated with management of stormwater include separation of clean and dirty water, minimizing run-off, avoiding erosion of exposed ground surfaces, avoiding sedimentation of drainage systems and minimizing exposure of polluted areas to stormwater.

### **Solid Waste**

Mines generate large volumes of waste. Structures such as waste dumps, tailing impoundments and containment facilities should be planned, designed, and operated such that geotechnical risks and environmental impacts are appropriately assessed and managed throughout the entire mine cycle. The most significant waste generating mining activities are the movement of large amounts overburden. Other types of waste include: workshop scrap, household and non-process-related industrial waste, as wells as waste oils, chemicals, and other potentially hazardous wastes.

## **Noise & Vibrations**

Sources of noise emissions may include noise from vehicle engines, loading and unloading of rock into steel dumpers, chutes, power generation, shoveling, ripping, drilling, blasting, crushing, grinding, and stockpiling. Good practice in the prevention and control of noise sources should be established due to the close proximity of residences and schools. The most significant vibrations are usually associated with blasting activities; however vibrations may also be generated by many types of equipment in use.

## **Increased Energy Demand**

The most significant energy consuming activities in the proposed plant are transport, drilling, excavation, extraction, grinding, crushing, pumping, and ventilation processes.

## **Moral decay**

Since the project will lead to an increase in income and raise living standards in the area, there is a likelihood of increased social vices such as prostitution, theft, alcoholism among others. The bank agency provided will also lead to increase in crime activities especially theft.

## **Population Influx**

Population influx will be evident as people will be attracted by the construction activity for employment. Population influx may lead to increase in pressure on the available resources in the area leading to their degradation.

## **Occupational Health and Safety**

During operation occupation hazards and incidences may occur, and the immediate neighbours and workforce involved would be more subjected to these hazards. Mining activities should seek to provide an operation where people are able to work without being injured and where the health of the workforce is promoted. Occupational health and safety issues occur during all phases of the mine cycle and can be classified according to the following categories:

- General workplace health and safety
- Hazardous substances
- Use of explosives
- Electrical safety and isolation
- Physical hazards
- Fitness for work
- Travel and remote site health
- Thermal stress
- Noise and vibration

### **7.1.5 Positive Impacts during Decommissioning Phase**

#### **Creation of Employment**

Employment opportunities shall be realized during decommissioning phase of the proposed development.

#### **Environmental Conservation**

On decommissioning, waste materials generated will be recovered and re-used. These materials will be used as raw materials in other construction processes hence reducing demand for raw materials. This in turn will reduce potential impact to the environment.

### **7.1.6 Negative Impacts during Decommissioning Phase**

#### **Noise Pollution**

Decommissioning related activities will lead to significant deterioration of the environment within the project site and the surrounding areas. This will be as a result of the noise and vibration that will be experienced during demolition activities.

#### **Acidification**

Potential change of geotechnical properties in dumps due to chemical or biologically catalyzed weathering should be considered. This can reduce the dumped spoils significantly in grain size and mineralogy, resulting in high ratios of clay fraction and a significantly decreased stability towards geotechnical failure.

#### **Loss of Employment**

Decommissioning phase will result to loss of employment to the person who will be working in the factory. Other people who will be affected indirectly include garbage collectors and neighbouring businesses.

#### **Occupational Health and safety risks**

Demolition works will inevitably expose workers and the public to occupational health and public safety risks: in particular, working with heavy equipment, handling and use of tools engender certain risks. Demolition workers are also likely to be exposed to risk of accidents and injuries resulting from accidental falls, falling objects, injuries from hand tools and other equipment.

#### **Air pollution**

Some localised increased dust levels will be unavoidable during decommissioning phase. Exhaust emissions are likely to be generated during demolition period by the various machinery and equipment to be used as well as motor vehicles used for the exercise. The impact will be short term and will last with duration of demolition process.

## 7.2 Mitigation Measures

### 7.2.1 Mitigation Measures during Construction

This part addresses the negative impacts during construction, operation and decommissioning phases. The following issues are addressed

#### Land Acquisition

Potential mitigation measures

- Active community mobilization & sensitization
- Engagement of local leaders in compensation process
- Preparation of a participatory compensation action plan
- Active community sensitization on reconstructing socio economic fabric

#### Noise Pollution

The impact of noise is usually moderately high during construction. However, during the operation phase minimal noise is expected.

Potential mitigation measures

- People participating in the high noise construction activities should be provided with Personal Protective Equipment (PPE) such as ear muffs for ear protection and their use thereof should be enforced.
- Ensure use of equipment with exhaust systems in good working condition should be encouraged so as to reduce the noise levels. The equipment should also be regularly serviced and maintained.
- Instruct drivers to avoid gunning of vehicle engines and hooting
- Vibration will be minimized in the project site and surrounding areas through sensitization of construction truck drivers to switch off vehicle engines while offloading materials.
- Safety distances and appropriate warning sound to be put in place when blasting

#### Dust Emissions

During construction generation of dust is a normal occurrence due to the heavy earth moving machinery and equipment.

Potential mitigation measures

- Masks should be provided to all personnel in dust generation areas throughout the period of construction.
- All equipment on site should be properly maintained and in good operating condition so as to emit minimal air pollution.
- Emission of gases from machines can be reduced by ensuring exhaust systems are in good working condition.
- Control of the speed and operation of construction vehicles will help in preventing the generation of much dust into the air. As well, the site as well as its access routes will also require to be regularly sprinkled with water in order to reduce the effects of dust.

- Watering all active construction areas as and when necessary to lay dust
- Dust generating activities like excavation, handling and transportation of soil will be avoided during strong winds

### **Vegetation Clearance**

The clearance of the affected area will possibly lead to the destruction of vegetation, destruction of fauna habitats and enhancement of soil erosion. Decreased vegetation cover leads to environmental degradation and increased soil erosion.

Potential Mitigation Measures

- Establish a tree plantation within the project location to replace the cleared vegetation
- Establishment of a natural buffer zone around the plant
- Sensitize migrants to the area to safeguard natural ecosystems and habitats

### **Energy Consumption**

The proposed development will utilize huge amount of energy resources. This will be attributed to the optimum use of electrical appliances, lighting systems, and other electric machinery as may be used for different purposes. It also will involve use of renewable energy resources.

Mitigation Measures put in place include;

- Switch off electrical appliances when not in use
- Conserve energy through minimal use of electrical appliances
- Make use of alternative source of energy such as solar power which is renewable source
- Put off lights immediately when not in use or are not wanted

### **Workers Health and Safety**

During the construction phase there will be a large work force on site. The workers are exposed to accidents especially during construction when loading and off-loading building materials and when handling construction equipment.

Recommended mitigation measure

- The sites shall be adequately protected or fenced off from unauthorized intrusions and warning signs should be properly displayed and strictly adhered to.
- Provision of adequate protective gears and well-equipped First Aid kits.
- Adequate sanitary facilities should be provided for the workers' hygiene and protection.
- The capacity of the workers on safety concerns should be built by way of awareness and sensitization sessions for the workers on safe working practices which should be held prior to the commencement of the construction phase.
- Reporting and recording any incidences on site



## **Increased Water Demand**

The construction work will result in an increase in water demand. High water consumption will occur during the construction phase. This will further strain the existing water.

### Potential Mitigation Measures

- Recycling of wastewater where appropriate
- Install water pipes which turn off automatically when water is not in use
- Work ethics: Provide notices and information signs to sensitize on means and needs to conserve water resources i.e. “keep/ leave the tap closed.” This will awaken the civic consciousness of the workers and occupants with regard to water usage and management

## **7.2.2 Mitigation Measures during Operational Phase**

### **Dust Emissions**

- Utilization of dust suppression techniques-wetting down, use of all weather surfaces, optimization of traffic patterns, and reduction of travel speeds
- Use of particulate scrubbers, fabric filters, Electrostatic precipitators
- Exposed soils and other erodible materials should be covered promptly
- New areas should be cleared and opened-up only when absolutely necessary
- Surfaces should be re-vegetated when inactive
- Storage for dusty materials should be enclosed or operated with efficient dust suppressing measures
- Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems
- Conveyor systems for dusty materials should be covered and equipped with measures for cleaning return belts.

### **Gaseous Emissions**

- Operations at controlled temperature since higher temperature roasters generally cause more problems of contaminant control
- Inclusion of an appropriate gas scrubbing system- wet/dry scrubbers
- Establishment of a natural buffer around the plant –to provide a sink for the emissions
- Air quality assessment to ensure compliance with standard provisions

## **Increased Water Demand**

- Adoption of dry operation processes where possible
- Recycling of effluent water
- Annual water consumption auditing to establish opportunities for conservation

### **Water Pollution**

- Provision of an effluent treatment plant for stormwater, process effluents, and overall mine works drainage
- Waste water discharge from the ETP should be monitored to ensure compliance with regulations -Water Resource Authority & NEMA
- Efficient oil and grease traps or sumps should be installed and maintained at refueling facilities, workshops, fuel storage units, and containment areas
- Spill kits should be available with emergency response plans

- Proper management of sanitary wastewater and regular maintenance of the system

### **Storm water management**

- Reducing exposure of sediment-generating materials to wind or water
- Divert run-off to designated areas for treatment and sediment removal
- Reducing or preventing off-site sediment transport by use of settlement ponds
- Storm water drains, ditches, and stream channels should be protected against erosion through a combination of adequate dimensions, slope limitation techniques, and use of and lining.

### **Solid Waste**

- Waste rock dumps should be planned with appropriate terrace and lift height specifications based on the nature of the material and local geotechnical considerations to minimize erosion and reduce safety risks
- Provide for neutralization of Potentially Acid Generating (PAG) wastes to minimize the risk of metal leaching
- Hazardous waste, including waste oils and chemicals, spent packaging materials and containers, should be managed as per the NEMA regulations
- Hazardous waste should be handled by specialized providers and management facilities specifically designed and operated for this purpose
- When such services are unavailable within a feasible distance of the mine, the mine should establish and operate its own waste facility with the necessary permits
- General solid wastes (office and staff residential areas) to be put in a designated area for appropriate disposal
- Provision of proper solid waste collection and disposal amenities

### **Noise Pollution & Vibrations**

The proposed project is likely to cause disturbance through noise and excessive vibration.

Proposed Mitigation Measures to be put in place

- Noise levels at the nearest sensitive receptor should meet the noise guidelines in the Noise and Excessive Vibrations Pollution Control Regulations, 2009
- Noise emissions should be minimized and controlled through enclosure and cladding of processing plants; Installation of proper sound barriers and / or noise containments, with enclosures at or near the source equipment (e.g. crushers, grinders, and screens)
- Installation of natural barriers at facility boundaries, such as vegetation
- Construction machinery, vehicles and equipment to be maintained regularly.
- Comply with provisions of the for permissible noise and vibration levels.
- Avoid hooting especially when passing through silent zones areas such as schools, churches, residential areas, offices and hospitals
- Optimization of internal-traffic routing, particularly to minimize vehicle reversing needs (reducing noise from reversing alarm)
- Use of specific blasting plan- correct charging procedures and blasting ratios, delayed / microdelayed or electronic detonators, and specific in-situ blasting tests
- Development of blast design, including a blasting-surfaces survey, to avoid overconfined charges, and a drill-hole survey to check for deviation and consequent blasting recalculations
- Implementation of ground vibration and overpressure control with appropriate drilling grids;

- Adequately designing the foundations of primary crushers and other significant sources of vibrations.

### **Increased Energy Demand**

Recommended energy conservation measures include:

- Use of non-invasive technologies such as remote sensing and ground-based technologies to minimize exploratory digging and drilling;
- Correctly sizing motors and pumps used in the excavation, ore moving, ore crushing, and ore handling process
- Use of adjustable speed drives (ASDs) in applications with highly varying load requirements.

### **Occupational Health and Safety**

- Preparation of emergency response plans specifically applicable to exploration and production activities and including the provision and maintenance of necessary emergency response and rescue equipment;
- Sufficient number of first aid trained employees to respond to emergencies;
- Implementation of specific personnel training on worksite health and safety management
- Communication program with a clear message about corporate management's commitment to health and safety.
- Illumination systems should be adequate and safe for the planned working conditions in travel paths, mine working areas, and within and around surface facilities and dumpsites of mines
- Signage in hazardous and risky areas, installations, materials, safety measures, emergency exits, and other such areas should be in accordance with international standards
- Provide workers and visitors with the necessary personal protective equipment (PPE), and provide instruction and monitoring in their appropriate maintenance and use
- Occupational health assessments should be conducted for employees on a regular basis, based on exposure to risk.
- Medical records should be retained for at least 20 years.
- Working areas should be provided with adequate ventilation and dust/ fume extraction systems to ensure that inhalation exposure levels for potentially corrosive, oxidizing, reactive or siliceous substances are maintained and managed at safe levels
- Using, handling, and transporting explosives in accordance with national explosives safety regulations
- Assigning certified blasters or explosives experts to conduct blasts
- Actively managing blasting activities in terms of loading, priming, and firing explosives, drilling near explosives, misfired shots and disposal;
- Adoption of consistent blasting schedules, minimizing blast-time changes
- Specific warning devices (e.g. horn signals, flashing lights) and procedures should be implemented before each blasting activity to alert all workers and third parties in the surrounding areas (e.g. the resident population).
- Specific personnel training on explosives handling and safety management should be conducted;
- Blasting-permit procedures should be implemented for all personnel involved with explosives
- Blasting sites should be checked post-blast by qualified personnel for malfunctions and unexploded blasting agents, prior to resumption of work

- Planning, designing, and operating all structures such as open pits, waste dumps, containment facilities and underground excavations such that geotechnical risks are appropriately managed throughout the entire mine cycle.
- Review of shift management systems to minimize risk of fatigue among employees;

### **7.2.3 Mitigation Measures during Decommissioning Phase**

Decommissioning is used to safely retire a facility that is no longer needed. During decommissioning, facilities or structures are cleaned or secured so that the facility does not pose a risk to public health or the environment now or in the future.

During decommissioning phase of a project any areas of land used for the project should be re-instated for sustainable future use.

In this case the following will be done: -

- Termination of water connections.
- Provision of Personal Protective Equipment (PPEs) to the workers who will participate in the demolition exercise.
- Waste from the site to be disposed in an environmentally friendly manner.
- Rehabilitation of land by removing any unnecessary materials that shall be covering land and preventing the natural biodiversity.
- Landscaping and re-vegetation of all disturbed areas.

## **8 Environmental and Social Management Plan (ESMP)**

The ESMP provides a systematic framework within which the negative environmental and social impacts identified during the ESIA study can be mitigated and any beneficial environment effects can be enhanced. Responsibilities for the implementation of the various aspects of the ESMP will be identified. The ESMP adopts the IFC standards which require a demonstration on capacity of responsible parties to implement identified mitigation measures, grievances redress mechanisms for project affected persons and the monitoring and evaluation strategies to be adopted.

Anticipated Negative Impacts	Recommended Mitigation Measure	Responsible Party	Organizational Capacity	Public Grievance Mechanism	Monitoring Mechanisms
<b>Land acquisition</b>					
Purchase of land parcels from illegitimate owners	Active community mobilization & sensitization Engagement of local leaders in compensation process	Proponent Local leaders- sub chief, village elders, chief	Collaboration with local leaders to mobilize the community	Establishment of a link between the area chief and Proponent-field officer	Project monitoring reports -Field visits
Conflict over compensation process	Preparation of a participatory compensation action plan	Proponent	Company's Environment/safety department staff	Establishment of a link between the area chief and Proponent	Project monitoring reports -Field visits
Socio economic disruption	Use of Free, Prior and Informed Consent (FPIC) Active community sensitization on reconstructing socio economic fabric	Proponent Local leaders	Collaboration with local leaders in community sensitization	Establishment of a link between the area chief and Proponent	Project monitoring reports -Field visits
<b>Site preparation</b>					
Vegetation clearance	Establish a tree plantation within the project location Establish a natural buffer zone around the project site Sensitize migrants to the area to safeguard natural ecosystems and habitats	Proponent  NEMA	Company's Environment/safety department staff in collaboration with Kenya Forest Service	NEMA county office -public complaints department	Annual project environmental auditing(legal requirement)
<b>Limestone Extraction &amp; Processing</b>					
Low mine optimization & low grade limestone production output	Assessment to develop an optimization design <sup>4</sup>	Proponent	Professional consultation	Ministry of Petroleum & Mining county/national office	Annual output audit

<sup>4</sup> Optimization design is attached in the report



Anticipated Negative Impacts	Recommended Mitigation Measure	Responsible Party	Organizational Capacity	Public Grievance Mechanism	Monitoring Mechanisms
Emissions (Dust & particulate matter) from drilling, blasting, transportation of crude limestone	<ul style="list-style-type: none"> <li>-Utilization of dust suppression techniques-wetting down, use of all weather surfaces, optimization of traffic patterns, and reduction of travel speeds</li> <li>- Use of particulate scrubbers, fabric filters, electrostatic precipitators</li> <li>-Exposed soils and other erodible materials should be covered promptly</li> <li>-New areas should be cleared and opened-up only when absolutely necessary</li> <li>-Surfaces should be re-vegetated when inactive</li> <li>-Storage for dusty materials should be enclosed or operated with efficient dust suppressing measures</li> <li>-Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems</li> <li>-Conveyor systems for dusty materials should be covered and equipped with measures for cleaning return belts.</li> </ul>	Proponent  NEMA	Environment & Safety department to coordinate emission control measures	NEMA county office —public complaints department	Air Quality Monitoring Schedule-NEMA requirement <sup>5</sup>
Emissions from vehicle exhaust, generators; limestone heating, coal heated kiln ( sulfur dioxide, nitrogen oxides, particulate matter (PM),	<ul style="list-style-type: none"> <li>-Thermal oxidizers for stationary equipment</li> <li>-Use of wet/dry scrubbers</li> <li>-Traffic control/management to limit idling time</li> <li>-Regular air quality monitoring</li> <li>-Occupational health measures</li> <li>-Establishment of tree plantations as a trade</li> </ul>	Proponent	Trained plant operators Experience in emissions control Monitoring by Environment and Safety department	NEMA office	Air Quality Monitoring Schedule-NEMA requirement

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5 Air Quality Regulations, 2014

Anticipated Negative Impacts	Recommended Mitigation Measure	Responsible Party	Organizational Capacity	Public Grievance Mechanism	Monitoring Mechanisms
and heavy metals)	<ul style="list-style-type: none"> <li>off for carbon/methane emissions</li> <li>-Waste generated from scrubbers should be re-used in the process</li> </ul>				
Noise pollution & vibrations	<ul style="list-style-type: none"> <li>-Noise levels at the nearest sensitive receptor should meet the NEMA noise guidelines</li> <li>-Noise emissions should be minimized and controlled through enclosure and cladding of processing plants;</li> <li>-Installation of proper sound barriers and / or noise containments</li> <li>-Installation of natural barriers at facility boundaries, such as vegetation</li> <li>-Construction machinery, vehicles and equipment to be maintained regularly.</li> <li>-Optimization of internal-traffic routing, particularly to minimize vehicle reversing needs (reducing noise from reversing alarm)</li> <li>-Use of specific blasting plan- correct charging procedures and blasting ratios,</li> <li>-Development of blast design, including a blasting-surfaces survey, to avoid overconfined charges, and a drill-hole survey to check for deviation and consequent blasting recalculations</li> <li>-Implementation of ground vibration and overpressure control with appropriate drilling grids;</li> <li>-Adequately designing the foundations of primary crushers and other significant</li> </ul>	Proponent	Experience in noise management	NEMA county office	Noise monitoring schedule - NEMA requirement <sup>6</sup>

<sup>6</sup> Noise and Excessive Vibrations Pollution Control Regulations, 2009

Anticipated Negative Impacts	Recommended Mitigation Measure	Responsible Party	Organizational Capacity	Public Grievance Mechanism	Monitoring Mechanisms
	sources of vibrations.				
Increased water demand	-Adoption of dry operation processes where possible <sup>7</sup> -Recycling of effluent water -Annual water consumption auditing to establish opportunities for conservation	Proponent	-Consideration made in project design report - Environmental and safety department -Existing environmental auditing framework	-Project liaison officer	Annual water consumption/quality audit
Increased energy demand	-Use of non-invasive technologies such as remote sensing and ground-based technologies to minimize exploratory digging and drilling -Correctly sizing motors and pumps used in the excavation, ore moving, ore crushing, and ore handling process -Use of adjustable speed drives (ASDs) in applications with highly varying load requirements.	Proponent	-Staff trained on energy conservation	NEMA county office	Annual Energy audit
Water pollution	-Provision of an effluent treatment plant for stormwater and process effluents -Waste water discharge from the ETP should be monitored to ensure compliance with regulations -Water Resource Authority & NEMA <sup>8</sup> -Efficient oil and grease traps or sumps should be installed and maintained at refueling facilities, workshops, fuel storage units, and containment areas -Spill kits should be available with	Proponent  Water Resource Authority  NEMA	ETP factored in plant design  Environment & Safety department to provide regular water quality data	Water Resource Authority regional office	Monthly monitoring of ETP discharge

<sup>7</sup> Recommended in the optimization design

<sup>8</sup> Standards for Discharge of Effluent or Waste Water attached

Anticipated Negative Impacts	Recommended Mitigation Measure	Responsible Party	Organizational Capacity	Public Grievance Mechanism	Monitoring Mechanisms
	<p>emergency response plans</p> <p>-Proper management of sanitary wastewater and regular maintenance of the system</p>				
Storm water management/ sediment control	<p>-Reducing exposure of sediment-generating materials to wind or water</p> <p>-Divert run-off to designated areas for treatment and sediment removal</p> <p>-Reducing or preventing off-site sediment transport by use of settlement ponds</p> <p>-Storm water drains, ditches, and stream channels should be protected against erosion through a combination of adequate dimensions, slope limitation techniques, and use of and lining.</p>	Proponent	Daily monitoring by environment & safety staff	Water Resource Authority regional office	Monthly monitoring of storm water discharge
Solid waste management	<p>-Waste rock dumps should be planned with appropriate terrace and lift height specifications based on the nature of the material and local geotechnical considerations to minimize erosion and reduce safety risks</p> <p>-Provide for neutralization of Potentially Acid Generating (PAG) wastes to minimize the risk of metal leaching</p> <p>-Hazardous waste, including waste oils and chemicals, spent packaging materials and containers, should be managed as per the NEMA regulations</p>	Proponent	Consideration of waste dumps will be made in structural design of the plant	NEMA county office Company's incidences desk Company liaison officer	Annual environmental audit

Anticipated Negative Impacts	Recommended Mitigation Measure	Responsible Party	Organizational Capacity	Public Grievance Mechanism	Monitoring Mechanisms
Risk of handling hazardous materials	<ul style="list-style-type: none"> <li>- Hazardous waste should be handled by specialized providers and management facilities specifically designed and operated for this purpose</li> <li>-When such services are unavailable within a feasible distance of the mine, the mine should establish and operate its own waste facility with the necessary permits</li> </ul>	<p>Proponent</p> <p>NEMA</p>	<p>Management environment &amp; safety department</p>	<p>NEMA county office</p> <p>Company's incidences desk</p> <p>Company liaison officer</p>	<p>Annual environmental audit</p> <p>NEMA inspection visits</p>
Occupational health & Safety	<ul style="list-style-type: none"> <li>-Preparation of emergency response plans;</li> <li>-Sufficient number of first aid trained employees to respond to emergencies;</li> <li>-Implementation of specific personnel training on worksite health and safety management</li> <li>-Communication program with a clear message about corporate management's commitment to health and safety.</li> <li>-Illumination systems should be adequate and safe for the planned working conditions in travel paths, mine working areas,</li> <li>-Signage in hazardous and risky areas, installations, materials, safety measures, emergency exits</li> <li>-Provide workers and visitors with the necessary personal protective equipment (PPE)</li> <li>-Occupational health assessments should be conducted for employees on a regular basis, based on exposure to risk.</li> <li>-Medical records should be retained for at least 20 years</li> </ul>	<p>Proponent</p>	<p>Adequately staffed environment &amp; safety department</p>	<p>Company's incidences desk</p> <p>Company liaison officer</p>	<p>Annual environmental audit</p>

Anticipated Negative Impacts	Recommended Mitigation Measure	Responsible Party	Organizational Capacity	Public Grievance Mechanism	Monitoring Mechanisms
Increased demand on existing health services	Provision of amenities to complement existing facilities-health, schools, housing	Proponent	Provision made in the plant design	Company Liaison officer	Annual environmental audit
<b>Decommissioning</b>					
Land dereliction	-Rehabilitation of project site-revegetation -Provide for neutralization of Potentially Acid Generating (PAG) wastes to minimize the risk of metal leaching -Establishment of income generating activities with wider community social benefits e.g. recreational sites	Proponent	Provision made in the plant design	NEMA county office Petroleum & Mining Office	Annual environmental audit



## 9 SUMMARY, RECOMMENDATIONS & CONCLUSION

### Summary

The proposed project presents multiple environment and social benefits including: employment creation increased household incomes, local economic growth and creation of climate resilient livelihood options in a semi arid region. It will also allows for optimal use of natural resources in the country. The realization of these benefits could have significant negative impacts on the environment. These include: vegetation clearance during site preparation, dust and gaseous emissions, water pollution, sedimentation, increased water demand, increased energy demand, noise and vibrations and occupational health and safety risks. Land dereliction is also expected to occur after project decommissioning. The negative impacts however can be mitigated through technical design considerations, compensation strategies such as revegetation, community sensitization, staff capacity building and continuous monitoring of environmental conditions against the baseline.

### Recommendations

- 1) The project should be implemented as it does not present any negative impact that cannot be mitigated
- 2) The proponent should develop a framework within which the Environmental and Social Management Plan (ESMP) will be implemented. This involves capacity building of the Environment & Safety Department and review of the company's environmental policy
- 3) The Environment & Safety Department should develop a monitoring framework to ensure continuous assessment of environmental conditions. It should bear specific environmental indicators as provided by national and international guidelines and the monitoring schedule.
- 4) A copy of the environmental and social management plan must be given to the Contractor prior to construction. The contractor needs to demonstrate how the ESMP will be implemented in the construction process.
- 5) The proponent should establish a partnership with environmental agencies and communities to support the implementation of the ESMP
- 6) The proponent should strengthen the liaison office to allow for communication between the community and the company.
- 7) The proponent and government agencies particular NEMA-environmental lead agency should strengthen their grievances redress mechanisms

### Conclusion

The proposed Savannah clinker plant in Kyuso Location will significantly improve the livelihoods of the local community in Kyuso, promote local economic development in Mwingi North and increase the Gross Domestic Product of the country. The project will not degrade natural habitats such as forests, wetlands, protected areas and wildlife corridors. It does not affect any indigenous or communities that may be classified as minorities or vulnerable. It does not

pose threat to historically significant features. All the identified negative impacts can be mitigated. The implementation of ESMP is critical for sustainable project implementation. The proponent demonstrates capacity to implement the ESMP through the Company environmental policy, an existing environment and safety department, existing partnership and collaborations with government agencies and local leaders in the proposed project area, company liaison officer who links the proponent with the local community and demonstrated staff training on environmental management and occupational safety.

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## Annex 1

### RECONAINSTANCE SCHEDULE 20<sup>th</sup>-21<sup>st</sup> November, 2018

ACTIVITY	Data Collection	Contact Person
Site visit	Village/location/wards	
Delineation of project catchment area	Location/villages/coordinates	
Identification of PAP	Households/farmers/businessmen/ Pastoralist/craftsmen etc	
Stakeholder Profiling	Ministries-Environment, mining, lands NEMA WARMA KFS	
Community mapping	Chief & sub chief Village elders Youth leaders Community based groups	
Vegetation Mapping	Vegetation profile	
Identification of sensitive ecosystems	Migratory routes Catchment area	
Identification of special sites	Cultural sites Social sites	
Household questionnaire administration strata	Village population and representative	
Baraza	Date, participants, venue, coordinator	



**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED SAVANNAH CEMENT CLINKER PLANT IN KYUSO -MWINGI NORTH, KITUI COUNTY**

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**HOUSEHOLD QUESTIONARRE**

*The client, Savannah Cement, has proposed to develop a Clinker Plant in Kyuso location in Kitui County. As part of the fulfillment of the requirements of the Environmental Management and Coordination Act CAP 387, the client has contracted Geoplan Associates to undertake an environmental and social assessment study. We are therefore seeking your opinion on behalf of the client regarding the proposed development. Your views will be treated with utmost confidentiality.*

**Name of Respondent**..... **Questionnaire Code:** .....

**Date of Interview**..... **Village:** .....

**Address(Telephone number)**..... **H/H GPS Coordinates**

.....

---

**A. Background Information**

**i. Household Demographic data**

Name	R/ship to Head	Gender	Age	Highest Education level	Marital Status	Religion

**Relationship To Head** [1] Head [2] Spouse [3] Brother/Sister [4] Child [5] Parent **Gender** [1] Male [2] Female **Highest Education Level** [1] Degree [2] Diploma [3] Certificate [4] None **Marital Status** [1] Married [2] Single [3] Widowed **Religion** [1] Christian [2] Muslim [3] Others (specify)

**ii. Household source of income**

Occupation	Formal Employment	Business	Farming (livestock/ Crop farming)	Casual labour	Informal employment	Any other (specify)
Tick appropriately						

**iii. Total Monthly Income**

Income Ksh	< 5000	5001-10000	10001-15000	15001-20000	20001-25000	25001-30000	30001-35000	35001-40000	>40000
Tick appropriately									

**B. Land use and tenure**

(i) What is the nature of land tenure for the land you have settled on?

[1] Own [2] lease [3] communal [4] squatter [5] others

(ii) Size and current land use

Land use	Size (percent)
Homestead	
Farming	
Grazing	
Others (specify)	
<b>Total</b>	<b>100%</b>



**C. Sources of energy**

(I) Which type of energy do you use for cooking?

- a) Electricity
- b) LPG
- c) Kerosene
- d) Charcoal
- e) Firewood
- f) Others (please specify).....

(II) Which type of energy do you use for lighting?

- a) Electricity
- b) LPG
- c) Kerosene
- d) Others (please specify)  
.....

**D. Waste Management**

How do you dispose waste from your household? (*indicate the number*)

**Disposal mechanisms** [1] Burning [2] composting [3] open dumping [4] livestock feeding [5] Others (specify)

<i>Type of Waste</i>	<i>Disposal Mechanism</i>
Crop residues-stalks, stem etc	
Animal waste-droppings	
Animal waste-byproducts e.g. hides	
Non Biodegradable-Polythene bags, containers, electronics	
Others (specify)	

**E. Ecological and cultural significant sites within the community**

Nature/type	Local name	Significance (use)

Forest/hill forests		
Hill		
Tree		
River		
Swamp		
Rock		
Valley		
Wildlife corridor		
Shrine		
(Any other-specify)		

**F. Vegetation in the project area**

Vegetation in the one's farm and homestead

<i>Name</i>	<i>Local Name</i>	<i>Common use</i>

**G. Environmental Management**

**i.** How do you access information on environmental conservation?

[1]Radio [2] TV [3] NGO [4] Posters [5] Seminars [6] Others

**ii.** How are you contributing towards environmental conservation in your community?

*E.g. tree planting, soil conservation, riparian reserve conservation*

.....  
 .....

**iii.** Are there any traditional rules/norms that govern environmental conservation in this area?

[1]Yes [2] No

If yes,

specify.....

.....

**iv.** Are there organizations that promote environmental conservation in the area(Governmental, NGOs, CBOs)

[1]Yes [2] No

If yes, specify.....

**H. Community Organization**

i. Are you a member of a community group?

[1] Yes [2]No

If yes, what is the nature and purpose of the group?

Group (specify name)	Purpose/Activities

**I. PROPOSED PROJECT INFORMATION**

Are you aware of this proposed development (*explain the proposed Clinker plant project by Savannah Cement?*)

[1]Yes [2] No

**J. SECTION G- WHAT ARE SOME OF THE ANTICIPATED IMPACTS OF THE PROPOSED PROJECT?**

*Please provide a list of possible environmental impacts that are likely to arise during the construction and operation of the of the proposed project*

i. Anticipated negative impacts during construction (*clearance, labour and machine mobilization etc*)

.....

.....

.....

.....

ii. In your own opinion how can these impacts be mitigated? (*Probe*)

.....  
.....  
.....  
.....

iii. Anticipated negative impacts during operation phase (*drilling, blasting, grinding, heating, packaging*)

.....  
.....  
.....  
.....

iv. In your own opinion how can these impacts be mitigated? (*Probe*)

.....  
.....  
.....  
.....

v. What benefits do you think the project will have to you, your neighbours and the community?

.....  
.....  
.....  
.....  
.....

vi. What is your general opinion about this proposed project?

.....  
.....  
.....

THANK YOU!



**ATTENDANCE LIST**  
**FOR**  
**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED**  
**SAVANNAH CEMENT CLINKER PLANT IN KYUSO -MWINGI NORTH, KITUI COUNTY**

N0	NAME	PHONE NO	Signature ID Number	Title Signature
1	Mugambi Abel	0724726003	Geoplan	
2	Henry Nyamai	0724985201	Collam/Saramah	
3	HARON ONG'EM	0726351129	Geoplan	
4	Monicah Njuki	0701513797	Geoplan	
5	Luke Odera	0707366884	Geoplan	
6	Dominic K. Njoka	0727246171	CONET REP	
7	GRACE N. MUYIMI	0726823258	A/CHIEF	
8	BERNARD K. MUTEM	0715145443	3722311	
9	DAVID M. MUTEMI	0724-799-796	22241020	
10	Mwango Kithero	0716 268 893	3768978	
11	KAMBI NISONZO	0706412258	5520808	
12	David Keluzo Kingo	0708342533	3723302	
13	Mutemi Joseph		26467511	
14	Ndaro Mochori			
15	Muyimi Mwenge	0701024779	5338605	
16	KAMBI M <sup>U</sup> S <sup>U</sup> KO			

17	KASIOVA MWALIMU	0710298124	13589879	ATL
18	Mwangangi Kiinga	0753294049	24296317	<del>ATL</del>
19	Munyah Kwar	0716716839	23927500	P.
20	Joseph R. Iteka	07291743538	9930363	<del>ATL</del>
21	Juliana M. Mulwa	0718896120	10924173	Juy
22	Margaret K Mwangangi	0708095067	23117390	Nday
23	Kangoro Muthui	0705367089	4333334	<del>P.</del>
24	Kauute Mulini	0700687916		<del>P.</del>
25	Kathiri STANDA	0703142256	9585165	<del>P.</del>
26	JULIANA KATINI	07957515785		<del>P.</del>
27	VERONICA KANIWI KIMWIELE	0712953932	13781348	<del>P.</del>
28	MUSYA KIDK	0727758683	2260989	me
29	Joseph Nguria M.		3768761	JCT
30	JOHN M Kimwiele	0713317451	5017161	JCT
31	John M. Muthengi	0790060568	Kimu Loc. CHIEFI	Shungi
32	Leyda S. Musyoka	0713085105		<del>ATL</del>
33	Kenzabeta M. Njama	0790699661	31790218	<del>ATL</del>
34	Faith Mumbwa Numbwa	0717387055	24756080	<del>ATL</del>
35	Kangere Mwakumbi	0701630516		<del>P.</del>
36	Purity Kiyamba	0708093553	3769080	<del>ATL</del>
37	Kalumu Numbwa	0712056921	20599120	<del>ATL</del>
38	MACHEGI	0718573934		<del>P.</del>
39	MARTIN MULIKOMA	0701630516	3745609	Byku



**ATTENDANCE LIST**
**FOR**
**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED  
SAVANNAH CEMENT CLINKER PLANT IN KYUSO -MWINGI NORTH, KITUI COUNTY**

NO	NAME	PHONE NO	Signature	Title
			ID Number	Signature
1	Mwimi Kinyaga	0728635386	13589926	
2	Mwendwa Kinyungu	0724914082	4820188	
3	Musili Ikina	0710890420	3723304	
4	Mutumbeki	0790717074	12627297	Mu.
5	MUTIE MUTEMI	0798058976	23315063	
6	Mbayeni	07115786	19192016	
7	Kido Musyimi	0797655482	11424625	
8	Mwendwa MWANZIA	0714753574	22351345	M
9	Munyoki Mwendwa	0797505963	27852733	
10	Mwacha Kiteme M.			
11	Mwendwa Ng'iro	0705650978	3769902	
12	Peter M. Kithuka	0727785485	21542026	
13	MUTHAI MUTEMI	0723404480	25037569	
14	Beber M MUTEMI	0707546019	28822109	
15	Mutua NZUZA		32670470	
16	STEPHEN KINYAGA	0702852194	11639242	M

17	<del>Muhwa Kimwele</del>	0724877315	22331084	<del>Kimwele</del>
18	Reginald Andrew	0790137524	10799557	Andrew
19	Joseph Nalayi	0703159517	4732929	Joseph Nalayi
20	Ndoni Musili	0713176824		Ndoni Musili
21	Mwiza Muthui	0718141391	3769023	Mwiza Muthui
22	Nzambi Mwinzi			Nzambi Mwinzi
23	Kakimbi Mwangi	0757280675		Kakimbi Mwangi
24	Lucy Mumbo	0713941214	12628184	Lucy Mumbo
25	Kavisa Mwangangi	0717667757	21139729	Kavisa Mwangangi
26	Margaret Kyambi	0790269204	9751655	Margaret Kyambi
27	MUTHWI MANZI	0703496087	204404218	MUTHWI MANZI
28	SYENSO THOMAS	0206444039	3722368	SYENSO THOMAS
29	Musili Kalonzo	0719331218	8721829	Musili Kalonzo
30	Musili Mutemba	0715593357	26815226	Musili Mutemba
31	Mwlonzi Kelleke	07		Mwlonzi Kelleke
32	JAMES MUSYOTER	0706329274	37576284	JAMES MUSYOTER
33				
34				
35				
36				
37				
38				
39				

## **EVIDENCE OF LAND OWNERSHIP**

# LAND ACQUISITION REPORT

GEOLOGICAL REPORT