

**ENVIRONMENTAL IMPACT ASSESSMENT-FULL STUDY
FOR THE PROPOSED BUILDING MATERIALS
PROCESSING PLANT**

**LOCATED AT LONGONOT/KIJABE BLOCK 4/5478(RARE) IN
NAIVASHA SUB COUNTY, NAKURU COUNTY**



SITE COORDINATES LATITUDE -1.015723, LONGITUDE, 36.576753

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DOCUMENT AUTHENTICATION

I, the undersigned certify and submit this Environmental Impact Assessment-Full Study Report for the Proposed Building Materials Processing Plant Located at Longonot/Kijabe Block 4/5478(Rare) in Naivasha Sub County, Nakuru County. The project report has been carried out in accordance to the Environmental Management and Coordination Act No. 8, 1999 (revised 2015) and Environmental (Impact Assessment and Audit) Regulations 2003, Legal Notice No. 101 for submission to the National Environment Management Authority (NEMA) for review.

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I declare that all the information contained in this report are accurate and a truthful representation of all findings relating to the operations of the proposed development to the best of my knowledge.

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ACKNOWLEDGEMENT

The EIA/EA experts take this opportunity to thank the proponent *for* providing this opportunity to conduct this Environmental Impact Assessment-Full Study and develop the project report for the proposed Building Materials Processing Plant located on Plot No Longonot/Kijabe Block 4/5478(Rare) in Naivasha Sub County, Nakuru County. This was done in an endeavor to comply with the legal requirement as stipulated in section 58 of Environmental Management and Co-ordination Act (EMCA) of 1999 (revised 2015) legal notice No.8 and Environmental (Impact Assessment and Audit) Regulations, 2003 Legal Notice No. 101, (Amendment 2019).

Sincere thanks to our client for availing the necessary documentation and facilitating the site visits to enable the experts to effectively carry out the EIA Full study.

To obtain baseline information on the project site, the firm of experts relied on site visits, literature review of information available from government offices and previous EIA studies undertaken by lead consultants

We further acknowledge and thank the neighbors and key stakeholders of the site who participated in our public consultation program by attending the baraza meetings responding to the questionnaires and filling the attendance lists.

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ACRONYMS

CBOs	Community Based Organizations
DOSHS	Directorate & Occupation Safety & Health Services
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ESIA	Environmental and Social Impact Assessment
EMPs	Environmental Management Plans
GDP	G ross Domestic Product
GoK	Government of Kenya
ISWMS	Integrated Solid Waste Management System
KESHP	Kenya Environmental Sanitation & Hygiene Policy
KPLC	Kenya Power & Lighting Company
MDAs	Ministries, Departments & Agencies
M&E	Monitoring and Evaluation
NCA	National Construction Authority
NEC	National Environment Council
NEMA	National Environmental Management Authority
NGOs	Non-Governmental organizations
ODF	Open Defecation Free
OSHA	Occupation Safety and Health Act
PPE	Personnel Protective Equipment
SDGs	Sustainable Development Goals
SEP	Stakeholder Engagement Plan
Sqm	Square Meter
SWMS	Safe Work Method Statements
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value Added Tax
TOR	Terms of Reference
WASREB	Water Services Regulatory Board
WRA	Water Resources Authority
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

In pursuant to the Environmental Management and Coordination Act section 58 (I) and the Environmental Impact Assessment and Audit Regulations, 2019 part II, an environmental project study was carried out for the proposed Building Materials Processing Plant project. The study was carried out in order to determine the anticipated environmental impacts of the proposed project and to identify the necessary mitigation measures in order to incorporate sustainable development aspects in the project cycle. At the same the Authority requires the proponent to initiate an Environmental Impact Assessment full study. Pursuant to the aforementioned regulations in June 2026, Terms of Reference (TOR) initiating an Environmental Impact Assessment Full Study were prepared and submitted to NEMA (**NEMA/ENVIS/EIA/TOR/0260**) and approved. The Environment Management and Co-ordination Act (EMCA), 1999 (Amended 2015), is the legislation that governs EIA studies. The second schedule of the Act lists the projects that are supposed to undergo EIA studies in accordance with section 58 (1-4) of the Act.

Proponent and Objectives

The proposed project by Xiaomi Investment Limited will involve the establishment and operation of a building materials processing plant designed to process raw volcanic ash and other raw materials into high-quality cement and related products. The overall objective of the project is to manufacture volcanic ash cement, mineral powder and aerated bricks products for use in construction, infrastructure, and industrial applications.

Key specific objectives include, but are not limited to:

- i. Producing high-quality cement and cement-based products that comply with national and international standards for infrastructure development, building construction, and industrial applications.
- ii. Support the growth of Kenya's manufacturing sector, adding value to locally sourced raw materials, and enhancing domestic production capacity in line with Vision 2030's industrialization goals

Location

The proposed project site will be located Plot No Longonot/Kijabe Block 4/5478(Rare) in Naivasha Sub County, Nakuru County. The project site can be accessed via 3.5 km access road from Lake wood City Resort, off Maai Mahiu- Narok road. The Global Positioning System (GPS) coordinates of the proposed site are: latitude -1.015723, longitude, 36.576753. The plant will be

located 108 km from Nakuru city, about 64km from Nairobi city and 5 km from the Maai Maahiu Centre.

Project Design and Components

The proposed development entails the establishment of a Building Materials Processing Plant with associated facilities and amenities. The key project components will include the construction of a warehouse housing the production line, installation of cement grinding machinery, development of raw material storage sheds, construction of an office block and establishment of a quality control laboratory. It will also entail provision of supporting infrastructure such as internal roads, truck parking areas, loading and unloading zones, drainage systems, perimeter wall, guardhouse and staff welfare facilities.

Component	Description	Key Equipment / Features
Batching Plant	The facility will be used for the automated weighing and mixing of cement, aggregates, water, and admixtures to produce ready-mix products	Cement silos, aggregate bins, skip hoist/lifting bucket, weighing systems, mixer, water dosing system, computerized control panel, discharge system
Grinding Plant	The plant will process clinker, gypsum, and additives into fine volcanic cement powder through mechanical grinding in order to achieve the required fineness and quality standards.	Vertical Roller Mill (VRM) / Ball Mill, feed hoppers, rotary air-lock feeders, dynamic separators, hot gas drying system, bag filters or electrostatic precipitators, cement silos
Grinding Unit	The unit will grind and blend clinker with gypsum to produce cement powder with controlled particle size and appropriate setting properties	Clinker storage silos, feeders, grinding mill, dynamic separator, bag filters/ESPs, pneumatic conveying system, packaging machines
Mineral powder	The core activities for the mineral powder production will be the inter-grinding process, where prepared steel slag, volcanic ash, and clinker will be processed together in a ball mill.	The ball mill will be carefully calibrated to achieve optimal fineness, targeting specific surface areas suitable for supplementary cementitious material applications
Aerated Bricks Manufacturing Unit	Standard aerated brick formulations will include Portland cement, quicklime	Steps to be undertaken include:-

	(calcium oxide), gypsum, aluminum powder (as the expansive agent), and water. Aluminum powder will be used to create small, finely dispersed voids in the fresh mixture	Raw Material Preparation and Grinding Batching and Mixing Pouring, Casting, and Setting Demolding and Cutting Autoclave Curing
Material Handling and Conveyance Systems	These systems will facilitate the movement of raw materials and finished products between various processing units within the plant	Belt conveyors, bucket elevators, feeders, transfer chutes
Storage and Packaging Facilities	These facilities will provide storage and packaging for volcanic ash cement, mineral powder and aerated bricks, prior to transportation and distribution	Storage silos, warehouses, bagging machines, palletizers, bulk loading systems
Dust and Emission Control Systems	These systems will be installed to control particulate emissions generated during plant operations and to ensure compliance with environmental standard	Cyclones, bag filters, electrostatic precipitators, scrubbers, stack monitoring systems
Water Supply and Utility Systems	These systems will supply water required for hydration processes, dust suppression, mixing operations and domestic use within the facility	Water storage tanks, pumps, pipelines

Project Activities

The construction phase of the proposed building materials processing plant and associated will involve a series of civil, structural, and engineering works. The key activities to be undertaken are outlined below:

1. **Site Clearance and Preparation:** This will involve clearing vegetation, removal of debris, stripping of topsoil, and leveling of the site to prepare it for construction activities. Topsoil will be stockpiled for later use in landscaping and site restoration.
2. **Excavation and Backfilling:** Excavation works will be undertaken to prepare foundations for buildings and plant equipment. This will include normal soil excavation and subsequent filling with hardcore and compacted material to provide stable ground for structural works.

3. **Foundation Slab Construction and Walling:** Construction of reinforced concrete foundation slabs to support plant machinery and building structures will be carried out. Masonry works for walls of the processing plant structures and site office will follow.
4. **Machine Assembly and Installation:** Delivery, positioning, and mechanical assembly of processing equipment including crushers, kilns, conveyors, and associated systems will be undertaken in accordance with engineering specifications.
5. **Electrical Installations:** Installation of electrical systems including wiring, control panels, transformers, lighting systems, and equipment connections to support plant operations.

Impacts and Mitigation Measures

The project implementation will be undertaken in phases, beginning with site preparation and construction, followed by operational activities and eventual decommissioning at the end of the project life. During each phase, potential environmental and social impacts; such as air emissions, noise, traffic, waste generation, occupational health and safety risks, and resource consumption, have

This construction project shares impacts similar to most private manufacturing development projects, and are thus manageable through the proposed EMP. This shall be developed commensurate to the assessment of its potential environmental and social impact in this study report. On the other hand, the major objective of the EIA full study was to evaluate the effects/impacts of proposed development in relation to the general environmental aspects i.e., physical, biological, and social economic environments. It aims at influencing the protection and co-existence of the development with the surroundings as well as the compatibility of the proposed development to the area; to ensure and enhance sustainable environmental management during implementation and operational phases.

The study analyzes some of the potential positive and negative environmental impacts and proposes measures to reinforce economic and social benefits as well as mitigating measures for the negative impacts.

The following are some of the potential economic and social benefits (positive impacts) likely to arise as a result of the project:

- Optimal utilization of vacant land
- Permanent investment opportunity for the project proponents
- Direct and indirect Employment creation

- Increased government revenue
- Promotion of social cohesion and cultural integration

Core issues identified from review of the Plan can be summarized into three key broad areas namely; Economic, Environmental and Social to ensure sustainability in the implementation of the project. The negative impacts of the three areas need to be mitigated to ensure that the cumulative impacts are addressed and the positive impacts enhanced for sustainability. The negative impacts of the three areas to be mitigated are highlighted below;

Social aspects

The significant negative social impacts may occur due to influx of people migrating to the site for economic gains. The new population settling within the site vicinity and those that will be involved directly or indirectly with the project implementation activities may result in gender violence, prostitution, creation of vulnerable groups such as urchins among others from unplanned settlements and casual business e.g., slums and filthy alcoholic drinking dens and eateries.

The proponent is aware of such possible occurrences that have happened in many new sites being developed within the country. They have put in place planned development criteria in liaison with the local and national government to curb unwarranted negative social impacts to realize;

- Reduced gender-based violence; prostitution and family break ups
- Reduce drug and substance abuse
- Support vulnerable groups
- Training for sustainable development
- Safe work environment
- Cohesive society
- Safe communities

Environmental aspects

The significant negative Environmental impacts will be from infrastructural development, operations of enterprises investing in the zone. The development has initiatives to address the likeliness of interference with adequate availability of water quality and access; pollution of ambient air, water and land including loss of biodiversity. The project has an environmental management and monitoring plan to mitigate significant negative environmental impacts focusing on;

- Sustainable management of natural resources

- Improve water quality and access
- Ensure climate resilient development
- Ensure green buildings
- Promote clean, sustainable, affordable energy at least cost
- Minimization of waste
- Reduce climate change and its effects
- To maintain and enhance biodiversity/ flora and fauna

Economic aspects

Negative aspects emanating from economic activities during the project implementation may be due to unfair employment opportunities, lack of sustained economic growth, discrimination of indigenous investment and lack of economic diversification. The proponent investment program is anchored on good investment practices that mitigate its investment program against negative social impacts.

The project encourages;

- Sustained economic growth
- Sustainable livelihoods
- Indigenous investment
- Economic diversification
- Equitable and satisfying employment

To avoid, reduce, and/or minimize for potential significant, negative environmental and social impacts, mitigation measures were proposed and environmental and social management plan (ESMP) formulated. Recommendations were proposed to carry out annual environmental audits and follow ups once the project is in operation. However, a monitoring program was also developed to not only track down occurrence of impacts, but also to check on compliance requirements. Outlined below is a summary of impacts and mitigation measures;

Impact	Mitigation Measures
Construction	
Air/Dust Pollution	✓ Ensure strict enforcement of on-site speed limit regulations ✓ Avoid excavation works in extremely dry weathers if and where possible ✓ Sprinkle water on graded access routes whenever necessary to reduce dust generation by construction vehicles ✓ Enclosing the structures under construction with dust proof nets. ✓ Using efficient machines with low emission technologies for the ones that burn fossil fuels. ✓ Regular maintenance and services of machines and engines. ✓ Use of clean fuels e.g. unleaded and low Sulphur fuels. ✓ Educate and raise awareness of construction workers on emission reduction techniques
Ecological imbalance due to loss of agricultural land and destruction of natural habitats for the local flora and fauna	✓ Maintain the proposed green spaces ✓ Where clearance of native vegetation is inevitable, consider introducing such natives in landscaped and other green spaces to compensate for the loss ✓ Ensure all projects comply with the Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, and Access to Genetic Resources and Benefits Sharing) Regulations, 2006
Generation of Solid Waste	Following EMCA regulations on Waste Management, Legal Notice 121 including: ✓ Using waste minimization techniques such as buying required quantities in bulk. ✓ Identifying all sources of wastes, and ensuring wastes are handled by licensed personnel ✓ Making available suitable facilities for the collection, segregation and safe disposal of the wastes. ✓ All construction materials left over at the end of construction should be used in other projects or sold ✓ Ensure proper handling and storage of construction materials to reduce damage ✓ Accurately estimate the sizes and quantities of materials required to reduce amounts left ✓ Excavated upgrading waste should be re-used or backfilled
Occupational Health and Safety Risks	✓ Provide all workers with the necessary protective gears ✓ Ensure all workers are in protective gears all the time when on site ✓ Place fire extinguishers in strategic areas within the deport ✓ Designate and mark smoking areas ✓ Workers to be trained as fire marshals ✓ Fire escape routes to be shown clearly ✓ Provide enough first aid kits within the project site ✓ Train workers in administering first aid ✓ Ensuring all potential hazards like movable machine parts are labelled.

	✓ Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment. ✓ Placing visible and readable signs around where there are risks. ✓ Ensuring there is security in and around the site to control the movement of people. ✓ Providing safe and secure storage for equipment & materials in the site. ✓ Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site
Noise Pollution	Complying with the EMCA noise regulation Legal Notice 61 including: ✓ Observe normal working hours during noisy construction works (00800 to 1700) hours ✓ Ensure that all generators and heavy-duty equipment are insulated or placed in enclosures ✓ Sensitize drivers to avoid unnecessary gunning of vehicle engines ✓ Regular servicing of engines & other machines shall be adhered to ✓ Site workers to wear ear muffs if working in noisy
Working at High Heights	✓ Use construction barrier tape to isolate and guard site visitors from accidents & injuries; ✓ Implement a fall protection program that includes training in climbing techniques and use of fall protection measures, ✓ Use of helmets and other PPEs to mitigate against injuries ✓ Providing First Aid facilities at site
Change in Soil Characteristics	✓ Sprinkling water on the soil to prevent dust from rising. ✓ Creating specific paths for the trucks ✓ Ensuring there is enough space for normal percolation of water. ✓ Preventing pollution from construction wastes by having specific sites for collection, sorting and transport of wastes. ✓ Proper installation and configuration of drainage structures to ensure their efficiency. ✓ Installing cascades to break the impact of water flowing into the drains. ✓ Controlling the earthworks and ensuring the management of excavation activities. ✓ Compacting areas with loose soil. Landscaping. ✓ Providing soil erosion control structures on the steeper areas of the site & controlling activities during the rainy season
Operations	
Air Quality & Emissions	✓ Install fabric bag filters (or Electrostatic Precipitators systems) on kiln and process vents, ✓ Install venturi or packed-bed wet scrubbers to capture particulate matter, acid gases (SO₂, HCl), and soluble pollutants, ✓ Scheduled preventive and corrective maintenance of all air pollution control equipment and process units to sustain efficiency, ✓ Fully or partially enclosed material transport systems to contain dust at transfer

	points, ✓ Install active and passive methods to wet or contain fugitive dust at source ✓ Optimize kiln feed size and combustion; minimize material drop heights.
Noise and Vibration	✓ Develop and strictly follow a preventive maintenance schedule for all noise-generating equipment, including crushers (jaw, cone, hammer mills), screens, conveyors, kiln fans/blowers, tipper trucks, and standby generators, ✓ Conduct monthly noise mapping and baseline measurements (using calibrated sound level meters) to identify equipment that exceeds permissible limits and prioritize repairs, ✓ Procure and use only modern, low-noise equipment models during plant design and future replacements ✓ Night-time or extended operations (if unavoidable for continuous kiln processes) will be restricted to low-noise activities only, with enhanced mitigation, ✓ Implement worker rotation/shift systems to reduce individual exposure time in high-noise zones (e.g., limit exposure in crusher areas) ✓ Fit high-efficiency silencers and mufflers on all exhaust systems of diesel engines, generators, compressors, and kiln blowers/fans, ✓ Install acoustic enclosures or soundproof barriers around major noise sources such as crushers, screens, and conveyor drive motors, ✓ Position noisy equipment (crushers, kilns) away from site boundaries and sensitive receptors, using natural topography or planted greenbelts as additional buffers
Increased demand on water sources	✓ Ensure implementation of Integrated Water Resources Management (IWRM) including promoting recycling and reuse of water as much as possible ✓ Adopt green building water use technologies such as low volume water fixtures in proposed development and projects ✓ Development of storm water management plan with design strategies for storm water treatment and filtration systems. Such would entail use of recycled and harvested storm water in cleaning and Landscaping ✓ Incorporate water accounting systems and metering for all areas ✓ Limited abstraction of river water and instead use of alternative sources of water such as roof catchment rain water harvesting and harvesting of flood waters ✓ Pre-treatment of all effluent before discharge into environment ✓ Undertake a hydrogeological study in collaboration with WRA to determine the sustainable ground water abstraction levels
Increased energy consumption	✓ Institution awareness programmes to conserve energy ✓ Energy conservation through installation/use of energy efficient appliances / fittings ✓ Adoption of green energy sources e.g. solar energy, waste to energy projects ✓ Use of green building designs that allow for passive heating and cooling, and maximum utilization of natural light in buildings ✓ Continually seek avenues for energy conservation as international best practices evolve ✓ Carry out Energy Audits and ensure all projects comply with The Energy Act 2019

	and subsidiary legislation under the Energy A
Solid Waste & By-Products	✓ Segregate waste at source using labelled bins; store in designated, covered, and bunded areas; transport only by ✓ NEMA-licensed waste handlers; ✓ Locate storage away from drainage lines and sensitive receptors; use covered skips or containers; maintain good housekeeping, ✓ Store in labelled, bunded, and secure areas; disposal shall only be through NEMA-licensed hazardous waste handlers, ✓ Install dust collection systems (bag filters) at all major dust generation points
Population Influx	✓ Workers to be issued with jobs cards to monitor their movements in the site area ✓ Only authorized personnel should be allowed entrance to the site ✓ Presence of a work registry book where workers sign in and out ✓ Educating the workers on proper sanitation methods Sensitizing the worker on HIV/AIDS ✓ Making available suitable facilities for the collection, segregation and safe disposal of the wastes. ✓ Ensuring all waste is dumped in their designated areas and legally acceptable methods
Increased Traffic	✓ Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. ✓ Ensuring all drivers for the project comply to speed regulations. ✓ Making sure the construction doesn't occupy the road reserves and complying with traffic and land demarcation obligations. ✓ Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use. ✓ Provision of adequate vehicular circulation space and parking areas ✓ Adoption of non-motorized transport (NMT) program and facilities including cycling, walking, use of wheelchairs, scooters, hand carts, skates, skateboards amongst others. ✓ Provision of pedestrian walkways along all roads within the development ✓ Paving all pedestrian walk ways with robust, durable, and non-slippery materials ✓ Provision of all necessary street furniture along all roads within the development to accommodate users (including the disabled, elderly, and children) and to enhance security. ✓ Provision of bollards in appropriate areas to prevent vehicles from encroaching into the pedestrian domains. ✓ Provision of street lights to provide sufficient light for both pedestrian areas and carriage ways. ✓ Provision of trees along pedestrian walkways for shading and that require minimum maintenance; preferably indigenous
Community Health & Safety	✓ Establish a multi-tier GRM (site level management external mediation); ✓ Develop and implement a Traffic Management Plan; enforce speed limits (≤ 30 km/h on site, ≤ 50 km/h on public access roads);

	✓ Regular monitoring of community and worker health to detect and address project-related health issues early, ✓ Conduct community awareness sessions (barazas) for education and sensitization programs for communities; ✓ Develop and test an integrated Emergency Response Plan; train local community volunteers; conduct annual drills with participation of nearby residents, ✓ Prioritize local hiring and implement community development initiatives
Fire Hazards and Accident	✓ Keep well stocked and functional first aid box Ensure proper storage of inflammables at the site. ✓ Maintain fire-fighting equipment and ensure that they are regularly inspected ✓ Create awareness among residents on proper safety measures
Surface Run-Off and Waste Water Disposal	✓ Landscaping to ensure there are areas where water will percolate underground. ✓ Constructing proper drains and monitoring them to ensure there are no blockages
Increase in Value and Land Use Changes	✓ Complying to zoning bylaws ✓ Collaborating with public and planning officials on current and future developments ✓ Aligning the project's objectives with those of National and County Development Policies
Greenhouse Gases Emissions	✓ Use of renewable sources of energy ✓ Retention of green spaces/landscaped spaces as carbon sinks ✓ Adoption of green buildings technology ✓ Continually seek avenues for energy conservation as international best practices evolve ✓ Annual air quality monitoring ✓ Use of modern, thermally efficient vertical shaft kiln technology (Select kilns with heat recovery systems (preheating and cooling zones); ✓ Optimization of fuel type, combustion efficiency, and operational parameters to minimize fuel consumption and associated CO₂ emissions, ✓ Install heat exchangers or recuperates to preheat combustion air / feed; ✓ Implement real-time process monitoring (temperature profiles, gas composition) ✓ Ensure compliance of The Environmental Management and Coordination (Air Quality) Regulations, 201
Socio-cultural Impacts	✓ Integrating Equal Opportunity Principles in human resource policies. ✓ Maximize the recruitment of locals where possible and have a Labour Management Plan to ensure workers' labour rights including health and safety and are protected ✓ Develop community awareness programmes to enhance cohesion between project employees and the local community. ✓ Consult with the public and the locals during implementation of proposed developments ✓ Develop and implement a grievance redress mechanism (GRM) to address concerns of the locals ✓ Promoting social cohesion and integration among people in the area. ✓ Creating awareness towards the diversity of cultures and different economic

	background of the people within residents ✓ Allowing the residents and businesses to form social groups and networks that build social capital. ✓ Targeting social investment programs towards the local communities and region.
Insecurity Impacts	✓ Employing competent security firm at the premises ✓ Security to always searching all vehicles and people entering the premises ✓ Use of CCTV cameras to monitor security within the premises ✓ Collaborating with the local police on security matters ✓ Placing alarms around the premises and establishing emergency preparedness and response procedures

The assessment established that the developer had complied with the existing legislative and regulatory requirements in relation to the proposed development. Based on the public consultation conducted in the project area, the public identified the following main concerns:

- Transparent mechanisms for prioritization of locals in employment opportunities for skilled & unskilled labor.
- Occupational Health and safety issues at project site.
- Dust management
- Potential accidents due to increased traffic especially during construction phase
- Noise due to construction activities

Conclusions and recommendations:

In conclusion, results from EIA study show that the proposed building materials processing plant project has significant impacts on the environment and can be mitigated. Implementation of an Environmental Management Plan will assist in dealing with environmental issues during the project cycle. There are also guidelines for addressing environmental, health and safety concerns. This project is recommendable for approval by the National Environment Management Authority (NEMA) for the issuance of an EIA license. This is subject to periodic monitoring and evaluation from the day of commencing construction operations and decommissioning phases, as long as the set standards, measures and regulations are thoroughly upheld and adhered to. This will be in compliance with the Environmental Management and Coordination Act of 1999 (Amended 2015) and the Environmental Impact Assessment and Audit regulations, 2019

CHAPTER I: INTRODUCTION

1.0 Background Information

Industrialization has been a crucial driver of economic development for over 200 years. Nearly every developed country has achieved high levels of economic and social progress by first establishing an advanced industrial sector. Recognizing its significance, the international community has prioritized industrialization as a key component of global development efforts. The 2030 Agenda for Sustainable Development, specifically Sustainable Development Goal (SDG) 9, emphasizes the importance of resilient infrastructure, inclusive and sustainable industrialization, and innovation. It acknowledges the industrial sector's potential to generate employment, stimulate economic growth, facilitate technology transfer, attract investment, and foster skills development.

Xiaomi Investment Limited (hereinafter referred to as *the Proponent*) proposes to develop a building materials processing plant on Land Reference No Longonot/Kijabe Block 4/5478(Rare), measuring approximately 2.426 hectares, located within Naivasha Sub County in Nakuru County. The proposed project site is situated approximately 5 kilometers from Maai Mahiu Town, within an area that is increasingly earmarked for industrial development. The site is accessible via a tarmac road branching off the Maai-Mahiu- Narok road, providing reliable connectivity to Maai-Mahiu, the wider Rift Valley region and national transport corridors. The geographical coordinates of the proposed development site are latitude - 1.015723, longitude, 36.576753.

1.1 Environmental Impact Assessment (EIA)

This Environmental Impact Assessment (EIA) full study report has been prepared for the purpose of seeking licensing for the proposed construction of the proposed building materials processing plant development and all its facilities and infrastructure on Plot L.R Longonot/Kijabe Block 4/5478(Rare), Naivasha Sub County in Nakuru County

In compliance with the requirements and provisions of the Environmental Management and Coordination Act No. 8 of 1999 and Regulation 10 of the Environmental (Impact Assessment and Audit) Regulations, 2003 Legal Notice No. 101 and Legal Notice 15 of the Environmental (Impact Assessment and Audit) Regulations, 2019, the Authority requires the proponent to initiate an Environmental Impact Assessment full study. Pursuant to the aforementioned regulations, in June, 2026, Terms of Reference (TOR) initiating an Environmental

Impact Assessment Full Study were prepared and submitted to NEMA (**NEMA/ENVIS/EIA/TOR/0260**) and approved.

This Environmental Impact Assessment report (EIA) seeks to examine both the positive and negative effects that the proposed commercial development project is likely to have on both the physical and socio-economic environment in order for sound decision making to promote human activities that align synergistically with the natural world within a sustainable development framework.

A comprehensive environmental policy was therefore needed to take care of the environment in a holistic way. This was achieved through enactment of the Environmental Management and Coordination Act (EMCA), 1999 (Amended, 2015). The Act stipulate that Environmental Impact Assessment be carried out on projects in the Second Schedule. It is in response to this provision that this EIA full study report has been prepared

1.2 Objectives of the Project

The overall objective of the project is to construct a building materials processing plant aimed at supporting industrialization, skills development and employment creation.

1.2.1 Specific Objectives of the Project

- i) Attract both local and foreign investments
- ii) Expand and diversify production of goods
- iii) Promote value addition
- iv) Provide decent wages and livelihoods
- v) Promote growth of local enterprises
- vi) Promote sustainable industrial development

1.3 Objectives of the EIA

The overall objective of the study is to assess the potential significant adverse impacts of the proposed development and articulate appropriate mitigation measures.

1.3.1 The specific objectives of this study include the following

- i) Proposed development and articulate appropriate mitigation measures
- ii) To identify and evaluate the significant environmental impacts of the proposed project.
- iii) To assess the environmental costs and benefits of the proposed project to the local and national economy.

- iv) To determine the compatibility of the proposed facility with the local environmental setting.
- v) To evaluate and select the best project alternative from the various options.
- vi) To propose mitigation measures for the negative environmental impacts
- vii) To incorporate Environmental Management Plans and monitoring mechanisms during implementation, operation and decommissioning phases of the project.

1.4 Terms of Reference

This Environmental Impact Assessment full study involved: -

- i) Generation of baseline information,
- ii) Establishing the current status of the proposed site and its environs,
- iii) Identification of predictable effects of the development on the environment (including infrastructure, occupational health and safety issues) and direction & magnitude of the changes,
- iv) Analysis of the compatibility of the proposed project with the surrounding land uses (as per the prevailing policy and legal framework) and
- v) Proposition of potential mitigation measures to be undertaken throughout the project cycle; Development of an environmental management plan with proposed mechanisms for monitoring and evaluating the compliance and environmental performance.

1.5 Scope of the Study

The study has been conducted to evaluate the potential and foreseeable negative impacts of the proposed development. The physical scope is limited to the proposed site and the immediate environment as may be affected by or may affect the proposed project. Any potential impacts, are also evaluated as guided by EMCA 2015 and the Environmental (Impact Assessment and Audit) Regulations 2019. This report includes an assessment of impacts of the proposed site and its environs with reference to the following:

- 1. A review of policy, legal and institutional framework.
- 2. Description of the proposed project.
- 3. Review of baseline information.
- 4. Assessment of the potential negative environmental impacts of the proposed project.
- 5. Analysis of alternatives.

6. Development of mitigation measures and future monitoring plans.
7. Occupational and Environmental health and safety management.

1.6 Methodology

1.6.1 Environmental Screening.

The environmental screening was carried out to determine whether an EIA study was necessary for this project and at what level of evaluation.

1.6.2 Environmental Scoping.

In environmental scoping, the focus was on environmental impacts of great concern. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects. Impacts were also classified as immediate and long-term impacts

1.6.3 Desktop Study.

The desktop study and review provided a detailed description of the project with respect to the intended revisions i.e. spatial coverage, preliminary design layout, magnitude, implementation schedules, costs and human resources. Relevant documents were reviewed to obtain information on the baseline information in general but specifically at the proposed project site.

Proposed project documentary review provided further understanding the project design (site plan and architectural drawings), land use, local micro-environmental conditions, data on demographic trends, land use practices, development strategies and plans (local and national) as well as the policy and legal documents among others.

Others included. area maps, current and past survey documents, Development Plans of the Nakuru, relevant policy, legal and institutional frameworks, regulations, guidelines and standards were also relied upon.

1.6.4 Field Site Visits

Physical evaluation of the project area was carried out with specific focus on landform trends, land use patterns, biodiversity, natural resources, hydrology and climatic variations. This was also an evaluation of the current environmental status with respect to physical, biological and sociocultural perspectives. It was a systematic field inspection backed with available documentation and direct interviews.

In addition to identifying the potential positive and negative impacts, field assessments contributed understanding the additional proposed works to be undertaken. The field survey adopted various techniques of baseline data collection on the existing environmental conditions, namely:

1.6.4.1 Field Observations

Detailed field observation assessment was undertaken to enable existing determination of the exact socio-economic activities within the proximity of the project site. Among the broad focal areas for which observation was done included; current settlement patterns and land use, commerce, and trade industry among others.

Checklists were used along with observations to check on additional/ possible environmental impacts of the project would have on the environment during both construction and operational phases. In this assessment, checklists were utilized to:

1. Indicate the magnitude of the additional development's environmental impacts both positive and negative;
2. Indicate possible adverse environmental impacts that are potentially significant but about which sufficient information can be obtained to make a reliable prediction on the additional developments; and
3. Indicate negative potential environmental impacts in the project area, which merit mitigation measures and monitoring during project implementation based the additional developments

1.6.4.2 Public Participation and Stakeholders Engagement

Structured stakeholder engagement was undertaken in the Rare neighborhood to capture the views and concerns of interested and affected parties. Photos of the project site and the immediate neighboring developments were taken from the initiated field visits and physical inspections for inclusion in this full study report. The engagement process entailed face to face meetings and interviews.

The study also sought public opinion/views of neighbors, interested or affected parties of the proposed project if any through Consultation and Public Participation (CPP) exercise. Public interviews were held with neighbors. The local county administration and relevant lead government agencies were engaged in the organization and participation of this meetings with key stakeholders. The questioners', minutes and attendance lists have been included in this report

1.7 Responsibilities and Undertaking

The Consultants undertook to meet all logistical costs relating to the assignment, including those of production of the report and any other relevant material. The consultants arranged for transport and travels during the exercise. On the site of the proposed development, the

proponent provided a contact person(s) to provide information required by the Consultants. The proponent also provided site plan(s) showing roads, service lines, buildings layout and the actual sizes of the sites, details of raw materials, proposed process outline, future development plans, operation permits and conditions, land-ownership documents and site history, and estimated investment costs.

- The output from the consultants includes the following:
- An Environmental Impact Assessment report comprising of an executive summary, assessment approach, baseline conditions, anticipated impacts and proposed mitigation measures,
- An Environmental Management Plan outline, which also forms part of the report recommendations.

1.8 Reporting

In the entire exercise, the proponent and ESIA experts contacted each other on the progress of the EIA Full Study and signing of various documents. The ESIA experts will have to submit to the National Environment Management Authority for review and issuance of an EIA license. All the materials and workmanship used in the execution of the work shall be of the best quality and description. Any material condemned by the architect shall be removed from the site at the contractors cost. Environmental concerns need to be part of the planning and development process and not an afterthought. It is therefore advisable to avoid land use conflicts with the surrounding area through the implementation of the Environmental Management Plan (EMP).

CHAPTER 2: PROJECT DESCRIPTION

2.0 General Overview

Accordingly, this chapter provides a comprehensive description of the proposed project, detailing the project design, layout, capacity, and the key technologies to be adopted during construction and operation phases. Additionally, it presents the geographical context of the project by describing its location, site characteristics, land ownership, and proximity to key infrastructure and sensitive environmental or social receptors.

2.1 Project Location

The proposed project site will be located Plot No Longonot/Kijabe Block 4/5478(Rare) in Naivasha Sub County, Nakuru County. The project site can be accessed via 3.5 km access road from Lake wood City Resort, off Maai Mahiu- Narok road. The Global Positioning System (GPS) coordinates of the proposed site are: latitude -1.015723, longitude, 36.576753. The cement plant will be located 108 km from Nakuru city and about 64km from Nairobi city; and 5 km from the Maai Mahiu Centre.



Plate showing GPRS site location

2.2 Justification of the Proposed Project

This study presents the justification of the proposed Building Materials Processing Plant project highlighted below as: -

2.2.1 Social - Economic and Environmental Justification of the Proposed Project

The proposed development has been subjected to economic analysis in order to determine whether or not it is economically justified. The cost-effectiveness and cost-benefit analyses, shows that the project is justified

2.3.2 Economic Growth

The development will attract investments, create jobs and boost local businesses, contributing to the overall economic growth of the county.

2.3.3 Subsidiary Industries Created, supported and expanded

This project through the supply of other utilities shall support other sectors in the area like security, logistics, retail and others like real estate business

2.3.4 Increased Revenue

The project will generate additional revenue through property taxes, business licenses and other fees associated with development of other amenities.

2.3 Environmental and Social Impact Assessment Consultant

The proponent has contracted Belexa Development Consultants a NEMA registered firm to carry out consultation, referred to as the consultants 'with a team of experts with a proven track record of excellence focusing mainly on environmental management, mining, mineral processing, and manufacturing industries, earth sciences, and, engineering projects. The team of experts has experience preparing quality Environmental Impact Assessment and Audit Reports that go a long way in ensuring sustainable projects development and utilization of natural resources.

2.4 The Scope of Work Undertaken

The Environmental and Social Impact Assessment Report has covered the following:

- i) Project Objectives
- ii) Complete description of the existing site location proposed for the building materials processing plant.
- iii) Anticipated critical environmental issues of concern by presenting baseline data, which should include social, cultural, and heritage considerations.
- iv) Assess public views and concerns of the proposed building materials processing plant.
- v) Relevant Policies, Legislation, and Regulations relevant to the proposed Building Materials Processing Plant

- vi) Potential negative and positive impacts of the project on the described environment, including direct, indirect, and cumulative impacts, and their relative importance to the design of the Building Materials Processing Plant
- vii) Possible mitigation measures to minimize predicted adverse environmental impacts if necessary and quantify associated costs.
- viii) The Environmental and Social Monitoring Plan that will ensure that the mitigation plan is adhered to.
- ix) The available alternatives to the project are considerate to the proposed site or any other location, including a no-action alternative.
- x) Conclusions and recommendations

2.5 Project design

The layout of the proposed building materials processing plant will be as follows;

- i) The production processing area
- ii) The raw material area
- iii) Store
- iv) Parking
- v) Security
- vi) Electrical control room
- vii) Shed for park material
- viii) Office building
- ix) Water tank

2.6 Production process

Activities to be undertaken within this area intends to produce: -

- i) Volcanic ash cement
- ii) Mineral powder
- iii) Aerated bricks

2.6.1 Volcanic ash cement

2.6.1.1 Volcanic Geology and Material Sourcing

The selection of Maai- Mahiu was fundamentally driven by the area's exceptional volcanic geology. Located on the floor of the Great Rift Valley between Mount Longonot and Mount

Suswa, the region experienced significant volcanic eruptions that left massive deposits of volcanic ash and pumice. The Menengai Tuff, a widespread ash deposit from a caldera-forming eruption dated to approximately 35,620 years ago, covers over 115,000 square kilometers, ensuring Xiaomi will have access to a virtually limitless supply of raw pozzolanic material. The volcanic ash contains essential chemical components for pozzolanic reactivity: high silica (SiO_2) and alumina (Al_2O_3), iron oxide (Fe_2O_3), calcium oxide (CaO), and magnesium oxide (MgO). Simultaneously, Xiaomi will secure a reliable supply of Portland cement clinker and gypsum through importation and agreements with existing producers.

2.6.1.2 Pre-Processing and Material Preparation

Before introduction into production, Xiaomi will implement comprehensive pre-processing. The ash will be dried in industrial rotary dryers to remove excess moisture from the porous volcanic soils, preventing material adherence to grinding equipment and ensuring smooth mill operation. The dried ash will undergo screening using vibrating screens and air classifiers to remove oversized debris and ensure consistent particle size distribution. Xiaomi will implement automated batching systems to precisely proportion the volcanic ash, clinker, and gypsum according to the desired final cement formulation.

2.6.1.3 Inter-grinding technology and chemical reactions

The proponent volcanic ash cement production operation will be an inter-grinding process. This is where prepared volcanic ash, cement clinker, and gypsum will be processed together in a ball mill to produce a more homogeneous final product with enhanced cementitious properties. The ball mill will be carefully calibrated to achieve optimal fineness, targeting a Blaine fineness of between $350 \text{ m}^2/\text{kg}$ and $400 \text{ m}^2/\text{kg}$. The operation will be controlled through careful management of mill rotational speed, ball-to-powder ratio, grinding duration, and feed rate.

Specialized grinding aids will be incorporated to improve mill efficiency and prevent particle agglomeration. This will help to achieve uniform particle size distribution despite the different hardness characteristics of clinker and volcanic ash. The heat generated within the ball mill will serve the additional purpose of further drying any residual moisture.

When the blended cement is mixed with water, the clinker will begin its primary hydration reaction, producing calcium hydroxide (Ca(OH)_2) and providing early strength development. The volcanic ash, rich in amorphous silica and alumina, will then participate in the pozzolanic reaction, consuming the calcium hydroxide to form additional calcium silicate hydrate (C-S-

H) gels, enhancing long-term strength and durability. Gypsum will control the setting time by reacting with aluminate phases to prevent flash setting, ensuring the cement can be transported, placed, and finished within acceptable timeframes.

2.6.1.4 Quality Assurance and Laboratory Testing

Xiaomi Investment Limited will establish a fully equipped quality control laboratory at the Maai Mahiu plant to conduct comprehensive testing throughout production. Trained chemists and technicians will perform routine analyses to ensure the final product meets international cement standards including ASTM C-595, ASTM C-1157, EN 197-1, and Kenya Standard requirements. Rigorous testing protocols will verify :-

- Chemical composition,
- Fineness and particle size distribution
- Setting time characteristics
- Compressive strength development
- Soundness and volume stability

Automated process monitoring systems will enable real-time adjustments to production parameters, including online particle size analyzers and computerized process control systems.

2.6.2 Mineral powder

2.6.2.1 Raw Material Sourcing

Xiaomi Investment Limited will source three primary materials for the mineral powder:

➤ Steel Slag (from local Steel Mills)

Steel slag is a byproduct discharged from steelmaking furnaces with typical chemical composition including CaO (approximately 50%), SiO₂ (approximately 15%), Al₂O₃ (approximately 1%), total Fe (approximately 16%), and other constituents. The slag will undergo pre-treatment including magnetic separation to remove metallic iron that could cause excessive mill wear.

➤ Volcanic Ash (sourced locally)

The volcanic ash from the Maai Mahiu region contains essential chemical components for pozzolanic reactivity: high silica (SiO₂) and alumina (Al₂O₃), along with iron oxide (Fe₂O₃), calcium oxide (CaO), and magnesium oxide (MgO). The ash will be dried in industrial rotary dryers to remove excess moisture and screened to ensure consistent particle size distribution.

➤ **Portland Cement Clinker**

The proponent will secure a reliable supply of Portland cement clinker through importation or agreements with existing producers to serve as the primary cementitious material activating the pozzolanic reactions.

Automated batching systems will precisely proportion the steel slag, volcanic ash, and gypsum according to the desired final mineral powder formulation.

2.6.2.2 Pre-Processing and Material Preparation

Before introduction into the inter-grinding process the proponent intends to implement comprehensive pre-processing. The steel slag will undergo pre-treatment to reduce particle size and metal content. This will be achieved by using processes such as magnetic separation to remove metallic iron that could cause excessive mill wear.

The volcanic ash will be dried in industrial rotary dryers to remove excess moisture from the porous volcanic soils. This will prevent material adherence to grinding equipment and ensuring smooth mill operation.

The dried ash will undergo screening using vibrating screens and air classifiers to remove oversized debris and ensure consistent particle size distribution. The proponent will implement automated batching systems to precisely proportion the steel slag, volcanic ash and gypsum according to the desired final mineral powder formulation

2.6.2.3 Inter-grinding technology and chemical reactions

The core activities for the mineral powder production will be the inter-grinding process, where prepared steel slag, volcanic ash, and clinker will be processed together in a ball mill. The ball mill will be carefully calibrated to achieve optimal fineness, targeting specific surface areas suitable for supplementary cementitious material applications. The operation will be controlled through careful management of mill rotational speed, ball-to-powder ratio, grinding duration, and feed rate. The heat generated within the ball mill will serve the additional purpose of further drying any residual moisture in the volcanic ash. The proponent intends to conduct extensive research to determine optimal blend ratios for the mineral powder.

2.6.3 Aerated bricks

2.6.3.1 Raw Material sourcing

The proponent will source the following primary materials for aerated brick production:

➤ **Steel Slag (from local Steel Mills)**

The use of steel slag in aerated bricks will help address the environmental challenges of slag stockpiling, which occupies agricultural land and contaminates soil, air, and groundwater.

➤ **Volcanic Ash (sourced locally)**

The volcanic ash from the Maai Mahiu region contains essential chemical components for pozzolanic reactivity, serving as the siliceous material in aerated brick production. Under autoclave conditions (185°C, 1.8 MPa), the silica from volcanic ash is effectively activated, promoting transformation into crystalline tobermorite through enhanced Ca^{2+} - SiO_2 reactions .

➤ **Other Aerated Brick Materials**

Standard aerated brick formulations will include Portland cement, quicklime (calcium oxide), gypsum, aluminum powder (as the expansive agent), and water. Aluminum powder will be used to create small, finely dispersed voids in the fresh mixture and increasing volume by about 50 percent in the molds within three hours .

2.6.3.2 Raw Material Preparation and Grinding

The aerated brick production process will begin with raw material preparation. Steel slag sourced from local Steel Mills will undergo ball mill pulverizing to achieve the required fineness . Volcanic ash will be ground to particle sizes suitable for the production process. Additionally, quicklime will be crushed and ground into lime powder, and cement will be stored in cement bins for subsequent use .

2.6.3.3 Batching and Mixing

All raw materials will be precisely batched by weight using electronic weighing systems . The batching process will follow the desired formulation, with typical aerated brick compositions including:

- Siliceous material (volcanic ash + steel slag): 30-35%
- Portland cement: 5-10%
- Quicklime: 10-15%
- Gypsum: 3-5%
- Aluminum powder: 0.05-0.1%
- Water: As required

The materials will be delivered to the mixer, where they will be thoroughly blended. The process requires careful temperature control and if the slurry temperature does not reach processing requirements, steam will be injected to achieve the correct temperature. The aluminum powder will be added as a suspension prepared by mixing with water, with every batch configured once .

2.6.3.4 Pouring, Casting, and Setting

After mixing the slurry will be poured into prepared steel molds. The expansive agent (aluminum powder) will create small, finely dispersed voids in the fresh mixture, increasing volume by about 50 percent . The molds will then be transported to a resting room where they will be kept at 40-50°C in an environment with 70-90% relative humidity for 1.5 to 2 hours. This allows the initial hydration to give the material sufficient strength to hold its shape and support its own weight .

2.6.3.5 Demolding and Cutting

Once the material has stiffened sufficiently, it will be removed from the molds. The stiffened body will be transported to a cutting station where specialized cutting machines will cut the material into predetermined shapes and sizes. The cutting process includes both rip cutting and crosscut operations . The scrap stock that falls during cutting will be recycled to waste slurry tanks and pumped back into the mixing process for reutilization .

2.6.3.6 Autoclave Curing

The cut bricks will be transported on steam-cured trolleys into large autoclaves, where the curing process will be completed . Autoclaving will be essential to achieve the desired structural properties and dimensional stability . The process will take approximately 8 to 12 hours under a pressure of about 174 psi (12 Bars) and a temperature of about 360°F (180°C), depending on the grade of material produced . During autoclaving, the wire-cut units will remain in their original positions.

Under autoclave conditions, the calcium ions from steel slag (through C_2S content) and the silica from volcanic ash will be effectively activated, promoting their transformation into crystalline tobermorite ($Ca_5Si_6O_{16}(OH)_2 \cdot 4H_2O$) through hydrothermal reactions . The quantity and crystallinity of tobermorite formed during autoclaving significantly affect the physical and mechanical properties of the aerated bricks, including compressive strength and bulk density .

2.6.3.7 Quality Control and Testing

The proponent will implement rigorous quality control throughout the production process.

Testing protocols will verify:

- Compressive Strength:
- Bulk Density:
- Dimensional Stability:
- Thermal and Acoustic Performance:
- Frost Resistance:

2.7 Equipment/ Machines

The main equipment to be installed and used within the materials processing plant will include:

2.7.1 Ball Mill and Vertical Roller Mill

The ball and vertical roller mills will be the core grinding equipment used in plant. They will be

responsible for reducing clinker, gypsum, and other additives into fine cement powder of the desired fineness. The ball mill uses rotating cylindrical drums filled with steel balls to grind the material, while the vertical roller mill employs rollers that crush and grind the material on a rotating table. Both systems will be designed for high efficiency, continuous operation, and uniform particle size distribution. The selection of the milling system will depend on energy efficiency, production capacity, and space availability within the plant.

2.7.2 Roller Press

The roller press is an energy-efficient grinding device used to pre-grind clinker before it enters the ball mill or vertical roller mill. It applies high pressure to the raw material between two rotating rollers, resulting in fine material and improved grinding efficiency. Using a roller press reduces overall energy consumption and increases throughput, making the process more cost-effective. It also reduces wear on downstream milling equipment.

2.7.3 Classifiers/Separators

Classifiers or separators will be used to separate fine cement particles from coarse ones. The coarse particles will be returned to the mill for further grinding, while fine particles are collected as finished cement. This will ensure that the final product meets quality standards and desired particle size distribution. Classifiers will improve milling efficiency, reduce energy consumption, and help maintain consistent cement quality.

2.7.4 Conveyors

Conveyors are mechanical systems to be used to transport raw materials, clinker, additives, and finished cement within the plant. They will include belt conveyors, screw conveyors, and bucket elevators. Properly designed conveyors will ensure smooth, continuous material flow, minimize spillage and dust emissions, and reduce manual handling risks. They are essential for maintaining productivity and operational safety in the plant.

2.7.5 Industrial Cyclone Dust Collector

An industrial cyclone dust collector, also known as a cyclone filter will be designed to remove large, dense, non-fibrous particles from waste gases in the cement manufacturing process. It will be used as a prefilter or first-stage dust collector before the main system, such as a bag filter or electrostatic precipitator to capture coarse dust particles. The cyclone collector aims to remove particles larger than 5 µm with an efficiency of 50%–90%.

The cyclone dust collector helps protect more sensitive and expensive dust collection equipment by capturing larger particles first, reducing wear and improving overall efficiency. During operation, dusty gas enters the cyclone tangentially, creating a circular motion. Centrifugal forces push dust particles to the sidewalls, where they fall under gravity into a collection hopper, while cleaner gas exits through the top. The system is low-maintenance, cost-effective, compact, and easy to install, making it suitable for the plant's dust control strategy.

This system will form a key component of the dust control strategy for the proposed plant, ensuring that emissions are minimized and environmental compliance is maintained. Another dust collection technology to be used will be the Bag Filters that capture fine cement particles

from the air, ensuring emissions meet environmental standards. Baghouse filters are highly efficient and widely used in building plants.

2.8 Project activities to be undertaken;

The construction activities shall involve engineering works; civil, mechanical, and electrical as here on

i. Site Preparation and Clearance

The existing ground situation will be altered through clearing of existing vegetation to pave way for implementation of the proposed building materials processing plant. The project proponent should strive to spare the mature trees on site not affected by the building line.

Further, there are plans to plant trees and flower gardens to create a green cool environment

Leveling and grading the site to ensure safe construction and efficient workflow.

ii. Excavation and Soil Preparation

Excavating the ground for foundations and replacing unsuitable soil with hardcore for stability.

iii. Foundation Slab and Walling

Laying reinforced concrete foundations to support the heavy grinding equipment.

Constructing internal walls for operational spaces, offices, and storage areas.

iv. Installation of Grinding Equipment

Placement and commissioning of grinding mills, feeders, separators, and other machinery required for production.

Ensuring equipment alignment, safety, and operational efficiency.

v. Plastering and Painting

Finishing internal and external surfaces to provide durability, safety, and a professional appearance.

vi. Stormwater and Drainage Construction

Installing drainage channels, soak pits, and stormwater management systems to prevent waterlogging and erosion.

vii. Connection to Utilities

Linking the facility to electricity, water supply, and other essential services.

Incorporating backup power sources such as generators or solar power.

viii. Pavement and Yard Works

Laying concrete or interlocking blocks for operational areas, access roads, and loading/unloading zones.

ix. Electrical Works

Installation of power lines, lighting, and electrical systems to support machinery, offices, and operational safety.

x. Landscaping

Planting trees and shrubs, constructing green belts, and implementing erosion control measures.

xi. Government Inspection and Certification

Obtaining all relevant approvals, including compliance certificates and occupation permits from county and national authorities.

xii. Commencement of Operations

Starting building materials processing operations, packaging, and dispatch once all infrastructure, machinery, and safety systems are in place.

Storage and Handling: Raw material stockpiles, finished silos/hoppers, and covered product storage.

Ancillary Facilities: Administrative block, laboratory, workshops, fuel storage (diesel), effluent treatment system, septic tanks/soak pits, internal access roads, security fencing, and green buffer zones.

2.9 Infrastructure and Utilities

Water Supply: The proposed development will receive water from an onsite borehole which shall be drilled to provide reliable water supply. This will be supplemented by provision of adequate water storage tanks, harvesting of rain water and recycling of waste water.

Foul Water Drainage: The proposed development will generate substantive amount of waste water per day. The waste water generated will be discharged into the waste water treatment plant.

Storm Water Drainage: The proposed development will generate enormous surface water. It is therefore recommended that adequate and well drainage channels be provided to accommodate the increased discharge. The flow of the storm water has been well captured in the plans and the proponent plans to develop adequate water storage tank for storage of harvested water.

Solid Waste Disposal: The proposed project will generate enormous solid waste. It is recommended that NEMA & County licensed private waste handlers be contracted to handle the waste. It is further recommended to have one common point within the premises to store the waste before final collection.

Electricity Supply: The proposed development will be connected to the Kenya Power and Lighting Company power supply line. The KPLC electricity supply lines are already available within the neighbourhood of the proposed project site. There will be a backup generator in case of Power blackout.

Communication: The area is well covered by communication facilities such as Telkom, Airtel and Safaricom among others. All these will facilitate communication during the project cycle.

Access Road: The proposed development site is served by a murram access road- 5km off Maai-Mahiu-Narok road. Adequate parking spaces shall be provided within the proposed project.

Landscaping and Tree Planting; The project will involve clearing of few vegetation and excavation of soil material. The site development involves cut and fill arrangement; whereby excavated material is used for backfilling. Any excess material will be disposed off-site.

The project site will be landscaped according to scheme plan. This will entail establishment of trees, grass and related ground cover to compensate for any cleared vegetation and to improve general aesthetics of the facility.

2.10 Project Inputs and Phases

The construction activities shall begin once the proponent obtains all relevant approvals from the county government of Nakuru, NEMA, NCA among others. Site clearing, demolition works, setting out and excavations works will then proceed. Materials from the excavations of the ground and foundation work will be reused for earth works and landscaping.

The proposed development will be constructed based on applicable building standards of Kenya. Other building standards will be incorporated. They include Building Code and the British Building Standards BS 8110, BS 5950, BS4449, BS4461 etc.

The development shall also incorporate environmental guidelines, health and safety measures. All the construction inputs shall be obtained from licensed dealers. The following will be required for successful implementation of construction activities. Construction tools and equipment including machinery mainly transportation vehicles will be used for the transportation of materials and in the execution of the proposed works.

2.10.1 Inputs during Construction

- a) **Construction raw materials i.e.,** sand, cement, stones, crushed rock (gravel/ ballast), ceramic tiles and other ceramic fittings, steel and wooden fixtures and fittings, glass, steel metals, timber, roofing materials, painting materials among others. All these should be obtained from licensed dealers and especially those that have complied with the environmental management guidelines and policies

- b) **Construction machines** including machinery such as excavators, trucks, concrete mixers, and tools and other relevant construction equipment. These will be used for the excavation, transportation of materials, clearing of the site and construction debris. Most of the machinery will use electrical and petroleum products to provide energy.
- c) **Construction labour** force of both skilled and Semi-skilled workers. These will require services such as energy, water supply and sanitation facilities.
- d) Water for construction purposes.
- e) Power from the mains grid or provided by generators.

2.10.2 Construction activities include the following

- i. Procurement of construction materials from approved dealers.
- ii. Transportation of construction materials and excavated materials using heavy and light machinery
- iii. Appropriate Storage of the construction materials.
- iv. Site clearing, excavation and filling and laying of foundation
- v. Construction works i.e., masonry works/building works including, finishes, fixtures and fittings.
- vi. Installation of grinding equipment and other supporting equipment such as the weighbridge
- vii. Disposal of debris/ materials. All debris and excavated materials will be dumped on sites approved by the county government.
- viii. Electrical, civil, and water engineering and sanitary works. These will be done by qualified and registered expertise.
- ix. Landscaping works and earth works mostly on completion of the proposed development.
- x. Completion of the development and occupation.

2.11 Project implementation sequencing/Phasing

i. Pre-construction stage

- Plan preparation and seeking of the appropriate approvals from the relevant authorities which has been done
- Appraisal of baseline condition to determine supply and demand for required infrastructural utility services.

- EIA study Report preparation including the necessary approvals.

ii. Construction stage

- **Establishment of related works and all support infrastructure that are significant for the construction work:** This would involve the transportation of machinery and deployment of the workers to the construction site. The machinery would be used for ground breaking and transportation of materials from the sources to the site. The major machineries that will be used include mixers, welding machines and transmission machines. The contractor will also mobilize human workforce at casual, permanent, skilled and unskilled levels.
- **Acquisition and transportation of building materials:** The contractor shall source for materials for construction from the various available suppliers. Supply of materials will be a continuous activity throughout the project life since different materials will be needed at different phases of the construction. The materials that shall be used in the construction include among others building stones, sand, ballast, cement, timber, reinforced concrete frame, steel, bars, G.I pipes, PVC pipes, pavement blocks, concrete slabs, murrum, hardcore, insulated electrical cables and timber among others.
- **Excavation and land filling works:** Excavation will be carried out to prepare the site for construction of foundations to lay the residential houses and all other proposed facilities and utilities. This will involve the use of heavy earthmoving machinery such as excavators, tractors, tippers and bulldozers
- **Masonry, Concrete Work and Related Activities:** The construction of the perimeter walls, building walls, foundations, floors, pavements, drainage systems among other components of the project will involve a lot of masonry work and related activities. General masonry and related activities will include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and will be supplemented by machinery such as concrete mix
- **Structural Steel Works:** The buildings will be reinforced with structural steel for stability. Structural steel works will involve steel cutting, welding and erection.
- **Roofing and Sheet Metal Works:** Roofing activities will include box profile roofing sheets and structural steel roof truss

- **Transportation of the construction wastes from the site:** Construction waste that cannot be used for either back filling or landscaping work at the site will be deposited in approved dumpsites by a contracted licensed waste handler.
- **Electrical Work:** Electrical work during construction of the premises will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets etc. in addition, there will be other activities involving the use of electricity such as welding and metal cutting.
- **Power distribution:** The location of the power transformer to serve the proposed building materials processing plant will be determined by experts from the Kenya Power and Lighting Company (KPLC). The proponent shall also explore alternative and renewable energy sources, such as stand by generator, to reduce overall electricity demand. Proposed solar installations may be used for water heating and to provide supplementary power during outages, enhancing energy reliability and sustainability for the facility.
- **Plumbing:** Installation of pipe work for water supply and distribution will be carried out within the proposed sheds, warehouses and associated facilities. In addition, pipe work will be done to connect wastewater from the premises to the waste water treatment plant, and for drainage of storm water. Plumbing activities will include metal and plastic cutting, the use of adhesives, metal grinding and wall drilling among others.
- **Fire protection:** A self-contained fire detection and alarm system will be installed, including manual call points, optical smoke detectors, heat detectors, and electronic sounders, particularly in operational areas. A hose reel system will be provided to cover all buildings, supported by a dedicated water storage tank and a network of distribution pipes. Portable fire extinguishers will be strategically located throughout the facility. Additional provisions will be made for high-risk zones and areas with special hazards to ensure comprehensive fire safety across the building materials processing plant.
- **Landscaping and tree planting:** To improve the environmental and aesthetic value or visual quality of the site once construction ceases, the proponent will carry out landscaping and tree planting. This will include establishment of lush grass lawns and will involve replenishment of the top soil. It is noteworthy that the proponent will use plant species that are available locally preferably indigenous ones for landscaping.

The proponent has already established a tree nursery in preparation of the trees to be used for landscaping and tree planting.

iii. Occupation/Operational stage

This stage will involve the routine operation, management, and maintenance of the building materials processing plant and its associated facilities in accordance with applicable laws, regulations, approved operational procedures, and environmental management plans.

- **Plant Operations:** Upon completion of construction and commissioning, the building materials processing plant facility will become operational. Activities during this phase will include receipt and handling of raw materials (clinker, gypsum, pozzolana, and other additives), operation of the grinding and milling systems, quality control testing, cement storage, loading, and dispatch. Plant operations will be undertaken by trained personnel in line with established safety and operational protocols.
- **Solid Waste and Wastewater Management:** Solid waste generated during the operational phase will mainly comprise packaging materials, maintenance waste, office waste, and collected dust from dust control systems. Appropriate waste segregation facilities, including designated bins and skips, will be provided within the facility for temporary storage prior to collection and disposal by licensed waste handlers at approved disposal sites. Wastewater generated from staff sanitary facilities and office operations will be managed through connection to a wastewater treatment facility. Storm water runoff from roofs, paved surfaces, and operational areas will be managed through a well-designed drainage system comprising channels, manholes, and silt traps to prevent flooding, erosion, and contamination of the surrounding environment.
- **Housekeeping and Compound Cleaning:** Regular housekeeping and cleaning of both paved and non-paved areas within the plant will be undertaken to maintain cleanliness, safety, and dust control. Cleaning activities will involve sweeping, washing of paved surfaces where necessary, and the controlled use of water and cleaning agents. Collected wash-down water and sediments will be managed to prevent environmental pollution.
- **General Repairs and Maintenance:** Routine inspection, repair, and maintenance of plant buildings, machinery, and support infrastructure will be conducted throughout

the operational phase. These activities will include maintenance of grinding equipment, conveyors, electrical installations, dust control systems, weighbridge, drainage infrastructure, and buildings. Preventive maintenance schedules will be implemented to ensure operational efficiency, occupational safety, and minimization of environmental impacts. Worn-out parts and materials will be replaced and disposed of in accordance with applicable waste management regulations.

iv. Decommissioning Phase

The decommissioning phase refers to the cessation of operations of the building materials processing plant, during which the facility will be closed, dismantled, and/or the site converted to an alternative use. In the event of decommissioning, the project proponent shall comply with all applicable Kenyan laws, regulations, and guidelines governing plant closure, waste management, occupational safety, and environmental protection.

Decommissioning activities will be implemented in a planned and phased manner to ensure safe shutdown of operations and to minimize adverse environmental and social impacts. The overall objective will be to rehabilitate the site to a condition that is as close as practicable to its original state prior to project development, or to a condition suitable for any approved alternative land use that is compatible with the surrounding environment and previous industrial use.

Where a change of land use is proposed, an Environmental Impact Assessment (EIA) or other

environmental study shall be undertaken, as required, to assess potential environmental implications of the new use and to inform appropriate mitigation measures. In cases where no alternative use is identified, the following site rehabilitation measures shall be implemented:

- ✓ Building materials, machinery, paving blocks, and other installations of economic value shall be dismantled and disposed of through resale, reuse, or auction, where feasible.
- ✓ All excavated and disturbed areas shall be backfilled with clean, uncontaminated soil and compacted to restore stable ground conditions.
- ✓ All solid waste, including demolition debris and residual materials, shall be collected, segregated, and disposed of at licensed disposal facilities in accordance with relevant waste management regulations.

- ✓ The site shall be landscaped and re-vegetated using appropriate indigenous or adaptive plant species to stabilize soils and prevent erosion.

Upon completion of decommissioning and site rehabilitation, the project proponent shall formally deregister the facility and surrender all operational licenses, permits, and certificates to the relevant regulatory authorities, in accordance with statutory requirements.

2.12 Project Outputs

2.12.1 Management of the Waste Generated

Different types of waste will be generated during the construction, operation and decommissioning phases of the project. The waste will be inert, hazardous and non-hazardous. The operations phase of the building will result in quite a significant volume of waste, mostly from project workers and the day-to-day operations of the facility. Maintenance and repair activities conducted during the operational lifetime of the project may generate limited volume of waste. Demolition of structures during decommissioning will result in large volumes of debris and other wastes.

2.12.2 Waste Management Strategy

Prior to the commencement of the proposed project, the Proponent will prepare a Waste Management Plan that will: State the methods for properly managing waste i.e. sorting, handling, storing, transporting and disposing wastes; Identify and describe possible locations of landfills or designated disposal sites;

Propose a minimization/collection/storage/treatment/re-use/disposal route for each waste; Identify potential third party re-users; Contract a NEMA licensed waste collector; and Propose location of waste storage and duties of site personnel.

The project proponent shall comply with the sustainable waste management Act 2024 through implementation of a Waste Management Plan during the all phases of the proposed project.

2.12.3 Waste Management Standards

The standards to be used for the construction, operation and decommissioning of the terminal will be in conformance with Legal Notice 121 on Waste Management Regulations 2006. If these regulations do not cover certain aspects of the project, then the Proponent shall comply with international regulations on environmentally sound management of waste.

2.12.4 Waste Inventories and Classification

Waste inventories will be created to quantify and characterize waste streams at each stage of the project. Separate inventories will be developed for construction wastes and for

commissioning/operational wastes. The volumes of waste requiring ultimate disposal will be minimized both through the control of waste generation and through land-filling. Inert and non-hazardous wastes that cannot be reused or recycled may be incinerated in a facility designed and operated in accordance with the Management Regulations 2006.

2.12.5 Hierarchy of Waste Management Practices

Each waste stream will be managed according to the following hierarchy of techniques, in which the technique chosen should be the first in the hierarchy that is safe and practicable:

- Eliminate or reduce the waste;
- Re-use as a material or fuel;
- Process and re-use as a material or as a fuel;
- Incinerate or re-use or landfill the ash;
- Landfill;
- Landscape - Landfill with appropriate vegetation planted
- Discharge to a receiving water course (applicable only to waste water)

2.12.6 Transfer of Waste to Third Parties

It is expected that there will be several third parties that may receive wastes generated during the construction of the proposed development. These third parties will include commercial waste disposal contractors and entities (corporate or individual) that have the capacity to reuse or recycle waste materials. In general, transfer to third parties for ultimate disposal will only be permitted if the part of their operation that is used for the proposed project waste is licensed. However, items such as timber wastes and other re-useable project wastes may be disposed to local population on the basis of case-by-case review by the proponent.

2.12.7 Waste Management

The primary objective of the waste management programme is to minimize environmental pollution while promoting waste reduction, reuse, and recycling wherever practicable. Waste management measures shall be implemented in an environmentally sound, socially acceptable, and financially sustainable manner throughout the construction and operational phases of the project.

2.12.7.1 Wastewater Management

Wastewater generated during the project will include runoff and effluent from construction activities, equipment and vehicle washing, and sanitary facilities. Wastewater from

temporary site offices and staff facilities shall be treated using approved on-site sanitation systems such as waste water treatment systems.

Wastewater arising from construction activities, including concrete curing and wash-down processes, is not expected to be hazardous; however, it shall be properly managed and monitored to ensure it does not cause soil, surface water, or groundwater contamination. Stormwater runoff will be managed through a properly designed drainage system incorporating channels, silt traps, and oil interceptors where necessary, to prevent flooding, erosion, and off-site pollution.

2.12.7.2 Solid Waste Management

Solid waste management will involve segregation at source, collection, temporary storage, transportation, and final disposal through licensed waste handlers in accordance with the Environmental Management and Coordination (Waste Management) Regulations 2024. Waste handling procedures shall be applied at all stages of the project as outlined below:

a) Construction Phase

During construction, the main waste streams will comprise residual construction materials and packaging wastes. These will include concrete debris, surplus sand and aggregates, off-cuts of metal, paint containers, polythene sheets, paper packaging materials, pipes, and other construction-related waste.

The following measures shall be implemented:

- An explicit contractual condition shall require the contractor to clear all construction debris and restore the site to a condition acceptable to the supervising architect and environmental consultant prior to issuance of the completion certificate.
- Excavated soil and surplus construction materials shall, where feasible, be reused for backfilling, landscaping, and site leveling to minimize off-site disposal.
- Recyclable materials such as scrap metal, timber, and plastic shall be segregated and sold or transferred to licensed recyclers.

b) Operational Phase

During the operational phase of the building materials processing plant, solid waste will mainly originate from production processes, equipment maintenance, packaging, offices, and staff welfare facilities. The proponent shall engage licensed waste handlers to collect and dispose of waste at approved disposal or recycling facilities at agreed intervals. Hazardous waste such as used oils, grease, oily rags, paint residues, and contaminated water shall be

handled separately and disposed of through licensed hazardous waste handlers in compliance with applicable regulations.

Overall, implementation of the above waste management measures will ensure compliance with statutory requirements while minimizing adverse environmental and health impacts associated with waste generation during both construction and operation of the building materials processing plant.

2.12.8 Atmospheric Emissions Operations

Atmospheric emissions associated with the proposed building materials processing plant will mainly arise from diesel powered generators, company vehicles, and machinery during both the construction and operational phases. These emissions will primarily consist of nitrogen oxides (NO_x), carbon monoxide (CO), sulphur dioxide (SO₂), particulate matter (PM), suspended particulate matter (SPM), volatile organic compounds (VOCs), and secondary pollutants. During construction, dust emissions are expected from earthworks, material handling, and movement of machinery, particularly during dry conditions. Regular watering of exposed surfaces and access roads will be undertaken to minimize dust generation.

Construction equipment will be properly maintained to reduce exhaust emissions.

During operation, the facility will be fitted with high-efficiency cyclone dust collectors and bag filters to control dust emissions from the building materials process. Collected dust will be recovered and recycled back into cement production, thereby minimizing waste and reducing emissions to the atmosphere. All workers potentially exposed to dust and fumes will be provided with appropriate personal protective equipment (PPE), including dust masks. With the proposed mitigation measures in place, atmospheric emissions from the project are expected to remain within acceptable limits and comply with applicable air quality regulations.

CHAPTER 3: BASELINE INFORMATION

3.1 Introduction

Baseline information (background information on the biophysical, social and economic settings) is important reference point for conducting EIA. Baseline data is essential for the assessment of the potential impacts of the project. The conditions of the natural environment forms a basis for the selection by planners of the area to be developed for various land uses for the sustainability of the proposed project and therefore evaluation of the baseline information is important in understanding the existing environmental set up. The main objective of baseline information is to provide adequate and accurate environmental baseline information and this can be broken down as follows:

- To provide a description of the status and trends of environmental factors, against which predicted changes can be compared and evaluated in terms of importance
- To provide a means of detecting actual change by monitoring once the project is implemented

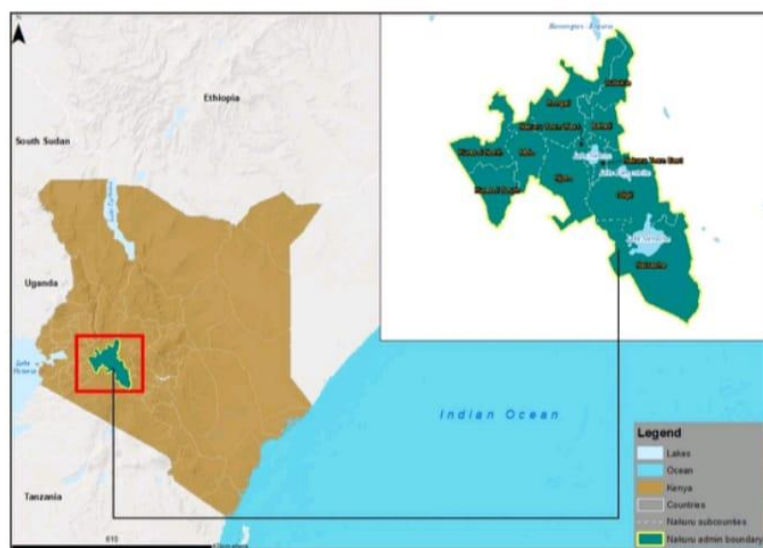
3.2 Physical Environment

3.2.1 Nakuru County

Nakuru County is one of the 47 counties of the Republic of Kenya provided in the Constitution of Kenya 2010. The county lies within the Great Rift Valley and borders eight other counties namely; Kericho and Bomet to the west, Baringo and Laikipia to the north, Nyandarua to the east, Narok to the south-west and Kajiado and Kiambu to the south. The county covers an area of 7,495.1 Km² and is located between Longitude 35 ° 28` and 35° 36` East and Latitude 0 ° 13 and 1° 10` south. The county headquarter is Nakuru Municipality which was previously the headquarters of Rift Valley Province provided for in the old constitution until 4th August 2010.

The county is divided into nine administrative Sub-Counties namely; Naivasha, Gilgil, Nakuru, Rongai, Nakuru North, Subukia, Njoro, Molo, and Kuresoi. Njoro and Kuresoi were hived off from Molo, Gilgil from Naivasha, Rongai Sub-county from Nakuru County, and Subukia from Nakuru North.

Naivasha Sub County covers an area of about 1,685.8 km² with Three (3) divisions and 20 sub locations hosting approximately 73,457 no. of households according to KNBS. It has a population of about 355,383.



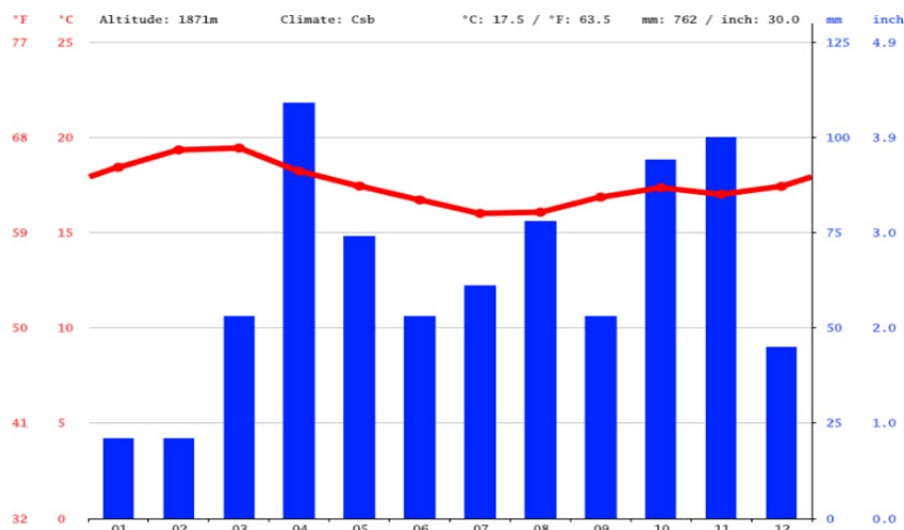
A map of Nakuru County and its Sub Counties

3.2.2 Climatic Conditions

The climate of Nakuru County is strongly influenced by the altitude and physical features. There are three broad climatic zones (II, III and IV). Zone II covers areas with an altitude between 1980 and 2700 m above the sea level and receives minimum rainfall of 1000mm per annum. This zone covers Upper Subukia, Rongai and Mau Escarpment. Zone III receives rainfall of between 950 and 1500 mm per annum and covers areas with an altitude of between 900-1800m above sea level. This zone covers most parts of the county and is the most significant for agricultural cultivation. Zone IV occupies more or less the same elevation (900-1800m) as Zone III. However, it has lower rainfall of about 500-1000mm per annum. This zone dominates Solai and Naivasha.

The climate of Maai Mahiu within Nakuru County is generally cool and moderately wet, largely influenced by its relatively high elevation of approximately 1,871 m above sea level. The area experiences an average annual temperature of about 17.5 °C and receives approximately 762 mm of rainfall annually. Temperatures remain fairly stable throughout the year, with mean monthly values ranging between approximately 16 °C and 19 °C. The warmest months typically occur in January to March, while slightly cooler conditions are experienced around June to August, which correspond to the dry and overcast season associated with cool southeasterly winds.

Rainfall in the area follows a bimodal distribution, which is characteristic of much of central and southern Kenya. The long rains occur between March and May, with April recording the highest precipitation levels, indicating the primary rainfall peak. A second rainfall season, the short rains, occurs between October and November, forming the secondary peak in rainfall intensity. The months of January–February and December are comparatively drier



Precipitation and temperature of the general location of the proposed site (Climate data, 2026)

3.2.3 Geology

Soils in Naivasha are of volcanic origins of the basin rocks and soils. The major soil types are Andosols, derived from volcanic ashes, Cambisols, rich and young soils showing little profile development, Regosols, high in organic matter and Lithosols, limited in depth by rock within 10cm. Planosolic, alluvial and lacustrine soil deposits are common in the region. These surround the lake making the fertility level of the soil to range from low to moderate. As a result these have greatly influenced the agricultural activities around the project site and its environs.

3.2.4 Topography/drainage

The area is characterized by relatively flat landscape. The topography of the proposed project site is gently sloping from east to west. The proposed area is generally flat and is mainly used for cultivation and rangeland. There exists a storm drainage channel along the access road.



Rangeland

3.2.5 Soils

In general, the area is characterized by sandy loam soil. The soil in the area is sandy loams which are well drained. The soils are suitable for crop production. Both topography and soil types favor agricultural production and this explains why crop production is the main economic activity in the area. The proposed site has been under cultivation for many years.



Maize plantation

3.3.6 Air quality

The Air quality tests were done at the site and at the nearest sensitive receptor. The main source of air pollutants in the area is vehicular emissions from the adjacent earth road. Other activities along the project area that have implications on air quality was quarry works. Though not dominant is outdoor burning of firewood at the residential homes. According to the USEPA (2016), sensitive receptors encompass but are not limited to

“hospitals, schools, day-care facilities, elderly housing and convalescent facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants”.

In addition to the aforementioned, the definition covers human settlements where involuntary exposures are likely to occur. Residential homesteads are the main receptors in the vicinity of the ESIA Study Area.

(Annexed Baseline Study Report for Ambient Air Quality Monitoring)

3.3.7 Noise and Vibration

Main source of noise at all the points assessed is quarry activities adjacent to the proposed project site. Others are vehicular movement along access road residential and commercial activities.

The obtained noise levels were compared against the EMC maximum permissible limits for construction sites. Noise levels obtained during the nocturnal schedule mostly within respective regulatory limits. Noise on the diurnal schedule at the residential home were below set limit for SP2- residential home. The busy neighboring quarry was noted to be the main source of these reported levels. The occasional traffic along the access road were also noted to contribute to intermittent elevated noise levels.

The baseline data obtained is representative of the noise levels at all the measurement locations and can be used to compare subsequent levels when the project is under construction and operational phases of the project.

(Annexed Environmental Noise Assessment Report)

3.3.8 The Rift Valley Fault line

It is important to note, as was pointed out in the geological survey that the site is still on a geological fault line within the Rift Valley. There is no conceivable way to mitigate for this kind of factor but relevant agencies need to continue monitoring seismic activities in this location.

3.3.9 Water resources

Water resources refer to various sources of water accessible in the site and its vicinity. The various water resources in the area are:

- Underground water;
- Water from Kiruiru River
- Rain water during rainy season.
- Water vendors.



Kiruiru River

The area has no sufficient water and thus the proponent wants to sink a borehole to meet the daily requirements.

3.4 Biological Environment

3.4.1 Vegetation

The unquarried areas are dominated by bushes, grasses and short shrubs. Generally, the vegetation cover on site is estimated at 60%. There are no species that are rare, endangered, threatened or are of conservation value.



Vegetation cover within project vicinity

(Annexed Biodiversity Report)

3.4.2 Fauna

The dominant animals around the site were livestock and scavenging birds. No wildlife activity was reported to have taken place in the proposed project area or its environs.

3.5 Socio-Economic Baseline

3.5.1 Human Population and land use changes

Human population around Naivasha sub County has registered a rapid increase from 43867 in 1969 to 158 679 in 1999 and 355,383 (census, 2019). This brought about the growth of small-sized rural and urban human settlement in the watershed areas and intensifying economic activities associated with the functional use of land. The growing population in the area is creating enormous pressures on the natural resource base in the watershed area.

3.5.2 Land Use

The dominant land use within and around the project area is agriculture. The surrounding parcels are largely utilized for small-scale farming and related agricultural activities, reflecting the rural character of the area. Prior to the proposed development, the project site itself was also used for agricultural purposes. However, a change of user approval has been sought to convert the land from agricultural use to light industrial use in order to accommodate the proposed development.

In addition to agricultural activities, the area hosts limited commercial and light industrial operations. These include small-scale businesses and resource-based activities such as quarrying, which are present within the broader locality.



Neighboring quarry and homestead

3.6 Infrastructure and Services

- **Roads and Accessibility:-**The transport and communication network in the project area is fair. The project can be accessed via 3.5 km access road from Lake wood City Resort, off Maai Mahiu- Narok road.



Site access road

- **Water Supply :-** The proponent will seek a water abstraction permit from the WRA and drill a borehole.
- **Surface Drainage :-**Most of the rainwater will mainly be absorbed into the soil during construction phase. Appropriate drainage systems have been provided for in the designs and will be put in place to handle the run-off/storm water from the site during operation of the project.
- **Energy: -** Construction machinery will require fuel during construction. This will be sourced from legitimate petroleum dealers. Electrical power will come in handy in driving the selected construction machinery. It will also be needed on operation of the completed project. The power (electricity) will be drawn from the power grid lines for KPLC.



Three phase powerlines within project vicinity

- **Communication:** - The area is well covered by communication facilities by the main telephone service providers including a Telkom, Safaricom, and Airtel among others. All these will facilitate communication during the implementation and on occupation of the project.
- **Security:** - There is single gate to the site. This will be manned 24 hours by qualified security personnel. The proposed project site has a masonry perimeter wall. The proponent should also install security lights to beef up security at the site both during construction and the operational phase of the project.



Secured gate

CHAPTER 4: RELEVANT POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Introduction

This section presents the institutional actors and legal texts that are relevant to the preparation of the EIA study, as well as an outline of the applicable EIA study process. National regulations are discussed along with international conventions to which Kenya is a party.

4.2 Constitutional Requirements for Environmental Protection

The 2010 constitution of Kenya acts as a benchmark for legislations and regulatory frameworks in Kenya by acting as a regulator and supervisor of development measures and project controls. It demands proper management of the environment as a national heritage and benefits to the future generations.

Environment and social sustainability is covered explicitly in the 2010 Constitution of Kenya.

Clause 42 under the Bill of Rights of the Constitution of Kenya, 2010 provides inter alia that every person has a right to a clean and healthy environment. Clause 43 of the Constitution provides that every person in Kenya has economic and social rights.

Chapter 5 of the Constitution provides for the sustainable management of land and the environment in Kenya. Specifically, **Part 2, Clauses 69 – 72** deals with environmental and natural resources management in Kenya and the proposed project will be conducted in accordance with these Clauses. **Clause 69(1)(f)** of the Constitution requires the State to develop systems for environmental impact assessment. The State already has a system for environmental impact assessment in the form of the Environment Management and Coordination Act, 1999 (EMCA) and its subsidiary legislation titled Legal Notice 101:Environment (Impact Assessment and Audit) Regulations, 2003 (L.N. 101)

4.3 Environmental Policy Framework

4.3.1 Environmental policy

According Sessional Paper No. 6 of 1999 on Environment and Development, since adoption by parliament in 1999 has been in use and had influenced the formation of EMCA (amended) 2015, but has since been surpassed by time and is therefore under revision to comprehensively cover areas that were previously left out to augment it.

The revised draft of the National Environmental Policy, dated April 2012, sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources, and recognizes that natural systems are under intense pressure from human activities particularly for critical ecosystems including forests, grasslands and arid and semi-arid lands. (National Environmental Policy, 2012). The objectives of the Policy include developing an integrated approach to Environmental Management, strengthening the Legal and Institutional Framework for Effective Coordination, Promoting Environmental Management Tools.

Relevance

The project shall implement the EMP to mitigate the impacts resulting during the construction and operational phases of the project; this will ensure that the natural environments are not destabilized by the subsequent project activities.

4.3.2 The National Shelter Strategy

In chapter 2, land policy is linked to constitutional reforms; regulation of property rights is vested in the government by the Constitution with powers to regulate how private land is used in order to protect the public interest. The Government exercises these powers through compulsory acquisition and development control. Compulsory acquisition is the power of the state to take over land owned privately for a public purpose. However, the Government must make prompt payment of compensation. (National Land policy, 2009).

Chapter 4 of the land policy under Environmental Management Principles, The National Land Policy provides for the policy actions for addressing the environmental problems such as the degradation of natural resources, soil erosion, and pollution. (National Land policy, 2009)

Relevance

Xiaomi management shall implement the EMP to ensure that the environment around the proposed site is not polluted by subsequent activities during construction and operational phases. Health and safety measures will have to be maintained to protect users and workers during construction and operational phases.

4.3.3 Kenya Vision 2030

Kenya Vision 2030 is the country's long term development blueprint guiding development in Kenya from 2008 to 2030. Its objective is to transform Kenya into a newly industrializing, "middle income country providing a high-quality life to all its citizens by the year 2030" Section 5.4 on the Environment, states that Kenya aims to be a nation living in a clean,

secure and sustainable environment by 2030. It also states that Kenya will harmonize environment-related laws for better environmental planning and governance. (Kenya Vision 2030, 2007)

Relevance

As part of environmental protection, mitigation measures have been formulated for this project which will ensure minimal negative effects to the environment. Development is in line with the national vision of providing a high quality of life for all its citizens.

4.3.4 National environmental policy 2013

The goal of this Policy is to Better quality of life for present and future generations through sustainable management and use of the environment and natural resources. (National Environmental Policy, 2013)

Relevance

The EIA Study report, as one of the project's management tool has developed an EMP for the study on how to handle wastes from the development to ensure environment is not compromised by illegal dumping of wastes.

4.4.5 National Policy on Water Resources Management and Development

While the National Policy on Water Resources Management and Development enhances a systematic development of water facilities in all sectors for promotion of the country's socio- economic progress, it also recognizes the by-products of this process as wastewater. It, therefore, calls for development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. This implies that Industrial and business development activities should be accompanied by corresponding waste management systems to handle the waste water and other waste emanating there from. The same policy also requires that such projects undergo comprehensive ESIAs 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.

Relevance

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 project implementation phase.

4.3.6 Kenya Industrialization Policy

This policy has a vision for the country to be the leading industrial nation in Africa with a robust, diversified, and globally competitive manufacturing sector. Its specific objectives include;

1. Strengthening local production capacity to increase domestically- manufactured goods by focusing on improving the sector's productivity and value addition by 20%
2. Raising the share of Kenyan manufactured products in the regional market from 7 to 15 %
3. Developing niche products through which Kenya can achieve a globally competitive advantage
4. Increasing the share of Foreign Direct Investment in the industrial sector by 10%
5. Increasing by 25%, the share of locally-produced industrial components, spare parts, and machine tools
6. Increase the local content of locally-manufactured goods for export to at least 60%
7. Increasing the share of industries located outside major urban centers to at least 50%

Relevance

Mitigation of possible negative impacts on the environment are contained in this EIA study report.

4.3.7 Energy Policy, 2012

The broad objective of the national energy policy is to ensure adequate, quality, cost effective, and affordable supply of energy to meet development needs while protecting and conserving the environment. The specific objectives are to:

1. Provide sustainable quality energy services for development
2. Utilize energy as a tool to accelerate economic empowerment for urban and rural development
3. Improve access to affordable energy services
4. Provide an enabling environment for the provision of energy services
5. Enhance security of energy supply
6. Promote development of indigenous energy resources, and
7. Promote energy efficiency and conservation as well as prudent environmental, health and safety practices

Relevance:

The project will need to incorporate the use of energy efficient lighting, that will optimize use of energy and is open to work in liaison organizations such as Kenya Cleaner Production to promote industrial symbiosis in relation to energy conservation.

4.3.8 Kenya's Green Economy Strategy and Implementation Plan (GESIP 2016-2030)

The vision is for a low-carbon, resource efficient, equitable, and inclusive socio-economic transformation.

Relevance

In regard to the project, provisions are incorporated to have the development in the plant to operate in a manner that does not adversely affect the environment but carried in an economical way.

4.3.9 The Kenya National Spatial Plan 2015-204

The National Spatial Plan supports the implementation of strategic national projects specifically the flagship projects spelt out under Kenya Vision 2030 by indicating their spatial locations and providing a framework for absorbing the spatial impacts of these projects. It provides a coordinating framework for sectorial planning which has been lacking in the country and it aims to address the dis-connect that has existed for a long time between physical and economic planning. The specific objectives of the National

Spatial Plan are: -

1. To create a spatial planning context that enhances economic efficiency and strengthens Kenya's global competitiveness.
2. To promote balanced regional development for national integration and cohesion.
3. To optimize utilization of land and natural resources for sustainable development.
4. To create livable and functional Human Settlements in both urban and rural areas.
5. To secure the natural environment for high quality of life

Relevance

The project has incorporated the Kenya National Spatial Plan 2015-2045 in its implementation strategy and the project is seen as an avenue that will result in:- opening markets for goods and services; allow movement of capital in the region and national level ; the area will also attract foreign direct investment to the area.

4.3.10 Kenya National Policy on Gender and Development of 2011

The overall aim of the Gender Policy 2011 was to provide precedence for the prevention of discrimination on the basis of sex in the national development process in order to improve social, legal/civic, economic, and cultural conditions of women, men, girls and boys in Kenya. Of the identified policy priorities, two were identified as relevant to project implementation. One of the priorities was incorporating gender equality objectives, indicators, as well as preventative action identification into the ministerial performance frameworks to which the project must comply. Additionally, the policy lays out a priority that each project will develop integrated gender equality strategies at the initiative level in priority areas.

Relevance

This policy will be a guide during initial project implementation, especially during hiring of staff, procurement of suppliers, and contracting of sub consultants/contractors.

4.3.11 The Kenya Environmental Sanitation and Hygiene Policy Of 2016-2030

The Kenya Environmental Sanitation and Hygiene Policy (KESHP) 2016-2030 provides broad guidelines to both state and non-state actors at all levels to work towards universal access to improved sanitation leading to improved quality of life for the people. Primarily, the KESH policy aims to increase the proportion of the population with access to improved sanitation to 100 percent by 2030 and ensure a clean and healthy environment for all in Kenya. The development of KESHP 2016-2030 is a result of extensive policy review and participatory stakeholder consultations and validation meetings held throughout the country.

The policy sets Kenya on the trajectory of ensuring that all Kenyans have sustainable access to improved sanitation and a clean and healthy environment by 2030.

Relevance

The proponent and the contractor will seek to comply with the provision of this policy to achieve 100% open defecation free (ODF) at the project area.

4.3.12 Kenya Health Policy Of 2014-2030

The Kenya Health Policy, 2014–2030 gives directions to ensure significant improvement in overall status of health in Kenya in line with the Constitution of Kenya 2010, the country's long-term development agenda, Vision 2030 and global commitments. It demonstrates the health sector's commitment, under the government's stewardship, to ensuring that the country attains the highest possible standards of health, in a manner responsive to the needs of the population.

Relevance

The proposed project is expected to employ both skilled and unskilled workers some who might come from the marginalized groups within the project area. The rights and fundamental freedoms of these workers should be protected in compliance with the requirements of this policy.

4.3.13 The National Occupational Health and Safety Policy Of 2012

This National Occupational Safety and Health Policy intends to significantly sustain continual development and implementation of the National Occupational Safety and Health systems and programs to reduce incidences of work-related accidents and diseases. In addition, it seeks to offer equitable compensation to those who suffer physical injuries and contract occupational diseases. The main objective of this policy is to establish national occupational safety and health systems and programmes geared towards the improvement of the work environment. The Policy seeks to reduce the number of work-related accidents and diseases, and equitably provide compensation and rehabilitation to those injured at work or who contract occupational diseases.

Relevance

The proponent will need to seek to compliance with the provision of the policy in ensuring that workers operate in a safe and healthy environment and that their welfare is safeguarded. There is also a need to establish a safety policy in line with the Act.

4.3.14 Kenya National Biodiversity Strategy and Action Plan (NBSAP) 2019-2030

The NBSAP 2019-2030 is presented as a road map to achieving biodiversity conservation targets in the country while also fulfilling international and regional obligations. The action plan sets the time required to realize the action, performance and verifiable indicators and allocates responsibilities for implementation to different institutions that include Government Ministries, Departments and Agencies (MDAs), County Governments, Private sector, Research and Academic Institutions, NGOs and CBOs. Its vision is to ensure that by 2030, Kenya will have a highly valued, conserved and sustainably utilized biodiversity contributing to socio-economic wellbeing of the people of Kenya.

Relevance

This policy is triggered by project in that it has the potential to cause significant conversion (loss) or degradation of natural habitats. The developer is expected to abide by the above provisions.

4.4 Environmental Legal Framework

The key national laws that govern the management of environment resources in the country have been briefly discussed in the following paragraphs. Note that whatever any of the laws contradict each other, the environmental management and coordination act 1999 prevails.

4.4.1 Environmental Management and Coordination Act (EMCA) of 1999(Revised 2015)

The Act received Presidential assent on 6th January, 2000 and came into force 14th January 2000. The Act was on a review of 77 statutes; 57 of them relating directly to protection of environment and management of natural resources, while the 20 relate indirectly to environment. Lack of coordination in dealing with environmental protection necessitated the need for a comprehensive Act to deal with environmental matters.

Part II of EMCA entitles every person in Kenya to a clean and healthy environment and confers upon every person the duty to conserve and safeguard the environment. Part V of the Act provides measures for protection and conservation of the environment. Pollution of environment through waste disposal, dust emission noise radiation pesticides, heavy metals and smell are prohibited. Violation of them may exert restoration orders from NEMA.

Part XI of the Act defines environmental offences and provides for heavy penalties on any person who commits an environmental offence. Section 148 provides that the act shall prevail over any written law, relating to the management of the environment that was in force immediately before coming into force of this act

The proponent has undertaken an EIA Full study report to ensure compliance and will undertake subsequent annual environmental audits. EMCA has provided for the development of several subsidiary legislations and guidelines that govern Environmental Management which are relevant to the current project.

4.4.2 The Environmental Impact Assessment and Audit Regulations 2003 (Legal Notice No. 101) and EIA & Audit Regulations (Amendment) 2019. Regulation 24 – EIA license

-Environmental Impact License shall be issued after the authority approves the project under regulations 23, and shall be issued in form.

Regulation 28 – False or incorrect information

-Substantial changes or modification and when project poses an environmental threat that information or data given by the licensee were false, incorrect or intended to mislead.

Regulation 24 – Annual Environmental Audit

-Annual environmental auditing after presentation of an EIA report shall be undertaken by the licensee to ensure the implementation of environmental management plan is audited on regular basis, an audit report submitted to NEMA annually and ensuring that the criteria to audit is based on environmental management plan developed during the EIA process or after the initial audit.

Regulation 40 - Monitoring changes after project implementation

Monitoring by NEMA and Lead Agencies shall be done to establish any possible changes in the environment and their possible impacts, immediate and long term effects of its operations, identify and determine parameters and measurable indicators and conduct changes that occurred after implementation. The aim of this section is to provide the Proponent and Contractors with quick reference to most critical legal and policy provisions to enable proper planning and impact assessment during project planning and implementation.

This ESIA study has been undertaken by a NEMA-registered Environmental Impact Assessment Lead Expert, supported by a multidisciplinary team of sector specialists. The assessment process followed all statutory requirements, including baseline environmental studies, stakeholder consultations, impact identification and evaluation, and the formulation of mitigation and monitoring measures.

4.4.3 The Environmental Management and Coordination (Air Quality) Regulations, 2024.

The objective is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources such as mobile sources and stationary sources. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set.

Ambient Air Quality Tolerance Limits

	Pollutant	Time weighted Average		
			Industrial area	Residential, Rural & Controlled areas***
I.	Sulphur oxides (SOX);	Annual Average*	80 µg/m ³	60 µg/m ³
				15 µg/m ³

		24 hours**	125 g/m ³	80 g/m ³	30 g/m ³
		Annual Average		0.019 ppm/50 g/m ³	
		Month Average			
		24 Hours		0.048 ppm /125 g/m ³	
		One Hour			
		Instant Peak		500 g/m ³	
		Instant Peak (10 min)		0.191 ppm	
2.	Oxides of Nitrogen (NOX);	Annual Average*	80 g/m ³	60 g/m ³	15 g/m ³
		24 hours**	150 g/m ³	80 g/m ³	30 g/m ³
		8 hours			
		Annual Average		0.2 ppm	
		Month Average		0.3 ppm	
		24 Hours		0.4 ppm	
		One Hour		0.8 ppm	
		Instant Peak		1.4 ppm	
3.	Nitrogen Dioxide	Annual Average	150 g/m ³	0.05 ppm	
		Month Average		0.08 ppm	
		24 Hours	100 g/m ³	0.1 ppm	
		One Hour		0.2 ppm	
		Instant Peak		0.5 ppm	
4.	Suspended Particulate matter (SPM)	Annual Average*	360 g/m ³	140 g/m ³	70 g/m ³
		24 hours**	500 g/m ³	200 g/m ³	100 g/m ³
		Annual Average***		100 g/m ³	
		24 hours***		180 g/m ³	
5.	Respirable Particulate Matter (<10 m) (RPM)	Annual Average*	70 g/m ³	50 g/m ³	50 g/m ³
		24 hours**	150 g/Nm ³	100 g/Nm ³	75 g/Nm ³
6.	PM2.5	Annual Average	35 g/m ³		
		24 hours	75 g/m ³		
7.	Lead (Pb)	Annual Average*	1.0 g/Nm ³	0.75 g/Nm ³	0.50 g/m ³
		24 hours**	1.5 g/m ³	1.00 g/m ³	0.75 g/m ³
		Month Average		2.5	

8.	Carbon monoxide (CO)/ carbon dioxide (CO ₂)	8 hours**	5.0 mg/m ³	2.0 mg/m ³	1.0 mg/m ³
		1 hour	10.0 mg/m ³	4.0 mg/m ³	2.0 mg/m ³
		mg/Kg			
		24 hours**			
9.	Hydrogen Sulphide	24 hours**	150 g/m ³		
10.	Non-methane hydrocarbons				
		instant Peak	700ppb		
11.	Total VOC	24 hours**	600 g/m ³		
12.	Ozone	1-Hour	200 g/m ³	0.12 ppm	
		8 hour (instant Peak)	120 g/m ³	1.25 ppm	

Ambient Air Quality at Property Boundary for General Pollutants

	Pollutant	Time weighted Average	Property Boundary
1	Particulate matter (PM)	Annual Average*	50 g/m ³
		24 hours**	70 g/m ³
2.	Oxides of Nitrogen (NOX);	Annual Average*	80 g/m ³
		24 hours**	150 g/m ³
3.	Sulphur oxides (SOX);	Annual Average*	50 g/m ³
		24 hours**	125 g/m ³
4.	Hydrogen Sulphide	24 hours**	50 g/m ³
5.	Lead(Pb)	Annual/24 hours	0.5-2.0 g/m ³
6.	Ammonia	24 hours**	100 g/m ³

The proponent shall ensure full compliance with the applicable Air Quality Regulations by conducting regular maintenance of machinery and equipment, as well as routine monitoring and measurement of atmospheric emissions to ensure adherence to permissible limits.

4.4.4 Water Quality Regulations, 2025

Water quality Regulations apply to water used for domestic, industrial, agricultural and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different uses. These Regulations provide for

the protection of lakes, rivers, streams springs, wells and other sources. The overriding objective of the Regulations is to protect human health and the environment. Proper enforcement of the Regulations can lead to marked reduction in water-borne diseases. The Regulations provide guidelines and standards for the discharge of poisons, toxins, radioactive and other pollutants into the aquatic environment. Standards have also been set for discharge of effluent into the sewer and aquatic environment. The National Environment Management Authority regulates discharge into the aquatic environment.

Part of the study involves a review of the environmental standards that provides a basis for monitoring and future audits. The table below presents recommended guidelines on wastewater quality for discharge into the public sewers and open water bodies

Standards for Discharge into public sewers (mg/l)

Parameter	Maximum Levels Permissible
Suspended solids (mg/L)	250
Total dissolved solids (mg/L)	2000
Temperature 0C	20 - 35
pH	6-9
Oil and Grease (mg/L) -where conventional treatment shall be used	10
Oil and Grease (mg/L)- where ponds is a final treatment method	5
Ammonia Nitrogen (mg/L)	20
Substances with an obnoxious smell	Shall not be discharged
Biological Oxygen Demand BOD5 days at 20 oC (mg/L)	500
Chemical Oxygen Demand COD (mg/L)	1000
Arsenic (mg/L)	0.02
Mercury (mg/L)	0.05
Lead (mg/L)	1.0
Cadmium (mg/L)	0.5
Chromium VI (mg/L)	0.05
Chromium (Total) (mg/L)	2.0
Copper (mg/L)	1.0
Zinc (mg/L)	5.0
Selenium (mg/L)	0.2
Nickel (mg/L)	3.0
Nitrates (mg/L)	20
Phosphates (mg/L)	30

Standards for Discharge into Environment (Water body)

Parameter	Max. Allowable (Limits)
1,1-dichloroethylene	0.2
1,2-dichloroethane	0.04
1,3-dichloropropene (mg/l)	0.02
Alkyl Mercury compounds	Nd
Ammonia, ammonium compounds, NO ₃ compounds and NO ₂ compounds (Sum total of ammonia-N times 4 plus nitrate-N and Nitrite-N) (mg/l)	100
Arsenic (mg/l)	0.02
Arsenic and its compounds (mg/l)	0.1
Benzene (mg/l)	0.1
Biochemical Oxygen Demand (BOD 5days at 20 oC) (mg/l)	30
Boron (mg/l)	1.0
Boron and its compounds – non marine (mg/l)	10
Boron and its compounds –marine (mg/l)	30
Cadmium (mg/l)	0.01
Cadmium and its compounds (mg/l)	0.1
Carbon tetrachloride	0.02
Chemical Oxygen Demand (COD (mg/l)	50
Chromium VI (mg/l)	0.05
Chloride (mg/l)	250
Chlorine free residue	0.10
Chromium total	2
cis –1,2- dichloro ethylene	0.4
Copper (mg/l)	1.0
Dichloromethane (mg/l)	0.2
Dissolved iron (mg/l)	10
Dissolved Manganese(mg/l)	10
E.coli (Counts / 100 ml)	Nil
Fluoride (mg/l)	1.5
Fluoride and its compounds (marine and non-marine) (mg/l)	8
Lead (mg/l)	0.01
Lead and its compounds (mg/l)	0.1
n-Hexane extracts (animal and vegetable fats) (mg/l)	30

n-Hexane extracts (mineral oil) (mg/l)	5
Oil and grease	Nil
Organo-Phosphorus compounds (parTanaon, methyl parTanaon, methyl demeton and Ethyl parantropheryl phenylphosphorothroate, EPN only) (mg/l)	1.0
Polychlorinated biphenyls, PCBs (mg/l)	0.003
pH (Hydrogen ion activity----marine)	5.0-9.0
pH (Hydrogen ion activity--non marine)	6.5-8.5
Phenols (mg/l)	0.001
Selenium (mg/l)	0.01
Selenium and its compounds (mg/l)	0.1
Hexavalent Chromium VI compounds (mg/l)	0.5
Sulphide (mg/l)	0.1
Simazine (mg/l)	0.03
Total Suspended Solids, (mg/l)	30
Tetrachloroethylene (mg/l)	0.1
Thiobencarb (mg/l)	0.1
Temperature (in degrees celsius) based on ambient temperature	± 3
Thiram (mg/l)	0.06
Total coliforms (counts /100 ml)	30
Total Cyanogen (mg/l)	Nd
Total Nickel (mg/l)	0.3
Total Dissolved solids (mg/l)	1200
Color in Hazen Units (H.U)	15
Detergents (mg/l)	Nil
Total mercury (mg/l)	0.005
Trichloroethylene (mg/l)	0.3
Zinc (mg/l)	0.5

Sources: EMC (Water Quality) Regulations

During the construction and operation phases, the proponent in conjunction with relevant government agencies, will require constant monitoring in order to ensure that the activities do not affect the water quality of both surface and underground water resources as the proponent aims to comply with the standards specified in this regulation.

4.4.5 The Sustainable Waste Management Act No 31 of 2022

Legal Notice No. 121: Section 4-6 Part II of the Environmental Management and Co-ordination (Waste Management) Regulations, 2006 states that: -4.

- (1) No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.
- (2) Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed off such waste in the manner provided for under these Regulations.
- (3) Without prejudice to the foregoing, any person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose off such waste in a designated waste disposal facility. In addition, the Regulations state that:
 - 5. (1) a waste generator shall minimize the waste generated by adopting the following cleaner production methods

The proponent shall ensure that the main contractor adopts and implements all possible cleaner production methods during the construction phase of the project. During the construction phase of the project, the proponent shall ensure that the main contractor implements the above-mentioned measures as necessary to enhance sound Environmental Management and Coordination (Noise management of waste).

Legal Notice No. 120; Part II – Protection of Sources of Water for Domestic Use.

- (1) Every person shall refrain from any act which directly or indirectly causes or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of these Regulations
- (2) No person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution
- 5. All sources of water for domestic uses shall comply with the standards set out in the First Schedule of these Regulations.

The proponent and project architect as well as engineer are urged to ensure that drainage channels are well designed during the construction phase of the project, and upon completion the entire project is supposed to be connected the wastewater treatment plant.

4.4.6 Noise and Excessive Vibration pollution (Control) Regulation, 2009

The Regulations prohibit any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether noise is loud, unreasonable, unnecessary or unusual,

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

Maximum Permissible Noise Levels - Construction Phase

Facility		Maximum noise level permitted (Leq) in dB(A)	
		Day	Night
1.	Health facilities, educational institutions, homes for the disabled, etc.	60	35
2.	Residential	60	35
3.	Areas other than those in (i) and (ii) above	75	65

Time frame:

Day: 6:01 am – 8:00 pm (Leq, 14 hours)

Night: 8:01 pm – 6:00 am (Leq, 10 hours)

Maximum Permissible Noise Levels - Operation Phase

Facility		Sound Level Limits (dBA) (Leq, 14 h)		Noise Rating Level (NR)(Leq, 14 h)	
		Day	Night	Day	Night
1	Silent Zone	40	35	30	25
2	Places of Worship	40	35	30	25
3	Residential - Indoor	45	35	35	25
4	Residential - Outdoor	50	35	40	25
5	Mixed residential (with some commercial and places of entertainment)	55	35	50	25
6	Commercial	60	35	55	25

Time frame:

Day: 6:01 am – 8:00 pm (Leq, 14 hours)

Night: 8:01 pm – 6:00 am (Leq, 10 hours)

Project work should be planned in a way that limits excessive noise and vibration, especially near sensitive receptors

To minimize the impacts of noise and vibrations from the proposed activities. All possible care will be undertaken to ensure that the machinery is properly greased and oiled to reduce friction and possible noise emission.

The contractor /sub-contractor for civil works will be required to ensure compliance with the above regulations in order to promote a healthy and safe working environment throughout the construction phase.

4.4.7 The Physical Planning Act 2019

This Act empowers Local Authorities to plan, guide and control development activities taking place within their areas of jurisdiction. The Act empowers Local Authorities with the powers to prohibit or control the use and development of land and to approve all development applications. The Act further provides for penalties relating to contravention of its provisions. A Local Authority is in addition empowered to require a development applicant to submit an ESIA where a proposed development is considered of potential injurious impacts on the environment, (section 36)

The proponent has to acquire the necessary approvals from the department of physical planning.

4.4.8 The Building Code 2024

Building Code regulates all the development activities into the building industry to ensure safety, convenience and acceptable standards. The By-Laws specify design standards relating to building materials, building sites, foundations, walls, fire safety. Roofs, floors, chimney, stairs, lifts, refuse disposal, water supply, ventilation and drainage of building. The By-laws also specify standards for sanitary conveniences, sewers, access to plots and sitting and spacing about building within a given plot. Any person who erects a building or develops land or changes the use of a building must therefore comply with the requirements of the code. All such developments must be applied for in a prescribed form and submitted to the relevant local authority for consideration and consequent approval or rejection.

During project implementation, the appointed contractor shall meet registration and approval requirements with NCA

4.4.9 Water Act 2016

The ministry of water is vested with duty to conserve and regulate the use of natural water resource. A section of the act related to the environment prohibits the abstraction of water without permit and also spells out penalties for pollution of water. The ministry through the district water board regulates the use of water and drilling boreholes. The Acts also creates

the water resource management authority responsible for the regulation of water allocation through the issuance and amendments of water permits.

Section 73 of the Act provides that a person who is licensed to supply water has a responsibility of safeguarding the water sources against degradation. According to section 75 (1) such a person is required 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.

Developments envisioned by project will require to keep water use consumption for monitoring purpose and as part of legal compliance to the regulations. Water sources such as boreholes will be expected to seek Water Resource Authority (WRA) approval as the authority is liable for management, conservation, use and control of water resources

4.4.10 Public Health Act 2012 ((Drainage and Latrine) Rules)

The Rule 85 provides that every owner or occupier of every workshop, workplace or other premises where persons are employed shall provide proper and sufficient latrines for use by employees. Rule 87 requires every contractor, builder or other person employing workers for the demolition, construction, reconstruction, or alteration of any building or other work in any way connected with building to provide an approved position sufficient and convenient temporary latrine for use by such workers. Rule 91 provides that no person shall construct a latrine in connection with a building other than a water closet or a urinal, where any part of the site of such building is within 200 feet of a sewer belonging to the local authority that is at a suitable level, and where there is sufficient water supply. (Laws of Kenya- Public Health Act, 2012)

Xiaomi management will be required to abide by these provisions throughout the project cycle. Specifically, the proponent must properly locate facilities for sanitary facilities. Provision of water and soap or other equipment for drying hands and their use should be done and supervised.

4.4.11 Prevention Act Cap 246

Section 5 – Drainage System-No operations shall obstruct flow of water into or out of any drainage. The management shall be required to maintain the drainage system within the area of the project for removal of water from any land around the project to prevent larvae breeding.

Section 191 – Fouling water-The proponent shall ensure that no water or any public spring or reservoir is rendered unfit for the purpose for which it was ordinarily used for by the community.

Section 192 – Dwellings and Neighborhood-The operation phases of the project shall ensure that health of persons in general dwellings or carrying on business in the neighborhood or passing along a public facility are protected.

Section 193 - Offensive Trade-The proponent shall control loud noises or offensive smells so as not to interfere with the common rights of the people within the surrounding. This offence is punishable for common nuisance.

The main contractor for civil works and proponent will be required to ensure strict adherence to the environmental Management Plan throughout the project cycle in order to mitigate against any possible negative impact associated with dust, noise, and effluent discharge.

4.4.12 Standards Act, Cap. 496

The Standards Act, Cap. 496 of the Laws of Kenya, enacted in 1974, established the Kenya Bureau of Standards (KEBS) as the national body responsible for the development, promotion, and enforcement of standards for products, processes, and services. KEBS ensures that goods and services in Kenya meet quality, safety, and environmental requirements, thereby protecting public health, the environment, and consumer interests.

The proponent shall ensure that all products manufactured at the facility are tested and certified in accordance with KEBS standards prior to market release. Packaging materials, production inputs, and operational procedures shall also comply with relevant KEBS requirements to ensure quality, safety, and environmental protection.

4.4.13 Occupational Health and Safety Act 2007

This Act of Parliament was enacted to provide for the health, safety and welfare of persons employed in workplaces and for matters incidental thereto and connected therewith. Its relevant clauses and stipulations relevant to the proposed project are;

- Part II of the Act provides the General Duties that Occupiers must comply with in respect to health and safety in the workplace. Such duties include undertaking S&H risk assessments, S&H audits, notification of accidents, injuries and dangerous occurrences, etc.

- Part III of the Act provides the administrative framework for supervision of the
- Part IV deals with the enforcement provisions that the DOSHS has been provided with under the Act. It discusses the instances when Improvement and Prohibition Notices can be issued as well as the powers of OSH officers.
- Part V of the Act requires all workplaces to be registered with the DOSHS. The Occupier has to apply for registration of their project with the DOSHS on completion of installation of the crusher and before the operational phase of the project.
- Part XI of the Act contains Special Provisions on the management of health, safety and welfare. These include work permit systems, PPE requirements and medical surveillance. All sections of this part of the Act will be applicable to this project during the operational phase.
- Part XIII of the Act stipulates the fines and penalties associated with noncompliance of the Act. It includes those fines and penalties that are not included in other sections of the Act and will be important for an Occupier to read and understand the penalties for non-compliance with S&H provisions
- Part XIV of the Act is the last section of the Act and contains miscellaneous provisions which are not covered elsewhere. Most of the sub-sections under this part of the Act will be applicable to mining projects and it is in the interest of an Occupier to read, understand and ensure compliance with it.

Some of the important subsidiary legislations which operationalized the Act and are applicable to the proposed project are described below.

I. Safety and Health Committee - Rules 2004 Legal Notice (L.N) 31 of OSHA 2007

These rules came into effect on April 28th, 2004 and require that an Occupier formalize a Safety and Health (S&H) Committee if there are a minimum of 20 persons employed in the work place. The size of the S&H Committee depends on the number of workers employed at the place of work. For a Proponent and Contractor, the Occupational Safety and Health Act and the S&H Committee Rules 2004 are important as they require compliance with the following measures:

- Posting of an Abstract of the Factories and Other Places of Work Act in key sections of each area of the workplace.

- Provision of first aid boxes in accordance with Legal Notice No. 160: First Aid Rules of 1977.
- Ensuring that there are an appropriate number of certified first aiders trained by a DOSHS approved institution and that the certification of these first aiders is current.
- Provision of a General Register for recording amongst other things all incidents, accidents and occupational injuries.
- Appointment of a safety and health committee made up of an equal number of members from management and workers based on the total number of employees in the company.
- Training of the safety and health committee in accordance with these rules.
- Appointment of a safety and health management representative by the proponent.

The Safety & Health Committee must meet at least quarterly, take minutes, circulate key action items on bulletin boards and may be required to send a copy of the minutes to the DOSHS local office. Proper record keeping including maintenance of all current certificates related to inspection of critical equipment such as the tractor, transport vehicles and the generator, etc. Such inspections need to be undertaken by a competent person certified by the Director of the DOSHS.

II. Noise Prevention and Control Rules

These rules have set minimum and maximum exposure limits beyond which workers and members of the public should not be exposed to noise without adequate means of protection.

The rules also have limits for exposure out of workplaces. The rules have several recommendations on a comprehensive noise control program for workplaces that includes a requirement for medical examination of workers who are exposed to noise. The rules have also set the minimum noise levels that should emanate from a facility to public/neighboring areas by day or by night. The proponent will provide functional earmuffs for those operating the noise emitting machines and those working in noisy environments; and keep on renewing their noise and vibration permit from NEMA. All in all, the project proponent will be required to adhere to all the stipulations of the OSHA Act, 2007 requirements and regulations.

III. Medical Examination Rules, 2005

These rules provide for Occupiers to mandatorily undertake pre-employment, periodic and termination medical evaluations of workers whose occupations are stipulated in the Second Schedule of the Act and the First Schedule of the Regulation.

The workers are to undergo medical evaluations by a Designated Health Practitioner (DHP) duly registered by the DOSHS. Exposure to airborne crystalline silica present negative impacts to human health, the workers exposed to the dust will be required to undergo medical examinations in accordance with the above Rules. The project proponent is required to ensure that on site workers are examined medically and appropriate gears availed to them while at site, like earmuffs, helmets, overalls and respiratory gears.

IV. Fire Risk Reduction Rules, 2007 Legal Notice (L.N) 59 of OSHA 2007

These rules were promulgated by the Minister for Labour on April 16th 2007 and apply to all workplaces. The rules apply to this sector project in several ways as enumerated below; Rule 16 requires a Proponent to ensure that electrical equipment is installed in accordance with the respective hazardous area classification system.

It is also a requirement that all electrical equipment is inspected after six months by a competent person and the Proponent is required to keep records of such inspections. Rules 29 – 31 refer to the installation and maintenance of firefighting systems in workplaces. Fire extinguishers are to be mounted at least 60cm above ground while a fire hose reel must be located within a radius of 30m. Fires can arise from electrical fault at the site. Worker's safety will be given priority during both construction and operation phases of the project.

The proponent shall adhere to the provisions of OSHA, 2007 and the subsidiary rules and regulations under it.

This ensures the workers are protected and safeguarded against risks or hazards to safety and health arising out of the proposed project activities. Administrative, Engineering and Human controls measures should always be put in place at all times so as to ensure safety and health of the workers at all times.

This act and the delegated legislations provided by the same act will be used as guideline to ensure health and safety of workers is guaranteed. The client must provide PPE to its entire staff and insure them against accidents at workplace.

4.4.14 Work Injury Benefits Act, 2007

This provides for compensation to employees for work related injuries and diseases contracted in the course of employment.

Section 7(a) of the Act, on the obligations of the employer, requires an employer to obtain and maintain an insurance policy with an insurer approved by the State in respect of any liability that the employer may incur under this Act to any of his employees.

Section 10(1) States that an employee who is involved in an accident resulting in the employee's disablement or death is subject to the provisions of this Act, and entitled to the benefits provided for under this Act. It also states expressly that an employer is liable to pay compensation in accordance with the provisions of this Act to an employee injured while at work.

On First Aid covered in section 45(1), an employer is supposed to provide and maintain such appliances and services for the rendering of first aid to his employees in case of any accident as may be prescribed in any other written law in respect of the trade or business in which the employer is engaged.

The proponent shall acquire insurance cover for all the workers for the time they will be working at the project site which will enable them get compensation in case of accident occurrence.

4.4.15 Persons with Disability Act Cap 133

The Government of Kenya took a step to the maximum of its available resources with a view to achieving the full realization of the rights of persons with disabilities set out in this act. The act provides for the rights and rehabilitation of persons with disabilities, to achieve equalization of opportunities for persons with disabilities and to establish the National Council for Persons with Disabilities.

With regards to this project, the act mandates that:

- No person shall deny a person with a disability access to opportunities for suitable employment.
- A qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives or allowances as qualified able-bodied employees.
- No employer shall discriminate against a person with a disability

During project cycle, the project will offer employment opportunities to both skilled and non-skilled persons. The proponent and contractor should abide by the provisions in this act.

4.4.16 Traffic Act Chapter 403

This Act serves as a comprehensive consolidation of laws pertaining to traffic on public roads. It not only regulates various aspects of road usage but also addresses the prohibition of encroachment on and damage to roads, including the protection of land specifically designated for road purposes.

By encompassing these provisions, the Act aims to ensure the orderly and safe use of public roads while preserving their integrity and functionality.

The proposed project is under the provisions of the Act, in that it will utilize the roads near the project.

4.4.17 Way Leave Act Cap 292

Section 3 of the Act grants the Government the authority to construct sewers, drains, or pipelines across any land, as long as it does not disrupt existing buildings. However, the Government must provide one month's notice before commencing such works, as outlined in Section 4. This notice should include a detailed description of the intended works and specify the location for inspection. If any damages occur during the works, Section 8 of the Act stipulates that the owner of the affected property must be compensated. It further states that anyone who constructs a new building without consent on a designated way leave or causes obstruction along the way leave will be considered an offense, and any necessary alterations will be at their own expense.

The proponent shall observe this Way leave Act when developing drainage system for the project.

2.4.18 Employment Act, 2007

This Act applies to all employees employed by any employer under a contract of service. It requires that employee recruitment, contract and grievance management, disciplinary measures and retrenchment and termination of service should be rational, fair and just. Employment of children is also regulated: Employment of children under thirteen years of age is prohibited, whether gainfully or otherwise in any undertaking (section 56 (1)). Children between thirteen and sixteen years of age may be employed to perform light work which is:

- Not likely to be harmful to the child's health or development; and
- Not such as to prejudice the child's attendance at school, their participation in vocational orientation or training programs or their capacity to benefit from the instructions received (article 56 (2)).

The proponent will need to follow the requirements of the Act during the Project

4.4.19 Land and Environment Court Act, 2012

A Land and Environment Court is established under Section 4 of the Act. The court has jurisdiction to hear any dispute relating to environment and land. The Court has original and appellate jurisdiction to hear and determine all disputes in accordance with Article 162(2)(b) of the Constitution and with the provisions of the Act or any other written law relating to environment and land. The court is also empowered to hear cases relating to public, private and community land and contracts, choices in action or other instruments granting any enforceable interests in land.

The court therefore has jurisdiction to deal with such disputes relating to environment or land administration and management that may arise during project implementation.

4.4.20 County Government Act 2013

The Act requires that every County council and every urban city shall have powers-

- a) To establish and maintain sanitary services for the removal and destruction of, or otherwise dealing with, all kinds of refuse and effluent and, where any such service is established, to compel the use of such service by persons to whom the service is available;
- b) To establish and maintain one or more fire brigades and to take all necessary steps for the prevention and extinguishing of fires and to compensate the owners of property demolished or damaged for the purpose of preventing or extinguishing fires;

Section 171 of the Act provides that a municipal council may establish and maintain any such sewage forms or sewage disposal works either within or without its area. It is on the basis of this Act that the proponent is determined to ensure conservation of the project site by adhering to the above act while maintaining environmental and public health safety.

4.4.21 National Construction Authority (2011)

The National Construction Authority Act, Number 41 of 2011 streamlines, overhauls and regulates the construction industry in Kenya. The industry has for many years suffered poor legislative framework and has been dominated by quacks and unqualified persons. All contractors must be registered with the Authority meaning that shoddy contractors and quacks will be locked out of the industry. It is an offence to carry out any construction work without first having been registered with the Authority. The Act contains provisions on quality and safety standards of any construction work.

The proponent shall register the project with the project with authority.

4.4.22 The Energy Act, 2019

The energy Act aims to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum and coal activities; regulation, production, supply and use of electricity and other energy forms; and for connected purposes.

The implementer of project should ensure close linkage with the County Government of Nakuru as they have power to ensure efficient use of energy and its conservation.

The Developer will liaise with the Kenya Power and Lighting Company before installation of electric power to the site to ascertain the requirements required to ensure that the power to the site is adequate and doesn't affect other users in the area.

All developments envisioned by the plan are expected to protect health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

4.4.23 Industrial Property Act, No. 3 of 2001

The Act provides for the promotion of inventive and innovative activities, to facilitate the acquisition of technology through the grant and regulation of patents, utility models, technology innovations and industrial designs, to provide for the establishment, powers and functions of the Kenya Industrial Property Institute and for purposes incidental thereto and connected therewith.

Part XI Section 80 states that Subject to this section, where—

1. the public interest, in particular, national security, nutrition, health, environmental conservation, or the development of other vital sector of the national economy so requires; or
2. the Managing Director determines that the manner of exploitation of an invention by the owner of the patent or his licensee is not competitive,

The proponent is anticipated to have the exclusive rights to sell or cause to be sold for commercial or industrial purposes the goods in which the design is incorporated

4.4.24 The National Gender and Equality Act, 2011

National Gender Equality Commission is a constitutional Commission established by an Act of Parliament in August 2011, as a successor commission to the Kenya National Human Rights and Equality Commission pursuant to Article 59 of the Constitution.

NGEC derives its mandate from Articles 27, 43, and Chapter Fifteen of the Constitution; and section 8 of NGEN Act (Cap. 15) of 2011, with the objectives of promoting gender equality and freedom from discrimination.

Gender mainstreaming in this project will ensure that the concerns of women and men form an integral dimension of the project development design, implementation, execution and the monitoring and evaluation ensures that women and men benefit equally, and that inequality is not perpetuated

4.4 Institutional Framework

4.4.1 National Environmental Management Authority (NEMA)

The object and purpose for which NEMA is established is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. A Director General appointed by the president heads NEMA. The Authority shall, among others:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects with a view to ensuring the proper management and rational utilization of the natural resources environment on a sustainable yield basis for the improvement of the quality of human life in Kenya.
- Take stock of the natural resources in Kenya and their utilization and consultation, with the relevant lead agencies, and develop land use guidelines.
- Examine land use patterns to determine their impact on the quality and quantity of the natural resources among others. Moreover, NEMA mandate is designated to the following committees:

NEMA will issue improvement orders to Contractors in the event that non-compliance to is observed. NEMA will also review the Environmental Audit reports submitted by private concessionaire during project implementation as required by the EIA/EA regulations (2019).

4.4.2 Water Resources Regulatory Board (WASREB)

The Water Services Regulatory Board (WASREB) is a regulatory state corporation operating under the Water Act, 2016. Its main objective is to protect the interests and rights of consumers in the provision of water services, while ensuring other stakeholders' interests are also safeguarded.

WASREB's statutory mandate is to monitor and review rules and regulations to ensure water services provision is affordable, efficient, effective, and equitable.

Various permits from Water Services Regulatory Board (WASREB) will be required for proposed water abstraction methods, whether surface or ground water.

4.4.3 Nakuru, County Government

The Constitution of Kenya, 2010 under chapter one article 6 has provided for the creation of a decentralized system of government that has devolved the Legislature and the Executive arms of government into 47 Political and Administrative Counties. The primary objective of decentralization is to devolve power, resources and representation down to the local level. To this end, various laws have been enacted by Parliament to create strategies for the implementation framework and the adoption on which objectives of devolution can be achieved including, but not limited to the County Government act No.17 of 2012, Urban Areas and Cities Act, No. 13 of 2011, National Government Co-ordination Act, No. 1 of 2013, and National Government Coordination Act, No. 1 of 2013.

The Fourth Schedule of the Constitution of Kenya 2010 Part 2 (3) provides for devolved environmental functions to be undertaken by the County Governments and includes; control of air pollution, noise pollution, and other public nuisances.

Nakuru County Government will be responsible for the issuance of trade licenses needed for the project, issuance of temporary facilities construction plan approvals, monitoring environment protection within the project, and general development control.

4.4.4 Directorate of Occupational Safety and Health Services (DOSHS)

DOSHS is responsible for the enforcement of Occupational Safety and Health Act (OSHA), 2007 and associated regulations. DOSHS undertakes workers' safety and health inspections at its own initiative or upon receiving reports on any associated issues and requires that all Construction sites be registered with the Directorate.

The project construction site will be registered with this authority as workplaces before the commencement of the construction works and the safety management plans.

4.4.5 County Environment Committee.

The County Environment Committee has an oversight and decision-making role at the County level. Like in the case of County Environment Committees, the County Environment Committees are responsible for the proper management of the environment within the province, which they are appointed. They are also to perform such additional functions as are prescribed by this Act or as may from time to time be assigned by the Minister by gazette notice.

4.4.6 Public Complaints Committee.

The Committee is charged with the following functions:

- Investigating allegations/ complaints against any person or against the Authority (NEMA) in relation to the condition of the environment and its management.
- Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment, and to perform such other functions and exercise such powers as may be assigned to it by the Council.

4.4.7 National Environment Action Plan Committee.

This Committee is responsible for the development of a 5-year Environment Action plan among other things. The National Environment Action Plan shall contain: Analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time, and Analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity among other duties as the EMCA specifies.

4.4.8 National Environmental Tribunal.

This tribunal guides the handling of case related to environmental offences in the Republic of Kenya. The Tribunal hears appeals against the decisions of the Authority. Any person who feels aggrieved may challenge the tribunal in the High Court.

4.5 International conventions and treaties

A treaty is a binding agreement under International Law concluded by subjects of International Law, namely states and international organizations. Treaties can be loosely compared to contracts; both are means of willing parties assuming obligations among themselves, and a party to either that fails to live up to their obligations can be held legally liable for that breach. The central principle of treaty law is expressed "pacts must be respected."

Kenya has ratified the following international conventions which are relevant to this Project:

4.5.1 United Nations 2015 Sustainable Development Goals (SDGs)

In October 2015, The United Nations adopted 17 Sustainable Development Goals aimed at transforming the world. Eleven of these goals have some bearing on the Project Plan. They include Goal number 1 aiming at reducing poverty, Goal 2, reducing hunger; Goal 3 good health and wellbeing; Goal 4, clean water and sanitation; Goal 7, affordable clean energy; Goal 8, decent work and economic growth; Goal 9, Industrial growth, innovation and infrastructure; Goal 11, sustainable cities and communities; Goal 12, responsible consumption and production; Goal 13, climate action; and Goal 15, life on land.

The projects and programs outlined in the proposed project are aligned with the objectives of all the 17 SDGs and their 169 targets in the three dimensions of sustainable development i.e., economic, social and environmental. In this regard, proponent has identified SDGs as relevant to its various sectors

4.5.2 The World Commission on Environment and Development (The Brundtland Commission of 1987)

The Commission in its 1987 report dubbed “Our Common Future” focused on the environmental aspects of development, in particular the emphasis on sustainable development that produces no lasting damage to the biosphere and to particular ecosystems. In addition to environmental sustainability is economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resources.

The project plan's with the ethos of social and sustainable development that maintains the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for health and well-being, adequate nutrition, and shelter, cultural expression and political involvement.

CHAPTER FIVE: IMPACT IDENTIFICATION, MITIGATION/SAFEGUARD MEASURES

5.1 Impact Assessment

The proposed building materials processing plant project will result in both positive and negative impacts to the physical, biophysical and socio-economic environment. All feasible measures should be put in place to ensure that; any significant negative impacts are mitigated; positive impacts are enhanced and maximized and local people from neighborhood benefit positively from the project.

5.2 Positive impacts

5.2.1 Positive Impacts on the Physical Environment

5.2.1.1 Optimal Use of Land

Currently, the proposed site for the project is idle land. The project will fully utilize the available land economically to benefit the locals, county government and the national government through the returns earned from various operations in the development.

Land is a precious resource in Kenya and optimized land use is encouraged. Such utilization will not only benefit the proponent but also the residents, local authority, among others. When the proposed development is complete and executed as per the plan, a lot of economic returns will accrue from industrial development activities compared to the current dormant state. In economic terms, the proposed development is more profitable in the long-run.

5.2.1.2 Landscaping and Improved Aesthetic

Implementation of the proposed development will involve carrying out landscaping activities. Execution of the planned developments together with the green spaces will make the site more interesting, appealing, and aesthetically attractive resulting in a significant positive impact. This will greatly improve visual landscape beauty of the proposed area.

5.2.2 Positive Impacts on the Biological Environment

5.2.2.1 Conservation of wildlife habitat and green spaces

The proposed development will have green spaces which will help minimize air, water, and noise pollution. The green spaces also provide for storm water attenuation, thereby acting as a measure for flood mitigation including preservation of biodiversity and nature conservation.

5.2.3 Positive Impacts on Socio-Economic Aspects

Table below gives a detailed analysis of the positive impacts on socio-economic aspects of the project execution.

Socio-Economic aspects	Description
Simulation of industrial development coherent with Kenya's Vision 2030	The project ensures industrialization and development through the utilization of the country's mineral resources to catalyze diversified industrial development. This is in line with the Kenya Vision 2030 which aims at harnessing the mineral resources for industrial development and transforming Kenya into a newly industrializing middle income country.
Increase in property value	Establishment of the plant will promote productive use of land and enhance the economic value of the surrounding area by attracting complementary industrial and commercial investments.
Improved infrastructure	Development of the project is expected to stimulate improvement of access roads, electricity supply, and other supporting infrastructure within the project area, benefiting both the facility and the surrounding community
Corporate Social Responsibility (CSR) opportunities	The proponent will implement CSR initiatives such as support to local schools, community infrastructure, environmental conservation, and community development projects, thereby strengthening community– company relations
Ease availability of building materials for local and regional markets	The project will enhance local cement supply, reduce transportation distances from distant plants, and contribute to stabilizing there availability for construction activities within the region.
Market for local goods and services	The plant will create sustained demand for local goods and services such as transport, catering, security, equipment maintenance, fuel supply, and raw materials, thereby supporting local enterprises and SMEs
Creation of employment opportunities	Several employment opportunities will be created during all the project phases. This will be a significant positive impact since unemployment rates are currently quite high in Nakuru County and the country at large
Revenue to national and county governments	Through payment of relevant taxes, rates and fees to the government and the local authority, the project will contribute towards the national and county revenue earnings.

Increased business opportunities	The large number of staff members required will provide ready market for various goods and services, leading to several business opportunities for small-scale traders such as food vendors around the construction site. During the operation phase of the proposed project, quite a number of businesses will mushroom hence creating additional employment and business opportunities for the population within and outside Nakuru County.
Improved security	Execution of the project will lead to implementation of advanced security system for the development. Amongst key envisioned facilities include use of CCTV, private security services emergency response system amongst other advanced security features

5.3 Potential negative

Key potential negative environmental impacts are likely to result from the proposed development during both the construction and operational phase of the project as discussed below;

Planning & Construction phase impacts	Operational phase impacts
✓ Change in land use ✓ Environmental risks of obtaining raw materials ✓ Health and safety risk ✓ Traffic Related issues ✓ Water demand and effluent generation ✓ Habitat Alteration ✓ Oil Leaks and Spills ✓ Dust nuisance ✓ Noise and vibration nuisance ✓ Disturbance to Flora, Avifauna and Habitats ✓ Increase in vehicular traffic ✓ Impacts of solid waste ✓ Social Disturbance Factors	✓ Increased gaseous emissions ✓ Increased dust emissions ✓ Increased noise disturbance ✓ Occupational injuries and or accidents ✓ Increased demand for water and electricity supply ✓ Mushrooming of Informal Settlements ✓ Public Concerns ✓ Surface drainage ✓ Wastewater generation

5.3.1 Potential negative during planning and construction phases

5.3.1.1 Change in land use

The land is unused but minor herding takes place. However, the proponent proposes to set up a building material processing plant which is inconsistent with the current land use.

Mitigation measure

- The proponent has applied and obtain a change of user from the County Government of Nakuru

5.3.1.2 Environmental risks of obtaining raw materials

Installation of the equipment's and other construction activities will require raw materials such as aggregate, cement and sand among others which will be sourced from the environment. These materials will have an impact at their points of origin.

Mitigation measures

- Procure quantities that are sufficient for the intended works and recycle as far as practical to curtail wastage
- Source raw materials from sites that are licensed as per the Environmental Management and Coordination Act Cap. 387 Laws of Kenya

5.3.1.3 Health and Safety Risk

Safety hazards are likely to increase resulting in a possible increase in accidents involving workers and/or the public. Development works will expose workers to occupational health and safety risks and injuries resulting from accidental falls or use of hand tools and construction equipment. Safety hazards are also posed to the public especially pedestrians and motorists passing near on-going developments.

Upon development (or various phases/projects are complete) and in operation, potential health and safety hazards may arise in the event of a lack of adequate facilities, protection measures, worker protection measures, and general laxity in adherence to best practices and OSHA, 2007 regulations. Adequate health and safety plans will therefore require to be implemented to mitigate all foreseeable health and safety risks in the development.

Mitigation Strategies

- Register the site as a work place with the Directorate of Occupational Safety and Health Services (DOSHS)

- Establish an emergency plan to assist in managing occupational hazards and risks for the development. Risk management plans should also be established with other facility control and safety systems.
- Ensure that all building plans are approved by the Local Authority
- Establish monitoring measures, hazard identification and risk assessments and Safe Work Method Statements (SWMS) for all activities intended to be done at the development.
- Provide employees with correct tools and equipment for the jobs assigned and train on their use
- Obtain insurance cover for the workers at the site
- Provide first aid services and an emergency vehicle at the site
- Regulate the entry of visitors to the site by deploying adequate security measures
- Ensure moving parts of machines and sharp surfaces are securely protected with guards to avoid unnecessary contacts and injuries during construction phase
- Comply with the provisions of the Occupational Safety and Health Act 2007

5.3.1.4 Traffic Related issues

The envisioned building materials processing plant development is likely to result into an increase in current levels of human and vehicular traffic with major impact being felt in the immediate access roads. Human population increase will result to a directly proportional increase in number of vehicles. This may pose a risk of increased traffic related accidents/incidents and traffic snarl-ups.

Mitigation Strategies

- Establish and implement a Traffic Management Plan. Key aspects to be considered include:
 - ✓ Warning signs, aimed at both drivers and other road users, to highlight hazards will be erected along the access roads,
 - ✓ Road safety initiatives proportional to the scope and nature of project activities should be designed:
- Adoption of best transport safety practices across all aspects of proposed plan operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public.

- Provision of adequate vehicular circulation space and parking areas
- Paving all pedestrian walkways with robust, durable, and non-slippery materials
- Ensure Installation and maintenance of all construction signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions

5.3.1.5 Water demand and effluent generation

The construction activities will utilize substantial quantities of water for mixing and casting concrete, drinking and sanitation purposes which will lead to an increased demand for water. Water will be sourced from a borehole that will be sunk in the area and 70% of domestic water use will generate effluent.

Mitigation measure

- Procure and deliver to the site mobile toilets from a NEMA licensed waste contractor for use by the workers during the construction phase of the project cycle
- Comply with the Environmental Management and Coordination (Water Quality) Regulations, 2006

5.3.1.6 Oil Leaks and Spills

It is important to note that oil/grease spills / leaks are prevalent in construction sites and in most areas that make use of petroleum products, which contain hard/hazardous elements that are detrimental to the environment.

During construction phase, oil waste may be generated from the vehicles of the residents if poorly maintained.

Mitigation measures

- All machinery must be keenly observed not to leak oils on the ground.
- Maintenance must be carried out in a designated area (protected service bays more suitably outside) and where oils are completely restrained from reaching the ground. Such areas should be covered to avoid storm water from carrying away oils into the soil or water systems by installation of oil interceptors and other suitable facilities.
- All oil products and materials should be stored in site stores or in the contractor's yard and should be handled appropriately to avoid spills and leaks.

- Car Park areas and other places handling oil activities (especially during construction) in the site must be well managed.
- Oil interceptors should be installed in the channels leading from such areas.

5.3.1.7 Dust nuisance

Dust is likely to be generated from the following activities/areas: ground excavation; delivery of building materials to site; and handling and mixing of cement.

i. Ground excavation-

Site preparation in readiness for construction work will require vegetation clearance stripping off of overburden material, ground leveling and compaction. These activities will open-up the ground to wind action and thus potentially resulting in dust generation. This is because vegetation clearance will directly expose the ground to agents of erosion, stripping off of overburden material will loosen soil aggregates thus making them easily susceptible to wind action; while removal of tree stumps and roots will weaken soil bounding and thus can easily be blown by wind

ii. Delivery of building materials to site

Construction materials such as building blocks, cement, sand, steel bars, ballast will be bulky and thus will require to be delivered on site by a fleet of trucks driving in and out of the construction site. During this exercise dust is likely to be generated from: handling of cement which is dusty by nature of the way it is; handling of ballast which could contain loose

iii. Potential Environmental Impacts of Dust

Dust produced will potentially negative effect on employees, general public; and vegetation.

Effects of dust to employees

- ✓ Eye irritation.
- ✓ Skin irritation.
- ✓ Impairment of normal sweating of the skin as it blocks pores on the skin.
- ✓ Chocking of the throat.
- ✓ Respiratory difficulties.
- ✓ Difficulty in breathing.
- ✓ Potential course of chest complication and ailment

Dust impacts to immediate neighbors and general public

- ✓ Reduced visibility; emission of high particulate matter to the environment will reduce local visibility.
- ✓ Continuous exposure of people to dust will likely affect one's eye sight that can potentially result in an outbreak of eye infection.
- ✓ Chest related ailment; continuous exposure of people to dust will likely result in chest complications and respiratory disorders.

Dust impacts to vegetation

- ✓ Dust settling on plant leaf surface will block leave stoma hence interfering with normal respiration of the plants.
- ✓ Dust settling on plants will reduce the evapo-transpiration of plants.
- ✓ Animals such as butterflies, caterpillars, grasshoppers who feed of foliage will be affected as the dust settled on foliage will render the foliage unpalatable.
- ✓ Heavy dust settling on plant matter will impair on normal growth of the plant.
- ✓ Heavy dust settled on plants will choke and kill plants.

Mitigation measures

- Regular sprinkling of water to be done on open surface and dust grounds until paving is done.
- Project management and contractor to enforce strict use of personal protective clothing.
- Restricting the speed of trucks and other vehicles accessing the project site
- Provision and enforcement of appropriate PPE to workers such as dust masks
- Develop and implement an air quality monitoring plan to ensure compliance with the limits set under Schedule I of the Environmental Management and Coordination (Air Quality) Regulations,
- Complaints of dust related ailments among employees and neighbors to be given access to medical attention

5.3.1.8 Noise and vibration nuisance

Noise is likely to be generated from the following activities/areas:

- ✓ During ground preparation.
- ✓ During assembly of building materials on site.
- ✓ During construction of the accommodation development.

A brief elaboration of each of the potential source/cause of noise is as follows: -

i. Ground preparation

Ground preparation is another activity that will potentially result in noise nuisance. Activities of ground preparation that are likely to result in noise nuisance include;

- ✓ Use of heavy machinery such as excavators, caterpillars in ground excavation will be a source of noise nuisance.
- ✓ Transportation of excavated earth material from site by use of dump trucks will result in noise nuisance. The noise will be mainly from the trucks.

ii. Assembly of building materials

Building materials to be used in construct site will first be gathered and assembled on site. These include building blocks, timber, steel bars, sand, gravel cement. Possible courses of noise nuisance when assembling construction material on site include;

- ✓ Offloading of building materials on site especially steel bars, gravel and building blocks can result in noise.
- ✓ Trucks ferrying in building materials can be a source of noise.
- ✓ Employees involved in offloading of building material can be a source of noise.

iii. Construction of the proposed development

Construction of the accommodation units will be labour intensive. This will involve engaging a large workforce, also during construction some machines and equipment will be in use. Possible sources of noise during construction work may include: loud talking, shouting and conversation among employees; noise from equipment such as cement mixers; noise from machines such as welding machines and wood working machines; increased machine and equipment activity on site.

iv. Potential environmental impacts of noise

Impacts of noise will potentially affect the immediate neighbors; and employees.

➤ **Impacts of noise to immediate neighbors**

- ✓ Noise nuisance especially from excavators, cement mixer, may be a nuisance to immediate neighbors.
- ✓ Continuous exposure of neighbors to noise nuisance may result in noise induced hearing lose.
- ✓ Noise nuisance may reduce concentration of neighbors in their private matters.

➤ **Noise impacts to employees**

- ✓ Noise nuisance especially from excavators, cement mixer, may impair oral communication among employees.
- ✓ High noise level will force employees to shout loud when communicating to one another.
- ✓ Exposure of employees to high noise level (above 85dB) continuous for 8hours per day may result in noise induced hearing loss.
- ✓ Exposure of ear to peak sound level instantaneously may result to deafness.

Mitigation measures

- Noise levels to be within the prescribed limits as stated in EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009.
- All construction work to be limited to daytime only.
- Immediate neighbors to be notified in writing on the date of commencement of construction work at least one month in advance.
- All employees likely to be exposed to ear noise to be provided with ear protectors.
- Contractor to ensure strict enforcement on use of ear protectors.
- Where applicable and possible exceptionally noisy machines to be fitted with noise reduction devices.
- Any employee who may complain about ear related pain and or complication while at work to access medical attention at the expense of the contractor or project proponent.
- Where employees are likely to be exposed to continuous noise, management to organize for work to be done in four hours shift instead of eight-hour shift.
- Noise equipment especially concrete mixer to be located as far away as possible from already built residence in the neighborhood.

5.3.1.9 Disturbance to Flora, Avifauna and Habitats

i. Impact of Vegetation Clearance

Construction of the proposed plant will require land clearing for installation of buildings, processing units, storage areas, internal access roads, utility infrastructure, and other ancillary facilities. These activities will lead to the removal of existing vegetation within the project site.

Vegetation clearance will reduce the availability of habitat for plant species, birds, and small terrestrial fauna that currently utilize the area for foraging, nesting, and shelter. The noise and movement associated with construction activities may also temporarily disturb wildlife present in the surrounding environment.

Bird species and other fauna may avoid the area during the construction period due to increased human presence, machinery operation, and vegetation disturbance. However, these impacts are expected to remain localized within the project site and its immediate surroundings.

Mitigation Measures

- Vegetation clearance will be limited to the minimum area required for construction activities.
- Environmentally sensitive areas identified during construction will be protected through clear demarcation.
- Where feasible, existing vegetation outside the construction footprint will be retained to maintain ecological stability.
- Buffer zones will be maintained around the project site where possible to preserve vegetation and provide refuge habitats.
- Workers will be prohibited from hunting, trapping, or disturbing wildlife within the project area.
- Environmental awareness training will be provided to all construction personnel. Periodic monitoring will be conducted to assess changes in vegetation and wildlife presence during construction.

5.3.1.10 Solid waste

Solid waste in considerable quantity is likely to be generated in two different phases. The first phase will be during site preparation stage while the second phase will be during

operational phase of the project. Solid waste to be generated will include kitchen waste, waste paper and garden waste. Of these, kitchen waste will be of critical importance.

i. Potential environmental impacts of solid waste

- ✓ Poorly disposed waste paper especially plastic waste can block drainage.
- ✓ Poorly managed and disposed kitchen waste can attract disease vectors.
- ✓ Decomposing kitchen waste can pollute local ambient condition.

Mitigation measures

- The project management to contract a NEMA licensed waste collection company disposal of solid waste.
- Procure and strategically place adequate solid waste collection bins with a capacity for segregation within the construction site
- Create awareness on best waste management practices among the workers i.e. on the process of solid waste collection, segregation and proper disposal
- Solid waste to be collected regularly for disposal.
- Colour code to be used to distinguish waste bins of different waste.
- Waste to be sorted at source.
- Procure a sizeable central solid waste collection bin with chambers to accommodate separated waste Solid waste to be disposed only at NEMA licensed disposal sites.
- Comply with the Environmental Management and Coordination (Waste Management)

5.3.1.11 Social Disturbance Factors

The introduction of construction activities associated with the proposed building material processing plant may lead to temporary social changes within the surrounding communities. These changes may arise from the presence of construction workers and increased economic activity in the project area. An influx of workers and job seekers may increase pressure on local infrastructure and services, including water supply, sanitation, healthcare, and social amenities. There may also be increased risks of social concerns such as petty crime, alcohol and substance abuse, or conflicts between workers and community members if not properly managed. However, the project will also generate employment opportunities during construction, particularly for unskilled and semi-skilled labor from the surrounding communities.

Mitigation Measures

- Preference will be given to hiring local community members for unskilled and semi-skilled positions.
- A Worker Code of Conduct will be developed and enforced to regulate worker behavior on and off the project site.
- Workers will undergo induction training covering acceptable conduct, community relations, and environmental responsibilities.
- A grievance redress mechanism will be established to allow community members to report concerns related to project activities.
- Access to the construction site will be controlled to prevent unauthorized entry

5.3.2 Potential negative during operational phase

Cement and cement products manufacturing operations, while essential for infrastructure development, present several potential environmental risks if not properly managed. These impacts arise from activities such as raw material handling, aggregate washing, storage, mixing, and wastewater disposal. Common issues include dust emissions, noise, water and soil contamination, and improper waste management. However, with sound environmental management practices, proper site layout, and the application of proven control technologies, these risks can be effectively minimized or eliminated to levels that are as low as reasonably practicable. Adherence to best practice design, operational controls, and regulatory compliance ensures that plants will operate efficiently while safeguarding the surrounding environment and community health.

5.3.2.1 Increased gaseous emissions

There are three main sources of gaseous emissions from a cement production system namely raw materials, the fuel, and the process itself. Gases produced from the clinker production process include carbon dioxide, carbon monoxide, nitrogen oxides, sulfur dioxide, and ammonia

Mitigation measures

- Emission of sulfur dioxide from production process can be mitigated by deploying technologies such as inherent scrubbing, oxygen control (increase), fuel substitution (lower total sulfur), raw material substitution (lower sulfide sulfur), raw material

alkali/sulfure balance, in-line raw mill, preheater upper stage hydrated lime injection, calcined feed recirculation, cement kiln dust internal scrubber, preheater upper stage trona injection and calcium-based internal scrubber.

- Emission of Nitrogen Oxides from production process can be mitigated by deploying technologies such as; oxygen control (decrease), indirect firing, low-NO² burner, mid-kiln firing, process improvements, process control improvements, low- NO² calciner, staged combustion, semi-direct firing, mixing air fan and cement kiln dust insufflation.
- Emission of carbon monoxide from production process may be mitigated deploying technologies such; good combustion practice, excess air (increase), raw material substitution, processing system design and mixing air fan.
- Emission of carbon dioxide from cl production process can be controlled by deploying technologies such; improved thermal efficiency, clinker substitution, improved electrical efficiency, raw material substitution and mineralizers.
- Emission of ammonia from clinker production process can be mitigated through raw material substitution and tailpipe scrubber technologies.

5.3.2.2 Dust Emissions

Excessive dust generation is one of the most common environmental challenges associated with plant operations. Dust is typically produced during the delivery, storage, and transfer of raw materials such as cement, sand, and aggregates, as well as during truck movements and processing activities.

When raw materials are offloaded from bulk tankers into silos, or when aggregates are handled and transferred, fine particles can easily become airborne if proper containment and filtration systems are not in place. Similarly, open stockpiles of sand and gravel are prone to wind erosion, especially during dry and windy conditions, resulting in fugitive dust emissions across the site.

During processing, the loading of cement and aggregates into equipment can also release dust, particularly where hoppers, conveyors, or pneumatic systems are inadequately sealed. Additionally, the movement of trucks on unpaved or poorly maintained internal roads stirs up dust, contributing further to air quality degradation within and around the site. If left uncontrolled, excessive dust can reduce air quality, cause respiratory discomfort for workers, and create nuisance conditions for nearby resident.

Potential negative impacts of exposure to cement dust would include:

- ✓ Lung infection resulting from inhaling of cement dust.
- ✓ Skin irritation.
- ✓ Itching of the skin.
- ✓ Irritation of the eyes.
- ✓ Chronic cough.
- ✓ Reduced visibility.
- ✓ Choking of plants

Mitigation measures

- The entire plant premises, including driveways, should be paved with hard, impervious materials,
- Natural or artificial wind barriers (trees, fences, landforms) should be installed in accordance with prevailing wind direction to control dust dispersion,
- The movement and handling of fine materials such as cement, sand, and dust should be carefully managed to prevent spillage onto paved surfaces and minimize wind-blown particulate emissions,
- Paved surfaces within the batching plant should be regularly cleaned using a mobile vacuum sweeper or water flushing system to remove dust, cement residue, and aggregate spillage, ensuring a tidy and safe working environment
- Vehicle movements within the plant yard should be restricted to 10–15 km/h to minimize dust generation,
- Minimize dust dispersion by providing special (covered) area for loading /unloading process,
- All aggregate and fine material stockpiles shall be enclosed on at least three sides and the top to minimize wind entrainment and dust dispersion
- The silo delivery pipe should be fitted with a butterfly or pinch valve, or similar, that enables tight shut off to prevent cement or fly ash dust escaping,
- Ensure the high-level sensor alarm is set at a point that prevents the silo from overfilling and automatic shut-down switch is also required to minimize spillage and dust,
- Exposure to cement dust can be mitigated by removing the cement dust being generated. Three dust removal technologies to remove dust from the production

line namely water sprinkling, bag filters and electrostatic precipitators can be employed to remove the generated dust.

- Water sprinkling to remove dust can be done in three areas of the crusher section namely at the hopper, dump hopper and belt conveyor system.
- The bag filter technology can be used in the plant to suck out dust generated. The system can be used in the following sections crusher, pre-blending stockpile, additive storages, raw material hoppers, raw mill building, blending silo, pre-heater tower, coal mill, clinker storage and dispatch station, cement mill and cement packaging and dispatch.
- Electrostatic precipitator technology can be employed at the clinker crusher section.
- High efficiency fabric filters can be used for controlling dust emissions from cement production material handling and product bagging systems.

5.3.2.3 Increased Noise disturbance

Excessive noise is another significant environmental concern plant operations'. Noise at the plant can originate from multiple sources, including the delivery and handling of raw materials such as cement, sand, and aggregates. During loading and unloading, the dropping and movement of these materials can produce high-impact sounds, particularly when conducted on hard surfaces or within metallic hoppers and silos.

The mixing process also generates considerable noise due to the operation of mixers, vibrators, and associated equipment. Truck movements within the plant especially during loading, idling, and reversing are frequent contributors to overall noise levels. The use of reversing alarms or beepers on trucks and heavy machinery, though essential for safety, adds to the cumulative sound intensity within and around the site.

Additionally, continuous operation of mechanical components such as conveyor belts, pumps, compressors, and motors creates a persistent background noise that may affect both workers and nearby communities. Another intermittent but significant noise source is the de-dagging of agitator bowls, a cleaning activity that involves striking or chipping hardened concrete residues from the inside of mixer drums. If not properly managed, these noise emissions can lead to occupational hearing risks, disturbance to adjacent land uses, and general nuisance.

Potential negative impacts of noise

- ✓ Continuous exposure of workers at the work place to high noise levels for a long time may result in noise induced hearing loss
- ✓ Extremely loud noise at the work place can result in immediate lasting damage to the worker's hearing mechanism
- ✓ Exposure of workers to loud noise will result in reduction of productivity and efficiency of the workers at the work place, this will ultimately translate to overall reduction of productivity in the workplace and hence reduced output
- ✓ Exposure of a worker to loud noise can upset the sense of balance and cause blood vessels to constrict, this will result in a rise in blood pressure hence reduction in the volume of blood flow
- ✓ High noise levels at the work place can result in fatigue, headache, nervousness, irritability and high tension; this will increase the likelihood of accidents at the workplace;
- ✓ Exposure of a worker to high noise levels will result in stressing the worker and thus result in reduced concentration.

Mitigation measures

- Assessing of noise risks by identification of noise hazards at the work place and developing the appropriate action plans
- Employee protection through elimination or controlling noise risks to acceptable legal limits by use good practice, appropriate engineering controls and employee protection
- Equipment use and maintenance involving appropriate use of all noise control equipment and appropriate use of hearing protection.
- Training and sensitization of workers by involving employee accessing information and training on noise risks, control measures and hearing protection.
- Conducting health surveillance involving hearing checks for exposed workers and using result to improve on protection of the workers.
- Work reviews involving constant review of work practice, changes in noise exposure and new ways to reduce risks.

- All vehicles, machinery, and on-site equipment shall be maintained in good mechanical condition and fitted with appropriate acoustic suppression devices, such as mufflers and silencers, to minimize exhaust emissions and operational noise levels.
- Regular servicing and preventive maintenance programs shall be implemented to ensure optimal engine performance, reduce emissions, and maintain compliance with manufacturer specifications and applicable environmental standards,
- Where feasible, acoustic barriers, noise screens, or vegetative buffers shall be established along the site boundary, particularly on sides adjacent to residential or institutional areas, to help absorb and deflect sound,

5.3.2.4 Occupational injuries and or accidents

The most significant occupational health and safety impacts occurring during the operational phase of plant include, dust, heat, noise and vibrations, physical hazards, radiation, chemical hazards and other industrial hygiene issues

Mitigation measures

Methods to prevent and control exposure to dust include the following: -

- Control of dust through implementation of good housekeeping and maintenance;
- Use of air-conditioned, closed cabins;
- Use of dust extraction and recycling systems to remove dust from work areas, especially in mills
- Use of air ventilation (suction) in cement-bagging areas;
- Use of PPE, as appropriate (e.g. masks and respirators) to address residual exposures following adoption of the above-referenced process and engineering controls;
- Use of mobile vacuum cleaning systems to prevent dust buildup on paved areas

Recommended prevention and control techniques against exposure to heat include the following:

- Shielding surfaces where workers' proximity and close contact with hot equipment expected
- Using personal protective equipment (PPE), as needed (e.g. insulated gloves and shoes);
- Minimizing the work time required in high temperature environments by implementing shorter shifts at these locations.

- Making available and using, as needed, air- or oxygen supplied respirators. Implementing specific personal protection safety procedures in the process to avoid potential exposure to exothermic reactions.

Control of noise emissions may include the following:

- Use of silencers for fans.
- Room enclosures for mill operators.
- Noise barriers and attenuators.
- Personal hearing protection

5.3.2.5 Impact on utilities

Increase in demand for water and electricity is likely to be experienced once the proposed accommodation development begins to be implemented. Demand for water will be for construction of the project and water to be used during operation of the accommodation units. As opposed to demand for water, rise in electricity demand will be experienced once the project is complete and operational.

i. Water demand and usage

Water use in the facilities will be in the following areas: food preparation, cleaning and sanitation, sanitary facilities. Water use for food preparation will be for food cleaning and cooking. Water use for sanitary purposes is mainly cleaning of floors and sanitary facilities. Water demand for these activities will depend on occupancy of accommodation units. The bulk of the water will go to food preparation and sanitation. Presumed sources of water for the project are mainly onsite borehole water.

ii. Potential negative environmental impact of increased water use

- ✓ Increased abstraction of ground water to meet demand may result in over abstraction which will strain local water table. Increase competition for ground water as the number of users in the locality increase.
- ✓ Change in ground water quality overtime due to salt water intrusion

Mitigation Strategies

- Adopt water systems that are efficient and not prone to wastage
- Adopt systems to recycle wastewater

- Development of storm water management plan with design strategies for storm water treatment and filtration systems. Such would entail use of recycled and harvested storm water in cleaning and Landscaping
- Put in place systems of monitoring water consumption and aid in future planning
- Ensure sustainable water resource protection, and conservation options.
- Adopt and implement a water conservation and management & monitoring plan for the development including surface and ground water quality checks from periodic tests and analysis in the various land use zones.

i. Energy demand and use

Energy demand for the facilities will be for lighting, heating, and cooling. Anticipated energy sources will be national grid supply from KPLC, standby generator. Demand for energy use will depend on:

- ✓ Prevailing weather- when it is hot, more energy will be required in air conditioning systems

ii. Sources of electricity

Just like in the case of water sources, there are three possible sources of electricity that the project proponent intends to exploit. These are:

- ✓ First priority is to source electricity from the national grid.
- ✓ Second priority will be installing power generators.
- ✓ Thirdly will be harnessing solar energy.

Electricity from the national grid will be the main supply of electricity.

iii. Potential negative impacts of energy demand and use

- ✓ Increase in energy use in the area will increase the peak demand of energy in the area. This might result to shortage and in extreme case to power rationing.
- ✓ The use of diesel-powered generator as standby power will result in generation of combustion emissions. The emissions are composed of greenhouse gases and thus long operation hours of the emergency generator will result in the higher greenhouse gas emissions.
- ✓ Reliability of energy supply is essential in the kitchen due to voltage sensitive equipment such as freezers and air conditioning systems. Increased energy demand might trigger power outages that would damage some of this equipment resulting in food spoilage.

Mitigation Strategies

The proponent is expected to put in place the following strategic measures to reduce energy consumption

- Carry out energy audits for evaluation and improvement of energy consumption and saving practices adopted by all sectors involved.
- Capitalize on renewable energy opportunities which include the harnessing of solar energy, and generation of energy from waste. This will reduce over-reliance on fossil fuel and expensive sources of energy such as diesel.
- Observe green building technology.
- Ensure machines, equipment and transport systems are energy efficient.
- Put in place systems to monitor energy consumption and aid in future planning.
- Adhere to requirements of the various Energy laws and Regulations including Energy Act, 2019

5.3.2.6 Mushrooming of Informal Settlements

The proposed development may involve mushrooming of informal settlements and kiosks around the surrounding area owing to workers' preference to stay near their places of work to reduce on costs associated with transport.

Mitigation Strategies

- Liaison with Nakuru County's planning department on effective planning regulations and enforcement
- The proponents should work in collaborative partnerships with the planning department of Nakuru County in supporting the developments compatibility with the neighborhood scale and character.

5.3.2.7 Public Concerns

Based on the proposed plant and scale of the development upon execution, it will have varying impact to the local communities and public.

Mitigation strategies

In brief the following mitigation strategies are recommended:

- Maximize the recruitment of locals where possible and have a Labour Management Plan to ensure health and safety of the community are protected

- Develop community awareness programmes to enhance cohesion between project and the local community
- Consult with the public and the locals during implementation of proposed developments
- Develop and implement a grievance redress mechanism (GRM) to address concerns of the locals.
- Establish a corporate social responsibility (CSR) plan to support key community needs
- Ensure public facilities including roads, parks within the development are aligned with the project plan and protected for accessibility / use by the public

5.3.2.8 Surface drainage

Run-off generated by rainfall may cause a myriad of consequences in various facets including flooding and its consequences which may include damage to property, health and safety hazards. The drainage layout should ensure effective flow of the anticipated surface run-off emanating from the roof catchments and other areas within the site.

Mitigation

- The designs should ensure that surface flow is drained suitably into the natural drainage system effectively. The internal channels should be designed with regard to the peak volumes and must ensure the safe final disposal of run-off /surface water and must be self-cleaning.
- Drainage channels should be installed in all areas that generate or receive surface water. The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and dirt entry that may compromise flow of run-off.
- Storm water generated from roof catchments should be harvested, stored and made use in various household activities i.e., general cleaning and garden watering. This will reduce run-off.
- Paving of the side walkways, driveway, parking and other open areas should be done using pervious materials i.e., concrete blocks to encourage water percolation; reducing run-off volume

5.3.2.9 Wastewater generation

Sewage encompasses soil and waste water from sanitary facilities and is of significant concern with respect to the environment and particularly to water and soil. In its raw form, it is serious health hazard and emits offensive odors. It must always drain effectively into the proposed sewer systems; via high quality, well designed and laid pipe networks.

Mitigation

- The internal and external sewerage system should be made of hard, strong, durable, smooth, impervious, and non-corrodible materials.
- All drain pipes passing under building; driveway or parking should be of heavy duty UPVC pipe tube encased in 150mm concrete surround.
- All manholes on drive ways and parking areas must have heavy-duty covers set and double sealed airtight; as approved by specialists. All waste pipes must have cleaning rodding eyes which must be accessible.
- Sanitary facilities must be kept clean always, through regular washing and disinfecting.
- The design of the sewerage system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project even during peak volumes. The gradient should be sufficient to ensure and maintain maximum depth of flow.
- Branches should be streamlined in the direction of flow. The sewer system should be constructed to the relevant standards and appropriate quality materials

CHAPTER 6: PROJECT ALTERNATIVES

6.1 Introduction

In deciding on the type of developments to be included in the proposed plan, the project proponent considered various alternatives. Note that for some issues, little data is available on which to base the assessment, and that many of the judgements are subjective. Further, despite a number of detailed technological alternatives at project proponent's discretion, the technology adopted in this project is informed by conventional building trend within the proposed project area. It's worth noting also that only those alternatives with the potential to materially affect the outcome of the environment have been discussed here.

6.2 Zero Option/ No Project Development

The zero option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will however, involve several losses both to the proponent and the community as a whole. The proponent will continue to pay rent on the plot while the property remains underutilized. The Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of the Kenyans and the local people would remain unchanged.
- The local skills would remain underutilized.
- Reduced interaction both at county, national and international levels
- No employment opportunities will be created for Kenyans who will work in the proposed project.
- Kenya's vision of becoming a competitive manufacturing hub would not be advanced.
- Development of supporting infrastructure, such as electricity, and water supply would not be undertaken.
- Opportunities for promotion of local trade in cement and related construction materials would be missed.
- The local and national economy would not benefit from increased revenue, industrial growth, or investment inflows.

- Technological advancement and transfer through modern processing techniques would not be realized.

6.3 Relocation Option

Relocation option to a different site is an option available for the project implementation. At present the proponent does not have an alternative site. This means that he has to look for the land.

Looking for the land to accommodate the scale and size of the project and completing official transaction on it may take up to three (3) years although there is no guarantee that the land would be available. The proponent will spend another two years on design and approvals since design and planning has to be according to site conditions. Project design and planning before the stage of implementation will cost the proponent hundreds of thousands of Kenya shillings. Whatever has been done and paid to date will be counted as a loss to the proponent.

Assuming the project will be given a positive response by the relevant authorities including NEMA, this project would have been delayed for about two (2) years period before implementation. This is a delay that our economy can ill afford. This would also lead to a situation like No Project Alternative option. The other consequence of this is that it would be a discouragement for private/investors especially in the manufacturing sector further aggravating our critical employment shortages. In consideration of the above concerns and assessment of the current proposed site, relocation of the project is not a viable option.

6.4 The Proposed Development

This proposal would see the construction/installation of the proposed project as proposed by the proponent and as outlined in this EIA Study report. This option has good support by the persons who would be most affected by its implementation. Therefore, community support is anticipated for the development.

Generally, it is believed that this alternative will provide positive benefits to the proponent, Kenyans (business entities, contractors and developers) and the Government through generation of revenue. These include benefits such as employment opportunities, cement and cement-based products' availability, source of income, e.t.c. The proposed development

is being designed and undertaken to meet and/or exceed the national and international standards and regulations as concerns such project

6.5 The Proposed Development with modifications

If there are issues concerning the project that may be enhanced, changed or modified to increase the acceptability of the project, then these issues should be considered. At this time based on public views in the project area, it appears that there are no major issues and once these minor issues are solved amicably through modification or compromise; the support for the development would further increase. These include, but are not limited to: Damage to the road network, Solid waste generation, Noise pollution and vibrations, Air pollution, and Waste water management.

These issues and others are easily resolvable through either modification or compromise and we do not foresee these issues resulting in disapproval of the development by interested groups and regulatory agencies. The proponent has resolved to operate an efficiently run project that will be the pride of all involved. This alternative retains the same positive benefits as with maintaining the proposed development option.

Analysis of Alternative Construction Materials and Technology

The implementation of the project will entail the use of materials that will be sourced locally provided they meet the required standards and are environmentally friendly. The adoption of use of locally available and internationally accepted materials is aimed at promoting the local industry and minimizing the cost of transport. The consultant evaluated recycling of existing pavement materials for subbase and base to reduce exploration of new materials.

Due to high cost of milling and recycling, and lengthy procedures required to meet the required design standards, the Consultant has proposed use of new materials to manage cost of the project. However, the contractor will be given the option to mill and recycle the materials provided the required subbase material standards are met, without incurring extra costs to the project.

Equipment that saves energy and water will be given priority without compromising on cost or availability factors. On the alternative construction materials and technology, rainwater should be harvested. The project will also evaluate the use of modern technologies that

comply with the environmental and safety issues and are cost effective. This includes evaluation of green technologies

CHAPTER SEVEN: CONSULTATIVE PUBLIC PARTICIPATION

7.1 Introduction

The Consultation and Public Participation Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58, on EIA for the purpose of achieving the fundamental principles of sustainable development. This chapter describes the process of the public consultation and public participation followed to identify the key issues and impacts of the proposed project.

Public consultation was carried out in this Project with the objectives of minimizing probable adverse impacts of the project through alternate working hours and to achieve speedy implementation of the project by creating awareness amongst the community on the benefits of the project. The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to the proposed development.
- To encourage and provide for people's participation in project development.
- To Obtain suggestion from stakeholders on possible ways that potential negative impacts can be effectively mitigated
- To facilitate and open and inclusive approach to consultation that provided timely and transparent information to the stakeholders;
- To provide an opportunity for stakeholders to provide feedback on the project raise their concerns;
- To aid project planning and development of mitigation measures and monitoring plans to address issues raised.

7.2 Stakeholder Engagement Plan

7.2.1 Objectives of the Stakeholder Engagement Plan (SEP)

The SEP seeks to define an environmentally, technically and culturally appropriate approach to stakeholder consultation and public participation process. The goal of this SEP is to improve and facilitate decision making and create a platform for communication that actively involves, and fosters in a timely manner, a common understanding between all project stakeholders and project affected persons/neighbors.

The SEP ensures that all groups of affected persons are provided sufficient opportunities to voice their opinions and concerns in regard to the proposed project, which will importantly

help the Authority with decision making on the sound development of the proposed project. The key objectives of the SEP can be summarized as follows:

1. Understand the stakeholder engagement requirements
2. Identify key stakeholders that are affected by the development project
3. Identify the most effective methods and structures through which to disseminate project information (potential environmental impacts and proposed mitigation measures) to ensure regular, accessible, transparent and appropriate consultations and public participation
4. Develop a stakeholders' engagement and public participation process that provides stakeholders with an opportunity to positively influence project planning and design
5. Establish formal grievance/resolution mechanisms,
6. Define roles and responsibilities for the implementation of the SEP
7. Define reporting and monitoring measures to ensure the effectiveness of the SEP and periodical reviews of the SEP based on ESIA study findings:

Key elements for a successful stakeholder engagement and consultations include the following:

- ✓ Proponent to ensure adequate engagement with affected communities throughout the project cycles by disseminating and disclosing relevant environmental and social information,
- ✓ Take account of the outcome of the engagement process with affected communities in the identification of risks and impact associated with the project,
- ✓ Provide affected communities with access to relevant information on:
 - The purpose, nature, and scale of the proposed project
 - The duration of the proposed project activities,
 - Any risks to and potential impacts on such communities and relevant mitigation measures
 - The envisaged stakeholder engagement process, and the grievance mechanism

7.3 Stakeholder Analysis and Identification

Stakeholder analysis determines the likely relationship between stakeholders and the proposed project and helps to identify the appropriate consultation methods for each stakeholder group during the various project phases. To this purpose, a process for identifying the environmental and social risks and impact of the proposed project will be

established, along with identification of affected persons and the proposed mitigation measures.

- The stakeholder analysis will be carried out to identify:
- Who will be adversely affected by the impacts of the proposed project?
- Who are the most vulnerable among the potentially impacted persons and where special engagement efforts are necessary,
- At which stage of the Proposed Project development will stakeholders be most affected (e.g., planning, construction, operations, decommissioning or both?)
- Which stakeholders might help to enhance the proposed project design,
- Which stakeholders can best assist with the early scoping of issues and impacts?
- Who strongly supports or opposes the changes that the project will bring and why?
- Who is critical to engage with first, and why?

Stakeholders Analysis and Categorization

No.	Community Category	Actual Community
1	Landowners whose property is impacted by the proposed project	Immediate neighbors, quarry facilities & businesses within project site
2	Local Media	They include; • 2 Local Nation-wide Newspaper/ Dailies • One Local Nation-wide Radio station • The Kenya Gazette Important for carrying the media adverts informing the public of the proposed development project
3	National & County Government Administrative Authorities	• National Gov't: Ministry of Environment • National Environment Management Authority (NEMA) • National Gov't: Interior ✓ County Comm., Nakuru Office (Deputy County Comm./Asst. County Comm.) ✓ Ward Administration ✓ Area Chief, • County Government of Nakuru Departments ✓ Revenue officer ✓ Lands Physical planning, housing and Urban Development ✓ County roads and Public Work Department ✓ County Environment, energy and Natural Resource ✓ Water Resource Authority (WRA)

4	Infrastructural Sector Government Agencies	They include National Construction Authority (NCA)
5	Local Political Class	Area Member of Parliament & County Assembly (MP/MCA)
6	Community Based Organizations (CBOs)	Churches
7	Business Groups	Viji fillings
8	Residence Associations	Rare Area Resident Association

7.4 Methodology used for Public Participation and Consultation

Views and concerns from the local residents, local leaders, surrounding institutions and development partners to the plant, who in one way or another would be affected or have interest in the proposed Building Materials Processing Plant was sought through interviews, key stakeholder and public meetings as stipulated in the Environmental Management and Coordination Act, 1999 (Cap 387). During the consultation process, the stakeholders were taken through the proposal including their objectives and possible impacts associated with implementation activities. Stakeholders were then given time to ask relevant questions regarding the Building Materials Processing Plant to enable the consultants clarify on any issues that they may not have understood properly. Stakeholders were consulted during screening and scoping.

In general, the following steps were followed in carrying out the public consultation process:

- Identification and compiling a database of interested and affected individuals and institutions
- Interview schedules to different target groups and local community members in the proposed development site.
- Technical Meetings with Key stakeholders

The public consultation and participation were conducted through;

1. Key stakeholder consultation and interviews
2. Key Stakeholder Consultative Meeting
3. Household socio-economic survey

The procedures used for each of the above are outlined below:

7.4.1 Public Participation and Key Stakeholder Technical meeting

To ensure adequate public participation was undertaken consultative invitation letters were sent to stakeholders including key ministries, government departments operating in Nakuru, local leaders, local authority amongst others who in one way or another interact with the proposed Building Materials Processing Plant and the technical key stakeholders meeting held from 9:00- 12:00 A.M Friday, 22nd July 2026 at the County Assembly Boardroom in Maai-Mahiu Centre



Stakeholder's meeting with Nakuru County government representatives

7.4.2 Key Stakeholders Consultation and Interviews

During the scoping exercise, forty (40) key stakeholders from proponent management team and lead agencies, private investors, interested and affected individuals and institutions within and neighboring the proposed Building Materials Processing Plant development were identified, consulted and interviewed on held from 2:00-5:00 P.M 22nd July 2026.

The public participation exercise was conducted by experienced experts via interviews and discussions under the guidance of interview schedules developed to capture the general and specific concerns, comments and issues comprehensively. The completion of such schedules subsequently allowed for the synthesis and analysis of issues that arose which provided basis upon which the environmental, economic and social aspects of the study was undertaken.

The purpose for such interviews was to identify the positive and negative impacts that have been studied in detailed in this report.

A standard public consultation and participation form was administered to the stakeholders to obtain their views, comments and concerns and the minutes were attached as annex.



Stakeholder consultative meeting

7.4.3 Household Interviews and Survey

Household surveys were conducted within the entire neighborhood of the proposed development. Survey tools were prepared for effective and systematic interviews by the environmental and socio-economic consultants assisted by a team of technical field assistants from the area on the baseline survey. The tool included; structured and non-structured household interview schedules, key informant guidelines, mapping, sampling of the areas to be surveyed, field visits and observations, and triangulation of field data which focused specifically on the communities who stay within and around the proposed site. Two meetings were conducted on 23rd July 2026.

A standard public consultation and participation form was administered to the stakeholders to obtain their views, comments and concerns and the minutes were attached as annex.



Public Disclosure of at Xiaomi Investment Limited premises

7.5 Positive comments made by the respondents

7.5.1 Employment Opportunities for the Locals

The respondents interviewed/consulted were optimistic that the proposed Building Materials Processing Plant development will create numerous employment opportunities for skilled, semi-skilled and unskilled labour during implementation of the project. Even though most of the development will need skilled labour force during operation, the participants expressed hope that they will be able to access employment once the development commences mostly as casual workers.

The respondents were also optimistic that they will be trained in advance by the proponent to take up jobs during construction and operational stages to ensure social investment to the community.

Employment opportunities are of benefit both economically and socially. Generally, employment will lead to multidimensional development in the area and improve several people's living standards.

7.5.2 Poverty Alleviation

The respondents were positive that the proposed plant project would improve the living standards for several individuals and households hence it is expected to alleviate poverty in its environs and boost the country GDP and improve the living standards of Kenyans.

7.5.3 Increased Business Opportunities

The respondents were optimistic that business opportunities will arise during construction and operational phases of the project. Small scale business people such as food vendors and kiosk owners will benefit greatly due to the expected population increase.

7.5.4 Increased exploitation of common minerals used at the plant

The proposed project will likely result in increased mining and exploitation of common minerals used for the plant production. Such common minerals include Volcanic ash which is the bulk raw material used in plant production.

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7.5.6 Development of Infrastructure and Social Amenities

Respondents were optimistic that the proposed project activities would improve infrastructure in the area. The area will develop from an agricultural to an industrial area with improved transport and communication infrastructure, power distribution network, education, among other social amenities.

7.5.7 Improved Security

The respondents were optimistic that the proposed development activities will lead to improved security situation in the neighborhood due to the numbers that will reside in the areas and the possible synergistic effects that populated neighborhoods bring along with them.

7.6 Negative impacts highlighted by the respondents

7.6.1 Environmental Degradation on change of land use

Respondents were concerned with the change of land use from agricultural to a built environment. Conversion of land in the proposed plant project from purely agricultural to industrial development will degrade the environment and alter the environmental conditions of the area. impact to the environment through loss of biodiversity in the area.

7.6.2 Noise Pollution and Vibrations

The respondents expressed fear over high noise and vibrations levels to be produced at the plant and it's effect on the neighbor's.

7.6.3 Air Pollution

The people expressed concern over possibility of generation of large amount of dust and fumes within the development and surrounding areas because of excavation works, transportation and operations.

7.6.4 Increased pressure on infrastructure

Some participants were concerned that due to magnitude of the proposed development, there is a potential of increasing pressure on existing infrastructure such as roads, water supply system, waste handling facilities and electricity. This would be due to increased volumes on human and vehicle traffic along the access road.

7.6.5 Increased Insecurity

There were concerns that due to an influx of many people during construction and operational phases, insecurity is likely to increase.

7.6.6 Dumping of Solid Waste

The people expressed concern over possibility of generation of large volumes of waste during the construction and operation stages.

7.7 Conclusion and Recommendation

The concerns and recommendations raised/provided by the neighbors were recorded and are herein enumerated in this report to help NEMA make an informed decision regarding the proposed Building Materials Processing Plant project. However, it's the environmental assessment experts' opinion that the approval be given to the proposed project as long as the proponent is willing and adheres to the mitigation measures provided. All the issues raised by the opposing neighbors can be mitigated.

CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLANS (ESMMP)

8.1 Introduction

The environmental management plan involves risk management strategies that should be undertaken by the project proponent and all the stakeholders to mitigate environmental degeneration. They are approaches to monitor, control, reclaim and restore the environment to a sustainable state. EMPs for projects thus provide logical frameworks within which the identified issues of environmental concern can be mitigated or monitored i.e. provide a checklist for project monitoring and evaluation.

The environmental management and monitoring plans have been developed and outlined to bring home the key findings of the Environmental Impact Assessment; recommending necessary mitigation actions, defining roles, monitorable indicators and the estimated cost.

8.2 ESMP for Planning Phase

The planning phase involved all the steps to be followed by the proponent before the start of the mine development. These include the approvals from all the relevant authorities such as the County Government of Nakuru and NEMA. The ESMP for planning phase provides a set of actions that the proponent needs to implement before the commencement of the construction and development of the structures and the plant phase. Foremost, the ESMP requires that the proponent should have applied for and obtained all the requisite approvals and procedures before the actual implementation of the project. The following are some of the activities carried out including the actors at the planning phase.

Environmental/ social impact	Proposed mitigation and aspects for monitoring	Actors	Monitoring	Estimated Cost	Frequency of Monitoring
Uncontrolled and incompatible development that is out of character with its context	Plan and obtain development permission for the project from relevant authorities	Registered Physical Planner and architect	Project approvals; routine inspections	10% of project cost	Random
Lack of Environmental Awareness on proposed project	Provide project information at entry to the project site.	Proponent, County Government of Nakuru, NEMA	Routine inspections; Sign boards and notices at project site	150,000	Random
Uncontrolled site demarcation	Survey of plot and establishment/confirmation of beacons before commencement of construction.	Proponent, surveyor	Survey plan; site inspections	200,000	Once
Uncontrolled construction contrary to approved plans and of poor workmanship	Appointment of a qualified project manager and contractor	Proponent; Project Manager	Verification ; inspection	450,000	Routine

Mismanagement of site operations contrary to conditions of approval.	Appointment of project manager Appointment of Clerk of Works	Proponent; Project Manager	Verification ; inspection	2,050,000	Routine
Vulnerability to accidents and hazards during project implementation	Obtaining insurance to cover all accidents including Workmen's Compensation.	Proponent	Verification ; Inspection	300,000	Once

8.3 The Environmental and Social Management and Monitoring Plan for Construction & Operational Phases

Environmental/ Social Impact	Proposed mitigation and aspects for monitoring	Responsibility During Design, Construction and Defects Liability Period	Monitoring Means (C) = Construction (O) = Operational	Estimated Costs (Kshs)	Monitoring Indicators and Frequency
Soil disruption	- Control earthworks & compact loose soils - Install drainage structures properly - Landscaping on project completion - Control and manage excavation activities - Control activities especially during rainy conditions - Provide soil erosion control and conservation structures/means where necessary. - Ensure standard appropriate practices on the provided gardens. -Excavate only areas directly affected by building foundations and associated infrastructure. - Transport and dispose of excess excavated materials at County/NEMA-designated disposal sites. - Where possible, reuse excavated soil for backfilling and landscaping.	- Contractor - Environmental - Health & Safety (EHS) for Xiaomi	(c) Inspection (o) Routine maintenance (c) Inspection (o) Routine maintenance	50,000,000	- Type of machinery and equipment - Paved area
Loss of vegetation	- Limit vegetation removal to actual proposed project site only - Plant trees around periphery of I plant and in open	Plant Manager Environmental Health & Safety	(c) Inspection (o) Routine maintenance	1, 000,000 p.a	Physical checking of number of trees planted around the

	spaces in the compound of the plant • Xiaomi to support planting of trees in public areas such as schools, Chief Camp, local dispensaries within the project catchment	(EHS) for Xiaomi	(c) Inspection (o) Routine maintenance		plant area • Physical checking of number of trees planted in open public places within the project catchment area
Changes in land use- extent and modification of micro-climate:	• Plant vegetation after project completion • Ensure compliance with existing planning policy. • The project shall be approved by the relevant government bodies before commencement. • Orient buildings to maximize natural ventilation and sunlight penetration • Provide adequate green/open spaces, with trees, shrubs, and gardens. • Minimize use of reflective materials to reduce glare.	Proponent and contractor	Inspection and records inspection	5,000,000	• Conserved vegetation • Records
Changes in hydrology/ impended drainage/deep excavations	• Proper Installation of drainage structures • Install cascades to break the impact of water flowing in the drains • Ensure efficiency of drainage structures through proper design and maintenance • Provide gratings to the drainage channels • A geotechnical survey shall be conducted and the recommendations thereof followed. • There shall be no blasting during excavation. • A methodology for excavation shall be generated as required by NCA prior to excavation	Contractor	(c) Inspection (o) Routine maintenance	9,000,000	• Amounts of storm water • Efficient storm water drains

Air, Clinker and cement dust pollution	• Enclose the site with dust-proof net during construction. • Water should be sprayed during the construction phase of excavated areas during dry conditions. • Control speed and operation of construction vehicles • Prohibit idling of vehicles. • Ensure sound condition of construction machinery and equipment. • Engage sensitive construction workers. • The entire plant premises, including driveways, should be paved with hard, impervious materials, • Use of bag filters • Deployment of electrostatic precipitators • Natural or artificial wind barriers (trees, fences, landforms) should be installed in accordance with prevailing wind direction to control dust dispersion, • The movement and handling of fine materials such as cement, sand, and dust should be carefully managed to prevent spillage onto paved surfaces and minimize wind-blown particulate emissions, • The silo delivery pipe should be fitted with a butterfly or pinch valve, or similar, that enables tight shut off to prevent cement or fly ash dust escaping, • Ensure the high-level sensor alarm is set at a point that prevents the silo from overfilling and automatic shut-down switch is also required to minimize spillage and dust, and	• Contractor • Plant Head • Environmental • EHS for Xiaomi • Section Heads • Individual employee	(c) Inspection (o) Routine maintenance	15,500,000	• Dust surveys should be carried preferable every six month; • Medical severance should be carried out every twelve months • Continuous checking of clinker and production technology and related processes • Compliance with international national ambient air quality, emission standards and meeting of NO² air quality index • Using NEMA accredited laboratories to measure emission standards; • Adopting Direct control Carbon monoxide (CO) monitor;
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	• Building materials should only be delivered from suppliers using sealed vehicles equipped with pneumatic transfer systems for silo loading. • Ensure de-dusting system is always efficient; • Workers to use appropriate PPE; • Strict enforcement on PPE use; • Ventilation at workplace to be sufficient;				• Amounts of dust • Extent of paved area • Type of machinery • Amounts of emission
Noise & vibration pollution	• Switch off engines not in use • Construction work to be confined to between 7am to 5pm • Monitor noise levels as per NEMA guidelines • Use newer technology and machines • Erect suitable barriers to control noise. • Comprehensive noise and vibration conservation programme including monitoring, use of noise attenuators, training and use of PPEs • Providing suitable hearing protection to all workers exposed to noise levels above 85dB(A); • Posting notices and signs in noisy areas; • Room enclosures for mill operators. • Carrying out audiometric test by a designated medical practitioner to all workers exposed to noise levels above 85dB(A) • Installing suitable mufflers on compressor components. • Installing acoustic barriers	• Contractor • Plant Head • Environmental • EHS for Xiaomi • Section Heads • Individual employee	(c) Inspection (o) Routine maintenance	8,040,000	• Measurement of noise levels periodically • Ear muffs/ Buffers/ Mufflers

	• Installing vibration isolation for mechanical equipment • Use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible. • Periodic medical hearing checks • Record and respond to complaints • Workers in the vicinity of or involved in high-level noise to wear safety & protective gear.				
Utilities operations wastewater (sanitary/storm water)	• The design of the entire sewerage system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project even during peak volumes. • Provide for adequate drainage systems. • Ensure effluents are discharged responsibly to the sewerage system. • Adaption of water conservation opportunities; • Minimizing use of antifouling and corrosion inhibiting chemicals; • Multimedia filtration for reduction in non- settleable suspended solids • Segregation of wastewater streams; • Treatment to meet national standards for sanitary wastewater discharge • Storm water should be separated from process and sanitary wastewater streams in order to reduce the volume of wastewater to be treated prior to discharge;	• Contractor • Plant Head • Environmental • EHS for Xiaomi • NEMA, • Public Health	(c) Inspection (o) Routine maintenance	38,000,000	• Sampling and testing for conformity with Water quality standards before discharge • Water amounts used • Roof catchments and storage

	- Runoff from areas without potential sources of contamination should be minimized (e.g. by minimizing the area of impermeable surfaces) and the peak discharge rate should be reduced (e.g. by using vegetated swales and retention ponds); - Monitor quality of wastewater to ensure compliance with the Environmental Management & Coordination (Water Quality) Regulations, 2024 and other relevant Laws.				
Oil pollution	- Proper storage, handling and disposal of new oil and used oil wastes as per waste regulations. - Maintain plant and equipment to avoid leaks. - Maintenance of construction vehicles should be carried out in the contractor's yard (off the site). - Provide oil interceptors along the drains leading from car park and potentially oil risk areas.	Contractor	(c) Inspection/ observation	960,000	- Incidences of spillage - Poorly disposed wastes
Traffic safety	- Enforce speed limits for construction vehicles especially along roads leading to the site - Provide bill boards at the site/entrance to notify motorists about the development - Provide adequate and well-marked parking facilities within the project site to accommodate both tenants and visitors. - All vehicles entering/exiting the premises must be registered, identified, and indicate their destination for security and monitoring purposes. - Strictly enforce speed limits (15 km/h within/around	- Contractor - Plant Head - Environmental - EHS for Xiaomi - County Government, Road Authorities - General public	(c) Inspection (o) Routine maintenance	2,000,000	- Records of traffic number in and out of the project site; - Record of vehicular Accidents and incident - Presence of ample parking in the premises - Smooth traffic flow - Absence of congestion or

	the premises) to enhance safety. • Restrict parking along the access Road to avoid obstruction, congestion, and disputes with neighboring facilities. • Establish a holding bay for trucks/delivery vehicles to prevent road blockage. • Deploy trained traffic marshals to manage vehicular flow and reduce disruption within the facility. • Collaborate with relevant road authorities to ensure the access road is well maintained • Conduct regular consultations with local residents and institutions to address traffic-related concerns and strengthen community relations.				• roadside parking • Bill boards • Safe access
Public health, occupational health and safety	• Train staff/workers on occupational health and safety. • Provide full protective gear & workmen's compensation cover in addition to the right tools and operational instructions & manuals. • Site shall be fenced and security services provided on site • Minimize dust exposure through dust suppression (e.g., water spraying, enclosure of mixers and conveyors, and proper ventilation). Workers operating in dusty areas should use approved respirators • Fuels, and lubricants shall be handled carefully and stored in clearly labelled containers within bunded and ventilated areas. Safety Data Sheets (SDS)	• Contractor • Plant Head • Environmental • EHS for Xiaomi • DOSH, • NEMA • Individual employee	(o) Observation	600,000	• Spot checks at workplaces on appropriate handling • -Presence of well equipped First Aid kit • Presence of Security Guards on site • Presence of a register on the site • Conducting Safety drills • Training records

	should be accessible, and workers trained in spill prevention and response procedures, • Use of air-conditioned, closed cabins • Use of dust extraction and recycling systems • Use of air ventilation(suction) in bagging areas • Use of PPE, as appropriate to address residual exposures • Engineering controls • Shielding surfaces where workers' proximity and close contact with hot equipment • Minimizing the work time required in high temperature environments by implementing shorter shifts • When working on equipment with moving parts, ensure the equipment is de-energized, isolated and locked/tagged out • Adopt sound waste management system to ensure proper solid waste disposal and collection facilities. • Adopt sound housekeeping practices. • Sensitize residents on environmental management. • Design of sewerage system should be as provided in the plans and should be constructed to approved size and design, standard and of approved materials. • Ensure use of standard construction materials and to the specifications. Avoid undesirable, substandard, hazardous or unauthorized materials during construction & maintenance. • Sensitized staff on social/health issues such as drugs				• Waste receptors • Clean sanitary facilities • First aid kits and training Sensitive workers
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	• Use fall protection such as belts • Ensure machinery and equipment servicing and maintenance as per schedules & legal requirements • Post strategically the Factories and Other Places of Work Act Abstract & provide material safety data sheets • Post clear warning signs e.g. 'No unauthorized use of machines', ensure there are guards on moving parts etc. • Provide fully equipped First Aid kits & train staff on its use • Ensure adherence with the legal requirements Factories Act. • Sensitize residents on environmental management. • Ensure Nakuru County Government certifies and issues occupation certificates.				
Record Keeping	• Collection and analysis of relevant environmental data of the site	Proponent/ contractor	(c) Inspection (o) Routine maintenance	4,890,000	• Relevant environmental records
Fire safety and preparedness	• Install firefighting equipment as provided elsewhere in the report. • Conduct training on firefighting, evacuation and emergency response. • Sensitize the residents on fire risks i.e., conduct regular fire drills. • Adapt effective emergency response plan. • Maintain/service firefighting machinery regularly.	Contractor	(c) Inspection (o) Routine maintenance	7,320,000	• Firefighting equipment • Training records • Display of emergency numbers

	• Provide emergency numbers at strategic points.				
Water quality	• The design of the entire sewerage system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project even during peak volumes. • Provide for adequate drainage system. • Ensure effluents are discharged responsibly to the sewerage system. • Install an oil water interceptor to trap oils that may be present in wastewater. • Apply and obtain an Effluent Discharge License (EDL) for effluent released into the environment. • Monitor quality of wastewater to ensure compliance with the Environmental Management & Coordination (Water Quality) Regulations, 2024 and other relevant Laws.	Proponent/ contractor	(c) Inspection (o) Routine maintenance	3,000,000 per year	• Records
Waste Management	• During construction phase, designate an area for temporarily holding waste materials. • All wastes should be disposed of in accordance with the Environmental Management & Coordination (Waste Management) Regulations, Segregation of wastes at the source for ease of handling and disposal. • Use of durable long lasting materials • Contract a NEMA licensed waste transporter to transport solid waste from the proposed site during construction and occupation phases. • Sell recyclable waste to recyclers.	• Contractor • Plant Head • Environmental • EHS for • Xiaomi • NEMA • Individual employee	(c) Inspection (o) Routine maintenance	2,000,000 per year	• Duly completed Waste generation, segregation and disposal tracking documents • Presence of waste handling bins • Absence of wastes • Protected environment

	• Provide bins for temporarily holding waste before collection by licensed transporters during occupation phase. • Truck agitators and chutes shall not be rinsed out near stormwater drains, roadways, or open ground surfaces to prevent contamination of stormwater and surrounding soil. Designated washout areas with impervious surfaces and proper containment should be provided for this purpose. • All building material dispatched and returned to the batching plant must be carefully tracked and recorded to ensure that excess or waste concrete is managed responsibly either through reuse in site works (e.g., paving, curbing) or disposal through an approved waste management facility. • All waste shall be stored in suitable, properly labelled containers that are kept closed except when waste is being added. Each container label should clearly indicate the type of waste, date of generation, and any other relevant safety or handling information. • Wastes must not be mixed, except where compatibility has been verified (e.g., compatible flammable solvents). Different classes of waste such as hazardous, non-hazardous, and recyclable materials must be segregated to avoid unwanted chemical reactions and facilitate efficient waste management.				
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	- Only licensed and NEMA-approved waste transporters shall be engaged to handle and transport regulated waste. Accurate records, including waste manifests, contracts, and receipts for all waste collection and disposal activities, must be maintained and kept for audit purposes. - Hazardous waste must never be poured onto the ground, into the sewer system, or placed in general waste bins. Such practices are prohibited under the Environmental Management and Coordination (Waste Management) Regulations, 2024. - Open burning of waste on-site is strictly prohibited. All waste materials must be handled in an environmentally sound manner to minimize pollution and protect human health.				
Energy Consumption	- Use electricity sparingly since high consumption of electricity negatively impacts on these natural resources and their sustainability - Use of Standby Generators - Servicing the generator and other energy consuming /utilizing equipment's regularly - Using alternative sources of energy especially renewable ones such as solar in lighting should be considered - Liaise with KPLC to ensure adequate power supply for the high demand development.	- Contractor - Plant Head - Environmental - EHS for Xiaomi - Individual employee	(c) Inspection (o) Routine maintenance	3,000,000	- Presence of KPLC power lines - Presence of generator

Excessive Water Use	• Sensitize staff on water conservation measures and promptly repair leaks to minimize wastage. • Getting supplementary source of water i.e onsite borehole • Installation of toilet flushes with low volume cisterns • Recycling of water	• Contractor • Plant Head • Environmental • EHS for • Xiaomi • Individual employee	(c) Inspection (o) Routine maintenance	1,000,000	• Metering of water • Presence of borehole
Security and social impacts	• Install a secure perimeter wall • Provide security guards, CCTV cameras and other security apparatus during the entire project cycle. • Construction work timings shall only in line with the NEMA licensing conditions	• Contractor • Plant Head	(c) Inspection (o) Routine maintenance	7,800,000	• Security guards • Security lights and records

8.4 Occupational Health and Safety Environmental and Social Management and Monitoring Plan for the proposed project during construction and operational phase.

KEY ISSUES	MITIGATION MEASURE	RESPONSIBILITY	TIME FRAME	COST KSH.
Registration of the premises	Register the premises under the Occupational Health and Safety Act Cap 514, of the Laws of Kenya.	Proponent	One-off	5,000
General register	Keep a general register of all workers within the facility as stipulated in Sec 62 (1) of the Occupational Health and Safety Act.	Proponent, contractor	Construction	500
Incidents and accidents	Report any incidents and accidents using prescribed forms obtainable from the Occupational Health and Safety Office.	Site Safety Officer	Continuous	20,000/month
	Conduct regular safety education and training.	Site Safety Officer	Quarterly	5,000,000
	Prepare a contingency plan for emergency response before the start of the project.	Site Safety Officer	One-off	1,000,000
Insurance	Insure the premises as per statutory requirements (third party and workman's compensation).	Proponent and all occupants	Annually	-
Safety healthy environment (SHE) policy	Develop, document and display prominently an appropriate Safety and Healthy Environment policy.	Site Safety Officer	One-off	60,000
Sanitary conveniences	Provide suitable, efficient, clean, well-lit and adequate sanitary amenities at the site taking care of gender division.	Contractor, proponent and all occupants	One-off	1,000,000
Machinery/equipment	Ensure that machinery, equipment, PPE, appliances and tools to be used	Contractor,	One-off	-

safety	comply with the prescribed safety and health standards and be appropriately installed, maintained and safeguarded.	proponent and all occupants		
Storage of materials	Ensure that materials are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse.	Contractor, proponent and all occupants	Continuous	-
Safe of access in the buildings	All floors, steps, stairs and lift of the premises must be of sound construction and be properly maintained.	Contractor, proponent and all occupants	Continuous	-
Emergency preparedness and evacuation procedures	Design suitable documented emergency preparedness and evacuation procedures for emergencies.	Site Safety Officer	One-off	2,000,000
First Aid	On site a stocked first aid box which is easily available and accessible	Site Safety Officer	One-off	680,000
Fire protection	Regularly inspect and service fire-fighting equipment by a reputable service provider and maintain inspection records.	Site Safety Officer	Every 3 months	50,000
Ventilation	Provide adequate space within the premises to allow for adequate natural ventilation through circulation of fresh air.	Contractor, occupants	One-off	-
Lighting	Provide adequate artificial or natural lighting in all parts of the premises where persons are working or passing.	Contractor, occupants	One-off	-
Electrical safety	Do not overload circuits. Clearly mark distribution board switches to indicate respective circuits and pumps.	Proponent and Contractor	Continuous One-off Continuous	100,000

	Ensure that no live electrical wires are exposed. Earth all electrical equipment.		One-off	
Diseases	Provide complete refuse collection and handling service.	Proponent and Contractor	Continuous	100,000
Security	Fence the site and employ security personnel operating 24 hours. Install security alarms and/or surveillance systems.	Proponent and Contractor	Continuous	500,000

8.5 The Environmental and Social Management and Monitoring Plan for the Decommissioning Phase

The necessary activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the decommissioning phase of the project are outlined in the table below.

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	MONITORING MEANS	TIME FRAME	COST (KSH)
Demolition waste management					
Demolition waste	Use of an integrated solid waste management system i.e., through a hierarchy of options: i. Source reduction ii. Recycling iii. Reuse iv. Sanitary land filling.	Project Manager and Contractor	Inspection and Observation	One-off	2,000,000
	All structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible.	Project Manager and Contractor	Inspection and Observation	One-off	500,00
	All foundations must be removed and recycled, reused or disposed of at a licensed disposal site.	Project Manager and Contractor	Inspection and Observation	One-off	500,000
	Where recycling/reuse is not possible, the materials should be taken to a licensed waste disposal site.	Project Manager and Contractor	Inspection and Observation	One-off	500,000

Rehabilitation of project site					
Vegetation disturbance	Implement an appropriate re-vegetation program to restore the site to its original status.	Project Manager and Contractor	Observation	One-off	200,000
	Consider use of indigenous plant species in re-vegetation.	Project Manager and Contractor	Observation	One-off	-
Minimization of occupational health and safety impacts					
Increased occupational health and safety risks	Adherence to the Occupational Health and Safety Rules and Regulations stipulated in the Occupational Safety and Health Act, 2007.	Health and Safety Manager	Inspection, Meeting and Observation	Throughout decommissioning period	100,000
	Provision of appropriate personal protective equipment as well as ensuring a safe and healthy environment for demolition workers.	Proponent	Inspection and Observation	Throughout decommissioning period	500,000
	Mitigate demolition workers' accidents by enforcing adherence to safety procedures and preparing contingency plan for accident response.	Health and Safety Manager	Meeting and Observation	Throughout decommissioning period	200,000
Minimization of demolition noise and vibration					
Noise and vibration	Sensitize demolition vehicle drivers and machinery operators to switch off engines of vehicles or	Project Manager and Contractor	Meeting	Throughout demolition period	No added cost

	machinery not being used.				
	Sensitize demolition drivers to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as churches, offices, hospitals, residential houses and schools.	Project Manager and Contractor	Meeting	Throughout demolition period	-
	Ensure that demolition machinery is kept in good condition to reduce noise and vibration generation.	Project Manager and Contractor	Inspection	Throughout demolition period	-
	Ensure that all generators and other equipment used are insulated or placed in enclosures	Project Manager and Contractor	Inspection	Throughout demolition period	
	The noisy demolition works will be planned to be during the day.	Project Manager and all site foremen	Observation	Throughout demolition period	No added cost

CHAPTER NINE: CONCLUSION AND RECOMMENDATION

9.1 Conclusion

In conclusion the proposed project will have several positive economic impacts during its different phases that include: creation of employment; stimulating development through revenue, taxes and income, and creating markets for goods and services. In general, several environmental impacts during the construction and operation phase will be encountered. Notable these impacts include noise pollution, cement, gaseous, exhaust and dust emission, increased water demand, energy consumption and increased waste water, solid waste generation and occupational health and safety impacts, among others. However, these impacts are synonymous with development and can adequately be mitigated through implementation of the EMP prepared. In addition, the contractor and proponent are committed on implementing the measures as outlined in the EMP as well as adhering to all relevant County, National and International environmental, health and safety standards, policies and regulations that govern such developments. Several environmental concerns were also been raised by area residents, specifically those residing within the area. These impacts can be adequately mitigated through implementation of the EMP.

Our conclusion is that the project is important for social and economic development and it benefits out weight its shortcomings. We therefore recommend that the project be licensed.

This project should be licensed subject to annual environmental audit once it has been commissioned. This will be in compliance with the EMCA Act of 1999 (revised 2015) and EIA/EA Regulations 2003 (Amended 2019).

9.2 Recommendation

In ensuring proper mitigation measures are instituted, the proponent and contractor will need to ensure the following:

- i) They are involved in every stage of the project implementation and particularly on the management of the anticipated wastes and emissions into the environment as well as other concerns that may touch on the neighboring residents especially control of dust, noise and management of construction waste.
- ii) All solid waste and debris resulting from the construction activities must be disposed of at approved dumpsites.

- iii) All construction materials that include sand, metals, treatment chemicals must be sourced from known and approve dealers and manufacturers who have environment sign of quality.
- iv) Landscaping of the site will be providing habitat to other small animals' bird life.
- v) Warning/informative signs should be erected when construction works are about to begin signs should indicate when works are likely to begin and end.
- vi) The proponent should ensure that construction activities must be undertaken only during the day, this will minimize anticipated disturbance and nuisance to the adjacent residents and general public.
- vii) The proponent should ensure that the development has been approved by the relevant regulatory department and should follow guidelines as set by the departments during construction and operation.
- viii) Ensure that the contractor installs all the systems to the specifications developed and agreed upon in the building plan.
- ix) The workers should be provided with PPE and safety gear and a fully equipped first aid kit must be within their reach.
- x) The proponent should look into ways of enhancing water supply especially to artificial shortage that will be created during construction.
- xi) Drainage system will be properly designed installed and regularly maintained.

REFERENCE

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