2022

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY REPORT FOR THE PROPOSED EXPLORATORY DRILLING & OPEN CAST MINING AT KILIMAPESA HILL

KILIMAPESA GOLD PTY LTD

A MEMBER OF THE CARACAL GOLD PLC GROUP OF COMPANIES




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GENERAL

PROJECT TITLE
Environmental Impact Assessment Study report for the proposed exploratory drilling & open cast mining at Kilimapesa Hill.

PROJECT LOCATION
The proposed project is situated at Kilimapesa Hill near Lolgorien town, Trans Mara District, Narok County. Geographically, the site is located on plot/parcel Transmara/Moyoi/Parcel 1236, Kilimapesa Hill, Lolgorian

PROJECT PROPONENT
Kilimapesa Gold (Pty) Limited
P. O. Box 40647-00100 GPO
Nairobi

PROJECT VALUE
Kshs

KRA PIN NUMBER
P051186741B

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P. O. Box 1303, 00100,
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PROJECT COORDINATES
1°13'21.0"S 34°46'20.7"E

CERTIFICATION

This Environmental Impact Assessment Report has been prepared by Ms. Valentine Wagura (NEMA Reg. 7010). The report has been done with reasonable skills, care and diligence in accordance with the Environmental Management and Coordination Act, 1999 and the Environmental Impact Assessment and Audit Regulations, 2003.
I certify that the particulars given in this report are correct to the best of my knowledge.

Lead Expert

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Proponent

Name of Proponent: Kilimapesa Gold (Pty) Limited

Address: P. O. Box 40647-00100 GPO Nairobi

Signature:..... Date:.....

ACRONYMS

ACRONYMS	Description
dB(A)	Decibels on the A-Scale
EA	Environment Audit
EHS	Environment, Health & Safety
EIA	Environment Impact Assessment
EMCA	Environmental Management and Coordination Act
MSDS	Material Safety Data Sheet
NEMA	National Environment Management Authority
OSHA	Occupational Health and Safety Act
DHP	Designated Health Practitioner
KPLC	Kenya Power and Lighting Company Ltd
HSEQ	Health Safety Environment and Quality
LR.NO.	Land registration number

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1. Background

Environmental Impact Assessment is a tool for environmental conservation and has been identified as a key component in new project implementation. According to section 58 of the Environmental Management and Coordination Act (EMCA) No.8 of 1999 second schedule 9 (1), and Environmental (Impact Assessment and Audit) regulation, 2003, such projects; with potential to cause adverse and irreversible effects to the environment, must undergo a full study. The Report of the same must be submitted to National Environment Authority (NEMA) for approval and issuance of relevant certificates. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

2. The Proposed Exploratory Drilling and Open Cast Mining and its Justification

The proponent, Kilimapesa Gold (Pty) Limited is located in a mining friendly area within Narok County in South Western Kenya. The mine is located in the historically productive Migori Archaean Greenstone Belt. Kilimapesa has a mining license with a JORC resource, an established, producing, and shallow underground mine and processing plant as well as an extensive prospecting permit. Gold ore is produced on site and exported to international refiners, offering immediate value uplift through revenue generation. The mine proposes to undertake exploratory drilling and open cast mining at Kilimapesa Hill in furtherance of its mining activities. The proponent intends to use a combination of Reverse Circulation (RC) Drilling, Diamond Drilling (DD), as well as Open Pit (OP) mining to complement the underground mining currently in place

The exploration exercise will involve collection of geological and geochemical data through the sampling method known as RC Drilling (Reverse Circulation Drilling) to determine the mineral potential of the area. Exploration Diamond Drilling will be used to probe the contents of the known ore deposits and potential sites. By withdrawing a small diameter core of the rock from the ore body, geologists will than analyze the core by chemical assay and conduct petrologic, structural, and mineralogical studies of the rock.

The proponent intends to then apply open pit/ open cast mining method to obtain gold bearing ore at the near surface of Kilimapesa Hill. Open pit mining is a surface mining technique of extracting rock or minerals from the earth from an open-air pit. This form of mining differs from extractive methods that require tunneling into the earth and is used when deposits of commercially useful ore or rocks are found near the surface. It is applied to ore or rocks found at the surface because the overburden is relatively thin or the material of interest is structurally unsuitable for tunneling.

The pit will be mined up to around 10-20m vertical depth on the western side of Kilimapesa Hill. The actual depth is determined by height of excavations from underground working. On the eastern side of the pit, mining will be done up to deeper depths of about 30 to 50m as its site on virgin ground where underground mining; currently in place, has not reached.

The ore from Kilimapesa Hill will be processed at the existing Company's ore processing plant located approximately 500 meters from the Kilimapesa Hill and 3 Kilometers from Lolgorien Town.

The ore will be processed using the existing CIL process which involves the product being loaded /impregnated with activated carbon. The activated carbon will be ferried to the existing elution plant which is approximately 4.81 kilometers from the ore processing plant.

The proposed auxiliary facilities to the exploratory drilling and open cast mining operations will be access roads, tailings dam, heap leach operations, camp site, power supply, water supply, provision of suitable and adequate sanitary facilities and generator room among others.

3. EIA Terms of Reference

The proposed exploratory drilling and open cast mining at Kilimapesa Hill is subjectable to the submission of an EIA project study report as part of the activities in Schedule 2 of the EMCA 1999 and revision 2015 (CAP 387) and Regulation 10 of the Environmental (Impact Assessment and Audit) Regulations, 2003, Legal Notice No. 101. The TOR for an EIA study report are to:

a) Undertake a critical analysis of the project objectives,
b) Assess the proposed location of the project site
c) Description of project objectives.
d) A concise description of the national environmental legislative and regulatory framework, and any other relevant information related to the project.
e) Evaluation of the technology, procedures and processes to be used in the implementation of the project.
f) Evaluation of materials to be used in the construction and implementation of the project and their extended sources.
g) Description, evaluation and analysis of the foreseeable potential environmental effects of the project broadly classified into physical, ecological/biological and socio-economic aspects which can be classified as direct, indirect, cumulative, irreversible, short-term and long-term effects.
h) Evaluation of the products, by-products and wastes to be generated by the project.
i) To propose/recommend a specific environmentally sound and affordable liquid and solid waste management system.
j) Evaluation and analysis of alternatives including the proposed project, project alternative, project site, design and technologies.
k) An Environmental Management Plan (EMP), proposing the measures for eliminating/minimizing or mitigating adverse impacts on the environment.)
l) Propose measures to prevent health and safety hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies. This encompasses prevention and management of the foreseeable accidents and hazards during construction phase, operation phase and decommissioning phase.

4. EIA Methodology

In carrying out the EIA study, the lead expert and contracted experts and laboratories used various methods which are prescribed by the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. Baseline environmental ambient air quality and noise measurements were done by NEMA approved and certified laboratory, ECOSERV Consultants Limited. The laboratory incorporated a methodology involving; identification of sampling points, on-site data collection at the sampled points, deployment of the air quality measuring equipment to the site and data analysis. Geological survey targeting petrologic, structural, and mineralogical studies of the area were done by François Ilboudo a Geologist. Underground and surface water quality analysis was undertaken by NEMA approved and certified laboratory, Cropnuts Laboratories Kenya.

The general EIA steps followed during the assessment included: -

a) Preliminary environment screening, during which the proposed project was identified as among those requiring to be subjected to the EIA process as stipulated under Schedule 2 of Kenya Gazette Supplement No.74 (Acts No. 5) EMCA amendment, 2015,
b) Environmental scoping that provided the key environmental issues to be considered,
c) Submission and subsequent approval of a Terms of Reference for the proposed project to NEMA
d) Desktop studies and documentary review of relevant reports, legal, institutional and policy frameworks

e) Physical inspection and assessment of the proposed project site
f) Analysis of project alternative options,
g) In-house consultative meetings with the proponent;
h) Preliminary baseline field environmental assessment;
i) Preliminary stakeholder consultations,
j) Detailed project impact analysis
k) Impact mitigation planning,
l) EIA report writing.

5. Key Environmental Issues and Potential Impacts

Positive Impacts

a) The positive impacts will include stimulation of industrial development coherent with Kenya's Vision 2030,
b) Mitigate the global demand for gold: The proposed project will be a source of gold which is a precious and expensive metal.
c) Creation of employment opportunities: It is estimated that the proposed project will employ 50 to 100 people mainly sourced from the local community with technical expertise outsourced from other areas of the country and beyond. Locals will be engaged either directly or indirectly as miners, plant operators, drivers, carpenters, welders, cooks and cleaners. Technical experts/expatriates will be involved in the exploration drilling and mining as geologists, miners and engineers.
d) Knowledge transfer from expatriates to local communities. Kilimapesa Gold in its activities continues to build competences of young professionals in the mining sector as geologists, metallurgists, hydrologists, surveyors, safety and health professionals, environmentalists and engineers by importing mining technology
e) The income to be earned by staff employed at the proposed project, will be used for the betterment of peoples' lives and families thus improving their living standards.
f) Demand for materials: This includes equipment, materials, chemicals and food supplies. The supply of these materials translates into boosting both the local and national economy. The multiplier' effect of this project also translates into increased revenue to the county and national governments.

g) Injection of capital into the economy: The proposed project will inject capital into the economy inform of rates, fees and royalties. Kilimapesa Gold pays taxes to the Government of Kenya, pays for all relevant permits and licenses required by the National and County Governments, remits all statutory fees required by relevant authorities and pays royalties to the local communities

Key Potential Negative Impacts and Recommended Mitigation Strategies

Table 1 Summary of Potential Negative Impacts & mitigation.

Possible Impacts	Recommended Mitigation Measures
Exploratory Drilling	
Potential influx of population may lead to increased natural resource use	• Provide adequate and appropriate sanitary facilities • Ensure water meter points are metered to ensure monitored and prudent water use • Sensitize workers on sexually transmitted diseases especially STIs and HIV/AIDS
Removal of vegetation (bush clearing and removal of grass cover) during line cutting is a significant cause of soil erosion and possible habitat destruction for local species of birds, mammals and reptiles.	• Minimize line width • Re-vegetation of disturbed areas with native plant species • Use of human labor as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion • Undertake selective clearance by clearing demarcated areas for exploration • Give the community priority on use of the removed vegetation for construction or other purpose. • Create buffer zones with vegetation
During trenching and pitting, there will be creation of land scars	• Infill after sampling, mapping. • Undertake re-vegetation with native plant species
Noise and vibration during drilling	• Noise generating activity will be strictly limited to daytime i.e. between 8.00 am to 5:00pm. • Posting notices at the sites to inform people of noisy activities. • The proponent to regularly conduct noise assessment studies and keep records. • Use of hearing protection devices e.g. ear mufflers by the employees • Inform neighborhood of any abnormal noise generating activities to minimize disruption to local residents. • The proponent shall comply with the Environmental Management and Co-ordination (Noise and Excessive vibration pollution Control) Regulations of 2009 where the maximum permitted noise level is 114dB (A) for mining and quarries. • No noise generation activity at night without noise license.
Soil and water contamination by oil spills and drilling wastes	• Plan emergency response measures in case of accidental oil spills; • Proper maintenance of construction equipment shall be done only on designated purpose-built surfaces to avoid contamination of soil; • All spills should be disposed appropriately and the site shall be fully cleaned before handing over
Solid waste management	• The exploration manager to ensure that the workers dispose any remaining solid waste such as metals, paper, plastics, etc. away from the site at an approved disposal site • Provide bins for separate collection of wastes into appropriate sorts such as recyclable and nonrecyclable. These bins should be labeled.

	• Use designated areas for repair and maintenance of vehicles and powered machinery to avoid fuel and lubricant spillage on site • Put in place an efficient, regular and appropriate waste collection and disposal scheme that will prevent the accumulation of wastes at collection areas. • Where possible material considered as waste may be re-used or recycled or be given to who may consider them useful for others uses. • Maintain and repair equipment rather than replacing it to reduce waste
Occupational Safety & Health Concerns	• An Environment, Safety & Health Officer to be contracted as the in charge of Environmental safety & health issues at the drilling site(s). • Secure the drilling site(s) with appropriate fencing for protection; provision of privacy; reduction of cases of trespass and theft; and for control of entry by straying animals and therefore avoid conflicts between people at the site and neighboring community. • Post notices informing the public of activities at the site and the need to be aware of potentially dangerous plant/machinery and spots at the site including open pits. • Provide hazard notifications, signage and warnings to warn the persons of potential consequences of their actions. • Supervise all specialty works at the site. • Remove all soil, boulders and other heavy materials from the edges of the pit. • Keep all passages clear at all times. • Provide appropriate PPE including masks, goggles, boots and overalls among other protective clothing as spelt out under section 101 (1) of OSHA, 2007 to all workers and sensitize them to use the same whenever they are in environments that warrant the use of such PPE especially in all situations where the body and skin are potentially exposed to hazards such as chemicals, harmful dusts, highly infectious wastes, sharp objects, burns and extreme temperature and/or when working in areas that present threatening experiences. • Have fully equipped First Aid Kits at the site at all times • Adopt proper working procedures and when working with machines and equipment. • Ensure that trained first aid personnel are available on site at all times to handle emergencies. • Put in place an appropriate emergency response plan including having emergency contacts (such as ambulance, fire tender and police) conspicuously displayed. • Control waterborne diseases by ensuring sanitation at the site as outlined in this report and by regularly conducting chemical and bacteriological quality testing of the water to ascertain its suitability for consumption and treating water before drinking using approved home-based water treatment methods such as filtration using life-straw, boiling and use of chemicals such as water guard. • Ensure presence of suitable and adequate sanitary facilities by adding pit latrines or outdoor toilets that can be emptied.

	• Always keep sanitary facilities and waste disposal facilities clean. • Frequently undertake workers through refresher trainings and hold tool-box talks in order to make them have a basic understanding of the tasks under them, the hazards involved, and how to manage them.

Possible Impacts	Recommended Mitigation Measures
Open Cast Mining	
Surface clearing, rock breaking and hauling causing terrestrial habitat alteration and soil erosion	• Re-vegetation of disturbed areas with native plant species • Use of human labor as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion • Undertake selective clearance by clearing demarcated areas for exploration • Give the community priority on use of the removed vegetation for construction or other purpose. • Create buffer zones with vegetation
Excavation causing loosening of soil which is prone to both water and wind erosion	• Soil excavated from the project area to be used for back filling in other mining areas within the precincts of Kilimapesa Gold areas of operation and should not be left exposed to wind or water for long periods. • The project shall pursue the zero-waste policy on the management of excavated soils and debris. • The valuable top soil containing organic material, nutrients as well as seeds and the soil fauna should be excavated separately and piled in an appropriate manner for re-use.
Compaction by moment of vehicles, plant, machinery and persons has the undesired effect of hindering air and water penetration beneath the soil surface	• Properly demarcate the project area and associated activities are restricted to the demarcated area • Re-establish vegetation in disturbed areas • Rip-off areas where compaction will have adversely affected to allow aeration of soil and ease infiltration of water into the soil. • Use excess soil especially the tailings in filling road potholes or hollow areas at the site among many other uses.
Noise and vibration during blasting	• Noise generating activity will be strictly limited to daytime i.e. between 8.00 am to 5:00pm. • Posting notices at the sites to inform people of noisy activities. • The proponent to regularly conduct noise assessment studies and keep records. • Use of hearing protection devices e.g. ear mufflers by the employees • Inform neighborhood of any abnormal noise generating activities to minimize disruption to local residents. • The proponent shall comply with the Environmental Management and Co-ordination (Noise and Excessive vibration pollution Control) Regulations of 2009 where the maximum permitted noise level is 114dB (A) for mining and quarries. • No noise generation activity at night without noise license. • Sensitize truck drivers and plant operators to switch off engines while offloading materials;

	• Avoid idling vehicle engines or hooting especially when passing through sensitive areas such as churches, residential areas and hospitals;
Air pollution	• Wet/mist all active construction areas as and when necessary to lay dust; • Speed limit within of proponent vehicles should be limited to 10kph to avoid generation of dust • Ensure regular inspection and maintenance of installed generators according to manufacturer's specifications. • Ensure proper handling of hazardous wastes associated with maintenance;
Acid mine drainage (surface and underground water contamination due to acidity and dissolved metal content)	• Ensure work areas involving storage , handling and manipulation of chemicals are at a predesigned work area which has an impermeable base and which does not drain as surface runoff or into underground water sources, streams or rivers • Provide accidental spill containment kits for the provided chemicals and instruct workers on safe use of the kits • Ensure all staff and workers are fully aware of the limits to the site for each activity, Standard Operating Procedures, and emergency procedures; • Any contaminated soil should be handled properly as hazardous waste and removed form site for safe disposal;

6. Conclusion and Recommendations

This project report has been carried out in line with the Environmental (impact Assessment and Audit) Regulation, 2003. The report has assessed the impacts of the project and suggested mitigation measures. An environmental management plan that is monitor able has been co-opted into the project.

The project is expected to contribute positively to economic growth, and employment. The project will pay government revenue and inject capital, which will boost the local economy and provide employment. Overall, the EIA concludes that the proposed project is viable and will not adversely affect the environment or the local community for precautionary measures, an EMP was developed to guide the mitigation of the identified key impacts.

1.0 INTRODUCTION

1.1 Project Background

Gold is a rare element. The average concentration of gold in the Earth's crust is 0.004 g/tonne (i.e. 0.004 grams of gold in one tonne of rock). A gold deposit becomes interesting for economic exploitation with grades usually above 0.2 g/tonne. A rich deposit has gold grades above 10 g/tonne. The extraction of gold does not depend only on the gold grade but also the mineralogy of the gold (i.e., how the gold occurs in the ore), as well as on the access and infrastructure of the site. Gold mineralization occurring in hard rocks is usually associated with quartz veins that can be as thin as a few centimetres and as wide as several meters. Inside the Earth's crust, gold is dissolved in hot silica-rich fluids. When the host or wall-rock suffers a geological fracture or accommodation, room is opened up for the gold containing hot liquid or vapor to come up and penetrate into the cracks and fractures. When the fluids cool down, gold-mineralized quartz veins are formed. This happened millions to billions of years ago. In some cases, the hot fluids react with the wall rocks. In these cases, gold mineralization is not restricted to the quartz veins but can be found in the host rocks, especially when these contain dark minerals, which are more reactive. Quartz veins can be very deep and can extend for kilometres. When gold occurs disseminated throughout the host rocks, it is usually finely distributed in the minerals that form the rock

Kilimapesa Gold (Pty) Limited (KPG) is a gold mining company in Kenya wholly owned by Carcal Gold Plc. The company is based in Lolgorien Town, Trans Mara District, Narok County. It has its underground mine at Kilimapesa Hill, which is an auriferous vein mine located in the Migori Archaean Greenstone Belt in Western Kenya. The company poured its first gold bar in January 2012 making it Kenya's first gold mine to be commissioned since independence in 1963. In the year 2016, the company was licensed to construct and commission a new ore processing plant approximately 3 kilometers from Lolgorien town and a few meters from Kilimapesa Hill.

The Company has a special mining lease with the Mines and Geological Department for a term of twenty-one (21) years from the first day of November Two Thousand and Eleven (2011) for 81.38 hectares of land on plot/parcel L.R. No. 194. The underground mining activities are undertaken at the aforementioned parcel of land at Kilimapesa hill. The ore from Kilimapesa hill is processed at the Company's ore processing plant through a CIL process with the product being loaded/impregnated activated carbon. The plant is located approximately 500 meters from the adits and 3 Kilometers from Lolgorien Town. The activated carbon is then ferried to the elution plant which is approximately 4.81 kilometers from the ore processing plant. Here, chemical and thermal processes are used to obtain the final product which is a gold bar. The mine receives great support from the local community and the Government of Kenya.

The mine intends to expand its mining operations by undertaking exploratory drilling and open cast mining at Kilimapesa Hill. The mine intends to use a combination of Reverse Circulation (RC) Drilling, Diamond Drilling (DD), as well as Open Pit (OP) mining to complement the underground mining currently in place

The exploration exercise will involve collection of geological and geochemical data through the sampling method known as RC Drilling (Reverse Circulation Drilling) to determine the mineral potential of the area. Exploration Diamond Drilling will be used to probe the contents of the known ore deposits and potential sites. By withdrawing a small diameter core of the rock from the ore body, geologists will than analyze the core by chemical assay and conduct petrologic, structural, and mineralogical studies of the rock.

Open pit/ open cast mining method is intended to be used to obtain gold bearing ore at the near surface of Kilimapesa Hill. Open pit mining is a surface mining technique of extracting rock or minerals from the earth from an open-air pit. This form of mining differs from extractive methods that require tunneling into the earth and is used when deposits of commercially useful ore or rocks are found near the surface. It is applied to ore or rocks found at the surface because the overburden is relatively thin or the material of interest is structurally unsuitable for tunneling.

The pit will be mined up to around 10-20m vertical depth on the western side of Kilimapesa Hill. The actual depth is determined by height of excavations from underground working. On the eastern side of the pit, mining will be done up to deeper depths of about 30 to 50m as its site on virgin ground where underground mining; currently in place, has not reached.

The ore from Kilimapesa Hill will be processed at the existing Company's ore processing plant located approximately 500 meters from the Kilimapesa Hill and 3 Kilometers from Lolgorien Town. The ore will be processed using the existing CIL process which involves the product being loaded /impregnated with activated carbon. The activated carbon will be ferried to the existing elution plant which is approximately 4.81 kilometers from the ore processing plant.

1.2 Project Objectives

The primary objective of the proposed exploratory drilling and open cast mining by the proponent is income generation and return of investments for the Company's investors and shareholders. Other benefits accruing from the project are:

a) Spurring the local economy by providing employment opportunities and payment of royalties to the community
b) Putting Kilimapesa Hill into a more socio-economic use
c) Provision of income for the county and national government through tax and licenses fees

1.3 Justification for the EIA Study

The enactment of EMCA (1999) (Revised 2015) made it mandatory for projects appearing in the second schedule to undergo EIA as per their categorization. The proponent of any project specified in the Second Schedule shall undertake a full environmental impact assessment study and submit an environmental impact assessment study report to the Authority prior to being issued with any license by the Authority. Mining and open cast extraction of precious metals such as gold is listed as in the schedule as requiring submission of an Environmental Impact Assessment Study report. In line with the prevailing legal requirements envisaged in the EMCA,1999 revised (2015) and EIA/EA regulations and based on the level of, extent and the potential impacts that are likely to arise from the proposed project, there was need to carry out this EIA to identify impacts and suggest their possible mitigation measures. It's with this regard that the proponent consulted the Lead Expert alongside other relevant professionals to carry out the study and prepare this report. The EIA sought to: describe the project; inform and consult the public; identify key impacts; evaluate the key impacts; provide mitigation measures of adverse impacts; and scale-up the positive impacts; draw an environmental management plan; and monitoring the key environmental impacts.

1.4 Purpose of the EIA

In compliance with the legal requirements of EMCA, 1999, the proponent contracted a Lead Environmental Impact Assessment Expert to carry out an EIA study report for the proposed exploratory drilling and open cast mining on Kilimapesa Hill on plot L.R No. 194.

The EIA sought to identify and evaluate key impacts of the proposed project on the proposed site, the surrounding community, employees and the biophysical environment. Further, the EIA proposed mitigation measures of the adverse impacts and putting forward measures to scale up the positive impacts. Moreover, the EIA is a platform for public engagement to incorporate their potential environmental and other concerns and address them at the inception and operation stages of the project. This EIA report raised both the potentially positive and negative impacts likely to emanate from the proposed project. Integrating Sustainable Environmental Management principles in the planning and implementation processes of any proposed projects is a milestone in reducing/mitigating conflicts as well as enhancing control and revitalization of the much-degraded environment.

1.5 Objectives of the EIA

The objectives of the EIA exercise are:

a) To carry out an assessment of the state of the environment of the project site and its environs with a view to avoid environmental degradation and maintenance of the proper functioning of ecological systems.
b) To conduct stakeholder's engagement with and aim of identifying stakeholders concerns and interests as well as clarifying goals and objectives of the proposed project.
c) To identify and evaluate the significant environmental impacts of the proposed project.
d) To determine the compatibility of the proposed project activities with the local land use
e) Formulation and incorporation of Environmental Management and Monitoring Plan during project construction, operation and decommissioning phases.

1.6 Scope of the EIA

The scope of the study included the carrying out of environmental investigations in line with current legislations. This was done in line with the requirements of Environmental Management and Coordination Act (EMCA) 1999 Rev. 2015 and Environmental (Impact Assessment) and Audit Regulations 2003. The study covered the physical extent of the project site and its immediate environs, implementation works of the proposed development and other facilities required for the project to function optimally.

The exploration phase of the project will involve construction and grading of access road, line cutting, trenching and pitting as well as drilling operations (reverse circulation drilling (RC) and diamond drilling (DD)). The open cast mining operations will involve site clearance, blasting, construction of open pit, heap leaching of gold bearing ore, construction of acid mine drainage and Tailings Storage Facility.

The scope of this EIA project report can be summarized as follows:

a) Stakeholders' identification and engagement;
b) Review of relevant secondary data and field visits;
c) Desktop analysis of baseline data for the description of the project area;
d) Prediction and evaluation of potential impacts;
e) Determination of appropriate mitigation measures that can eliminate, reduce/minimise the impacts;
f) Development of an Environmental Management Plan (EMP) and environmental monitoring plan; and
g) EIA Report preparation

1.7 Terms of Reference

The scope of the assessment study covered the exploration phase of the project which will involve construction and grading of access roads, line cutting, trenching and pitting as well as drilling operations (reverse circulation drilling (RC) and diamond drilling (DD)). The open cast mining operations will involve site clearance, blasting, construction of open pit, heap leaching of gold bearing ore, construction of acid mine drainage and Tailings Storage Facility.

The output of the process was a comprehensive EIA project report for the purposes of applying for an EIA license as required by EMCA, 1999 Rev.2015 and its subsidiary legislations. The EIA project identified existing and potential positive and negative environmental impacts and the concerns and interests of the stakeholders of the proposed project site. The study also proposes conceivable and cost-effective mitigation measures for the negative impacts as stipulated in the Environmental Monitoring and Management Plan (EMP). The project assessment investigations and analysis of the anticipated environmental impacts of the proposed development in line with terms of reference stipulated in the Environmental (Impact and Audit) regulations 2003 and in particular part 2 S 7 (1).

The Lead Expert, on behalf of the proponent, conducted the study by incorporating but not limited to the following Terms of Reference (TOR): -

a) Description of the nature of the proposed project
b) The location of the project including the physical area that may be affected by the project's activities
c) The activities that shall be undertaken during the project construction, operation and decommissioning phases
d) The design of the project, the materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal
e) To review relevant legal, policy and institutional framework applicable in the implementation of the proposed project
f) Evaluation and analysis of alternatives including, the proposed project, no project alternative, project design and technology
g) To propose and recommend specific environmentally sound and affordable waste management practices
h) To identify, predict and analyze the environmental and social impacts of the project, including seeking neighbours' and public views, interests and concerns
i) Evaluation of the technology, procedures and processes to be used, in the implementation of the project
j) An action plan for prevention & management of possible accidents during the project cycle
k) An Environmental Management Plan (EMP) proposing the measures for eliminating, minimizing or mitigating adverse impact on the environment

1.8 The EIA Approach and Methodology

The approach and methodology to conduct the EIA exercise and generate the EIA report included the following:

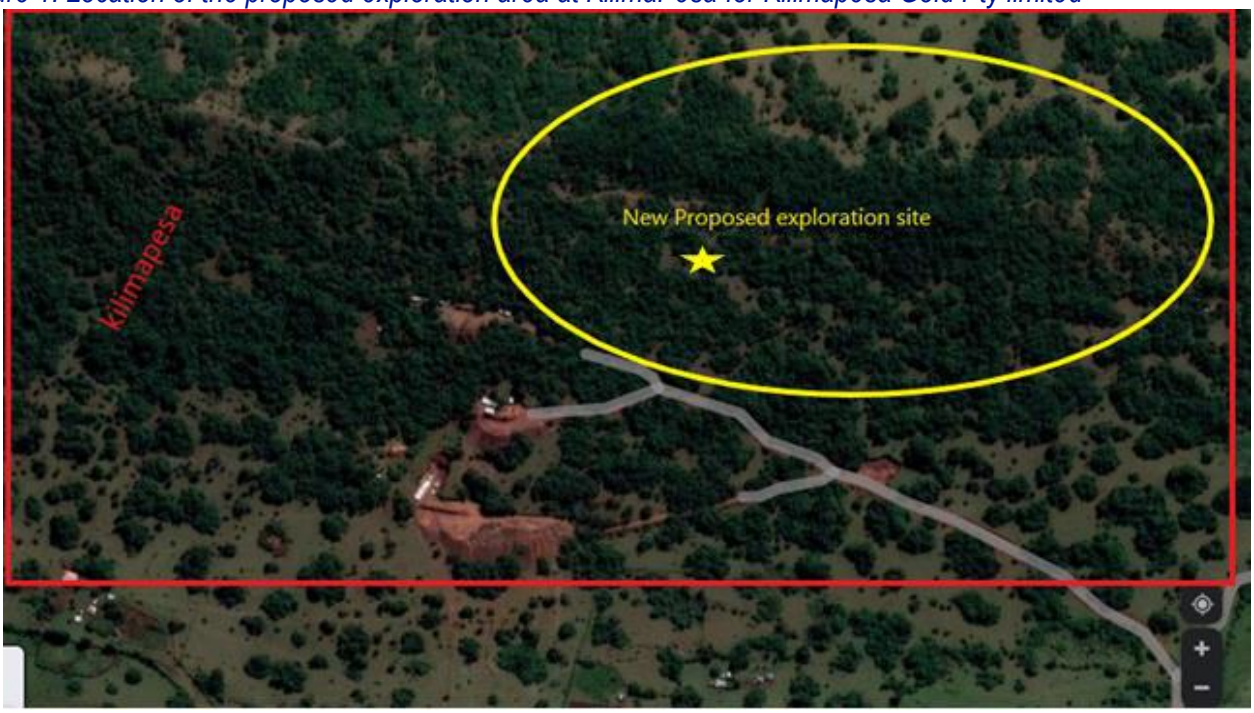
a) Preliminary Assessment
b) Environmental Screening
c) Environmental Scoping
d) Data Collection
e) Consultation and Public Participation
f) Data Analysis and Evaluation of Alternative

2.0 PROJECT DESCRRPTION

2.1 Project Location

The proposed project is located at Kilimapesa Hill near Lolgorien town, Trans Mara District, Narok County. Geographically, the site is located on 1°13'21.0"S 34°46'20.7"E (-1.2224935, 34.7724184) on Transmara/Moyoi/Parcel 1236, Kilimapesa Hill, Lolgorian within Narok County approximately 230km west of Nairobi and 20km north of Tanzanian border.

Figure 1: Location of the proposed exploration area at KilimaPesa for Kilimapesa Gold Pty limited



Map 1: Location of the proposed exploration area at KilimaPesa for Kilimapesa Gold Pty limited (Source: Google Maps)

2.2 Site Ownership

The Company has entered into a lease agreement dated 1st June 2017 between itself and Moyoi Group Ranch (the lessor); a group incorporated under Section 7 of the land (Group Representatives) Act, 287 Laws of Kenya (now repealed) for a portion of property title Number Transmara/Moyoi/Parcel 1236, Kilimapesa Hill, Lolgorian. The lease is granted for fifteen (15) years for a portion of 80.65 hectares.

2.3 The Proponent

Kilimapesa Gold (Pty) Limited is a gold mining company in Kenya wholly owned by Carcal Gold Plc. The company mining activities are based at Lolgorien Town, Trans Mara District, Narok County.

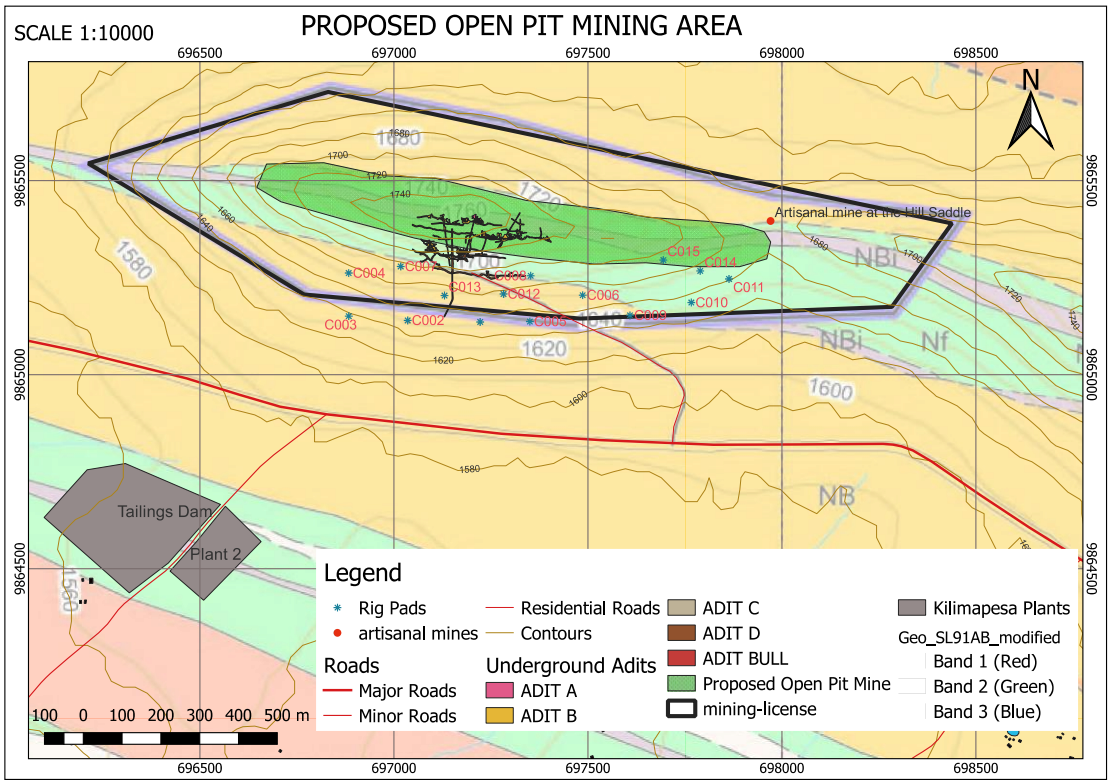
The proponent was issued with a Special Mining License 27 by the Mines and Geological Department for a term of twenty-one (21) years from 11th November 2011 for full and exclusive right to explore, develop and mine Gold resources at Kilimapesa Hill, an area of approximately 81.38 hectares of land. Kilimapesa Hill is an auriferous vein mine located in the Migori Archaean Greenstone Belt in Western Kenya. The company poured its first gold bar in January 2012 making it Kenya's first gold mine to be commissioned since independence in 1963. In the year 2016, the company was licensed to construct and commission a new ore processing plant approximately 3 kilometers from Lolgorien town and a few meters from Kilimapesa Hill.

The proponent is currently undertaking underground mining activities with the Ore from Kilimapesa Hill is processed at an existing Ore processing plant and Elution plant located near Lolgorien town.

2.4 Nature of the Project

Kilimapesa Gold (Pty) Limited through its special mining license intends to carry out further gold exploration and gold extraction on the surface of Kilimapesa Hill. The proponent intended to use combination of Reverse Circulation (RC) Drilling, Diamond Drilling (DD), as well as Open Pit (OP) mining to complement the underground mining currently in place. Figure 2.2 Shows the Special Mining lease area

Figure 2: Kilimapesa Gold (Pty) Limited Special mining license area



1) EXPLORATION

a) Reverse Circulation (RC Drilling)

The exploration exercise involves the collection of geological and geochemical data through the sampling method known as RC Drilling (Reverse Circulation Drilling) to determine the mineral potential of the area. The RC drilling will be performed to a maximum depth of 120 meters. The holes will be cored between 60 degrees and 90 degrees. where necessitated by the ground profiles, PVC casing will be used. The drilling will be carried out using the most suitable equipment's, tools and consumables supported by well qualified and properly trained personnel. The personnel will comprise of the head driller, his assistance, the sampler, data logger and junior assistance.

The drilling operations will be conducted in a manner that will provide the highest possible sample recovery and the depth of each hole will be determined during the drilling operations. Samples obtained from the RC Drilling will be analyzed so as to define the physical limits of the ore body and permit a more reliable estimate of economic value of the gold deposit. The finding will dictate the method to be used to reach the ore body, the extent of the development work, and the best method of exploration.

The method chosen for mining will depend on how maximum yield may be obtained under existing conditions at minimum cost, with the least danger to the mining personnel and the environment.

b) Diamond Drilling (DD)

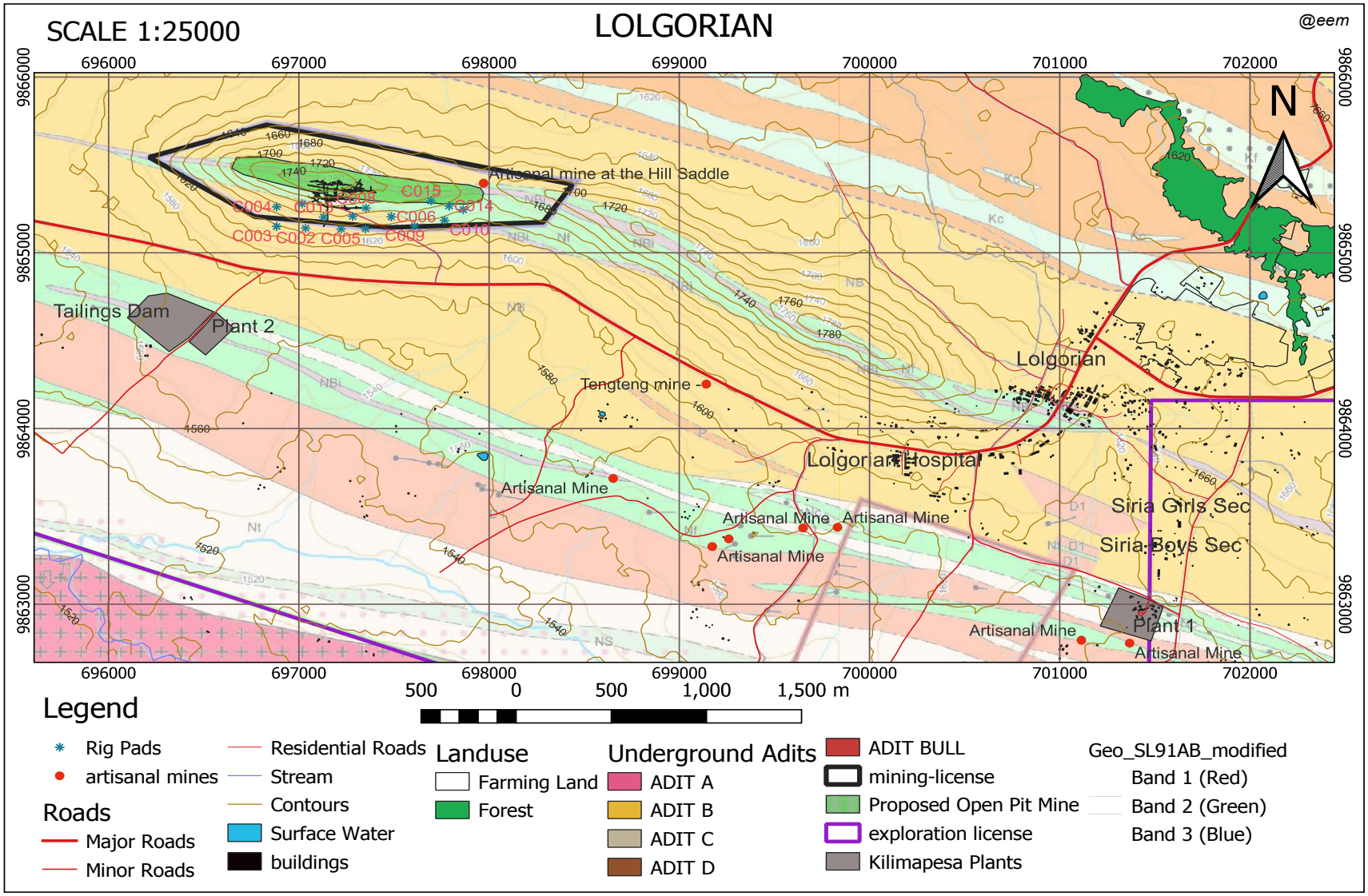
Exploration Diamond Drilling will be used to probe the contents known ore deposits and potential sites. By withdrawing a small diameter core of the rock from the ore body, geologists will than analyze the core by chemical assay and conduct petrologic, structural, and mineralogical studies of the rock.

2) OPEN PIT MINING

The pit will be mined up to around 10-20m vertical depth on the western side of Kilimapesa Hill. The actual depth is determined by height of excavations from underground working. On the eastern side of the pit, mining will be done up to deeper depths of about 30 to 50m as its site on virgin ground where underground mining has not reached.

No blasting will be done during OP mining. Ore will be loaded into trucks and delivered at the existing Company's Ore Processing Plant located approximately 500 meters from the Kilimapesa Hill and 3 Kilometers from Lolgorian Town. The ore will be processed using the existing CIL process which involves the product being loaded /impregnated with activated carbon. The activated carbon will be ferried to the existing elution plant which is approximately 4.81 kilometers from the ore processing plant

Figure 3: Proposed Project siting Area



3.0 BASELINE INFORMATION OF THE PROPOSED AREA

3.1 Physical Environment

3.1.1 Topography

The topography of Trans Mara West Sub-County comprises of two major categories, the highlands which lie between 2200 and 2500m above the sea level and the plateau which rise from 1500 to 2200m above the sea level. The highlands consist of the Osupuko, Kapune, Meguara and Shankoe Hills in Pirrar and Kilgoris Ward and Keiyan and Nkararu Hills in Keiyan Ward. The plateau covers the eastern part in Kiridoni Ward, and the southern part in Lolgorian Ward. Parts of Maasai Mara, Murgan, Soit in Kirindoni Ward, Masurura in Keiyan ward, Kerinkan, Olopikidogoe, Angata Barikoi and Lolgorian Ward also form part of the plateau. The terrain both on the highlands and on the plateau, permit agricultural and livestock activities. Crop production is concentrated on the highlands while livestock development takes place on the lower grounds on the plateau.

3.1.2 Climate

Lolgorien has a tropical climate. Winters bring with them more rainfall than in summer. The area is classified as Aw using the Köppen-Geiger climate classification. Lolgorien and the areas surrounding Kilimapesa receive an average annual temperature of 20.0 °C and annual rainfall of 1266 mm.
April records the highest relative humidity at 73.69 % while October records the lowest relative humidity at 56.49 %.
The driest month is July with an average of 27 mm of rainfall. With an average of 177 mm, the most precipitation falls in November.

Table 2: Climatic conditions for Kilimapesa Lolgorian

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	19.8 °C (67.6) °F	20.9 °C (69.6) °F	20.7 °C (69.2) °F	19.9 °C (67.8) °F	19.7 °C (67.5) °F	19.5 °C (67.1) °F	19.5 °C (67.1) °F	19.9 °C (67.8) °F	20.5 °C (68.8) °F	21 °C (69.7) °F	19.8 °C (67.6) °F	19.5 °C (67) °F
Min. Temperature °C (°F)	14.5 °C (58.2) °F	15 °C (59) °F	15.3 °C (59.5) °F	15.4 °C (59.8) °F	15.1 °C (59.2) °F	14.5 °C (58.1) °F	14.1 °C (57.4) °F	14.5 °C (58.1) °F	15 °C (58.9) °F	15.5 °C (60) °F	15.1 °C (59.1) °F	14.7 °C (58.5) °F
Max. Temperature °C (°F)	25.7 °C (78.3) °F	27.2 °C (81) °F	26.8 °C (80.2) °F	25.5 °C (77.9) °F	25.1 °C (77.3) °F	24.8 °C (76.7) °F	25.2 °C (77.3) °F	25.7 °C (78.2) °F	26.6 °C (79.8) °F	27.3 °C (81.1) °F	25.6 °C (78.2) °F	25 °C (77.1) °F
Precipitation / Rainfall mm (in)	133 (5)	98 (3)	142 (5)	173 (6)	103 (4)	49 (1)	27 (1)	46 (1)	52 (2)	90 (3)	177 (6)	176 (6)
Humidity (%)	71%	61%	66%	74%	70%	64%	58%	58%	57%	56%	70%	73%
Rainy days (d)	13	10	13	14	11	6	4	6	6	8	13	15
avg. Sun hours (hours)	9.4	10.0	9.4	9.0	9.4	9.6	9.8	9.8	10.0	10.1	9.2	9.0

Source : https://en.climate-data.org/africa/kenya/narok/lolgorien-103941/

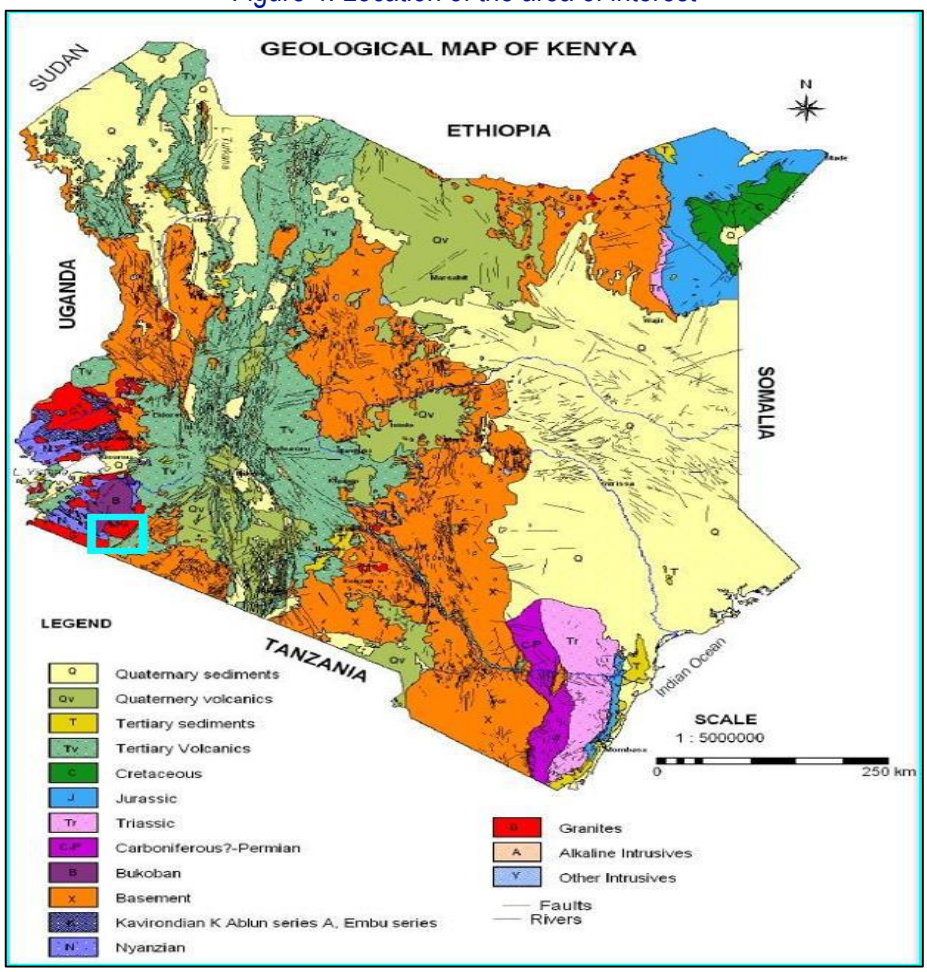
The driest month is July with an average of 27 mm of rainfall. With an average of 177 mm, the most precipitation falls in November.
The warmest month of the year is October, with an average temperature of 21.0 °C. December has the lowest average temperature of the year recording an average low of 19.5°C.

The difference in precipitation between the driest month and the wettest month is 150 mm. During the year, the average temperatures vary by 1.5 °C.

3.2 Geology

Geology overview

Figure 4: Location of the area of interest



3.2.1 Regional Geology

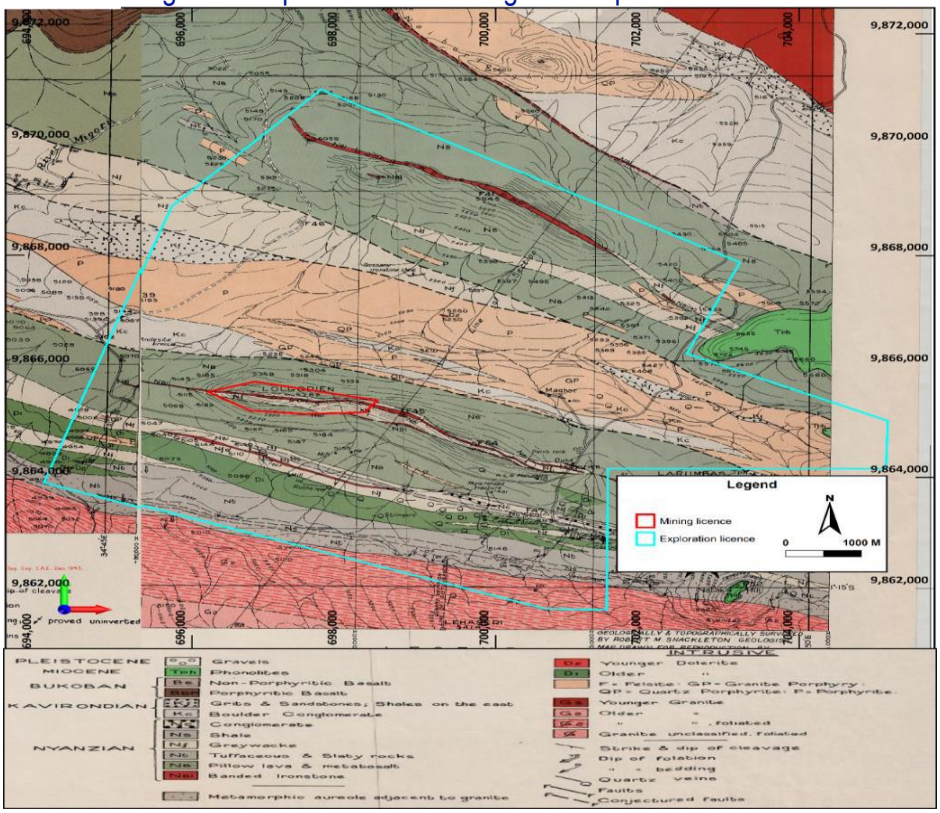
The tenements (Fig.4) cover a small section of in the WNW-ESE Archaean Migori Greenstone Belt of Western Kenya, which is dominated by rhyolites, andesites, basalts and minor banded ironstones, tuffs and agglomerates. The Migori Greenstone Belt is an extension of the granite-greenstone terrain of the Tanzanian Craton (Lake Victoria Gold Fields) which straddles NW Tanzania, W Kenya and SE Uganda. The Migori Greenstone Belt extends from Lake Victoria to the West to the Olololoo Escarpment to East, where it disappears under recent phonolite lava flows. It is separated from the Southern Mara Greenstone Belt (Tanzania), which hosts the 4.0 Moz North Mara Mine, by the extensive undifferentiated Migori Granite and from the northern Kakamega Greenstone Belt by the north east trending Winam or Nyanza Trough (a failed arm of the East African Rift System). The Migori Greenstone Belt is responsible for a large part of Kenya's gold production. A large part of the production comes from the Migori area, both from quartz veins (Masara) and from remaining gossans at the Macalder Mine, which produced 950 kg of gold between 1936 and 1966. This mine represents the only significant

gold-bearing massive sulphide deposit on the Tanzanian Craton. Gold mineralization occurs along a WNW trending complex of anatomising shear zones with orientations that roughly parallel the strike of the belt. The Lolgorien area occurs in a zone of anomalously high strain, where the NW trending shears converge with the Migori Granite contact and then trend WNW. The Migori Greenstone Belt is intruded by syn- to post-tectonic granites.

3.2.2 Tenements Geology

The tenements (Fig.5) cover the eastern end of the Migori Greenstone Belt. The southern portion of PL189 is underlain by the extensive undifferentiated leucocratic Migori granite. To the north of the granite edge, the greenstone volcano-sedimentary package consists of calc-alkaline volcanics, basalts, tuffs, shale, greywacke and Banded Iron Formation (BIF) having undergone very low-grade metamorphism. This sequence, younging to the north, has a regional strike of 100° and dips to the SW at ~65°. The BIF forms two parallel ridges. In the Eastern part of the license, phonolite outcrops cover the top of some hills (e.g. Alpha Ray). Structurally the Lolgorien area consists of a duplex of shear zones that form part of the regional shear zone complex, bound by WNW trending shear zones. The contact with the Migori Granite is sheared and foliated, confirming that at least some of the granite was intruded prior to, or during, the deformational phase

Figure 5: Exploration and mining license permits location



3.2.3 Hydrology

Mara River originates from the Eastern Mau forest and drains the low altitude eastern section and flows to Tanzania. The Migori river which almost bisects Transmara sub-county into two flows in a south westerly direction from south west Mau joining Gucha river in Migori County to flow and empty into Lake Victoria. There are many small streams and rivers which drain into Migori (Mogor) River. The land on both sides of Migori River is a plateau. The altitude rises from 1524 m asl along the Mara River to about 1950 masl around Kilgoris to 2073

masl. on the hill tops. Topography is gentle to flat in the plains but rather steep on some hills.The main water sources in use by both livestock and people are rivers, pans, dams and taps. During periods of severe drought, the few existing catchment pools are not in use since they dry up. This forces the pastoralists to walk long distances in search of water for their pasture.

3.2.4 Current land use of the project site and adjacent properties

The proponent has a Special Mining Lease for full and exclusive right to explore, develop and mine Gold resources in the area. The proponent is currently mining at Kilimapesa Hill Mines consisting of 5 adits (A, B, C, D and Bull), three of which are active. The adits have intersected at least 4 gold-bearing veins, 3 of which have been developed through drives, raises, and stopes. Adit mining is used to access the vein of gold ore. Production mining is done to access the ore body (gold vein) by excavation of non- valuable waste rock.

Figure 6: Adits B, Bull and D on Kilimapesa Hill mine

-1.2224935,

34.7724184

3.3 Biological Environment

3.3.1 Flora

The county has an estimated 724Km2 of gazetted forest, 930 Km2 of non gazetted forest and 480 Km2 of county council trust forest. The total area under forest cover represents 11.9 per cent of the total county surface area. In addition, Maasai Mara game reserve covers approximately 1,510 Km2. Of this area 1,000 Km2 is in Narok South sub county while 510 Km2 of game reserve is in Transmara West sub county and is famously referred to as Mara Triangle. The vegetation cover of these forests is mainly natural trees in the highland areas and shrubs and grasslands in the lowlands.

Forests in the Transmara west are important wildlife sanctuaries and form a crucial dispersal zone for the Maasai Mara National Reserve. The Maasai traditional land use pattern allowed maintenance of rangeland production potential and was compatible with wildlife use of the area. Compatibility of land use with wildlife is particularly important in the eastern portion of Transmara because it borders the Maasai Mara National Reserve and has historically been an important dry season forage source for wildlife during drought in the Serengeti.

Unfortunately, Transmara has experienced unprecedented shift in pastoralism as the major form of land use to crop production. Unlike in the past when most of the cultivation was by non-Maasai cultivators, most Maasai have now ventured into small as well as large scale farming. Land renting to farmers from outside Transmara on a short-term basis (usually one year) is also very common. There are several underlying reasons for the apparent "rush" in forest clearing. Two obvious ones are:

- The inevitable shift by the Maasai (especially the elite group) from a predominantly pastoral lifestyle to a cash-oriented economy and land is seen as the resource that has hitherto remained
- The ongoing land unexploited and should now be fully tapped to achieve this demarcation process where land owned by group ranches is being subdivided among the members. In most cases, this has not been without controversy and forest clearing by individuals is often one way of legitimizing ownership.Flora along the proposed project footprintVegetation within the proposed site consisted shrubs intermittent with trees and grass cover.

3.3.2 Fauna

There are about 95 species of mammals, amphibians and reptiles and over 420 bird species recorded in the Maasai Mara game reserve. The main wild animals in the park are the big five (buffalo, elephant, leopard, lion, and rhino). Other game include Wildebeests, Hippopotamus, Cheetah, Impala, Topi, Coke's hartebeest, giraffe, Roan antelope, Zebras, Spotted hyenas, waterbucks, Thompson's and Grants gazelles. The main birdlife includes the vulture, marabou stork, secretary bird, hornbill, crowned crane, ostrich, long crested eagle, and pygmy falcon. Nowhere in Africa is wildlife more abundant than in Maasai Mara Game Reserve.

Maasais are pastoralists who keep domestic animals such as cows, sheep, and donkeys. The project area is in close proximity (about 30km) to the Mara (triangle) game reserve. The wild animals freely roam into the human settlements where they interact with the domestic animals. During the field study we observed zebras freely feeding together with the cows and sheep. Although we did not observe this, it was reported that other wild animals like elephants, and giraffes frequently crossed the human settlements.

The project area in Lolgorian is however about 10km (direct distance) from the boundary of the Maasai Mara Game Reserve to the south east. It is thus not expected to directly interact with the protected area

3.4 Demographic Patterns

3.4.1 Land Area and Administration

Narok County is divided into four administrative Sub-Counties. The sub- counties are further sub divided into 16 divisions, 92 locations and 182 sub locations. According to the records from the County Commissioner's Office, the County had 169,220 households in the year 2013. The county has six constituencies namely; Kilgoris, Emurua Dikirr, Narok North, Narok East, Narok South and Narok West; and 30 electoral wards.The project area lies in Transmara West sub-county within Kilgoris central

Table 3: Sub-Counties and Area in Km2

No.	Constituencies	Areas in Kilometers
1	Transmara West	2,526
2	Transmara East	320.5
3	Narok South	2,603.3
4	Narok West	5,452.7
5	Narok North	2,603.3

6	Narok East	2,059.5

3.4.2 Population

Based on 2009 National Census, Narok County has a total population of 850,920 with a population density of 47 persons per square kilometre (KNBS 2009). However, the

2019 Population and Housing Census show that the population increased to 1,157,873. More than 90% of the settlement is rural with only 6.9% comprising urban population. The Masai are considered the most dominant population in the county. The distribution of population shows that the county has a relatively young population at 53% below the age of 14 years. The county has a greater population growth rate than the national figure standing at 3.9 % compared to the national figure of 2.2%. The population of Lolgorian town had a total population of 2,689 people (2009 census) which currently stands at 6,053 as per the 2019 census.

3.4.3 Ethnic groups

There is a unique characteristic in the settlement patterns, where majority of the urban population in Kilgoris town are from areas outside Narok County, i.e. the Kikuyu, Kalenjin, Luo, Gusii and the Kuria communities from the neighbouring Bomet, Nakuru, Migori and Kisii counties. These are mostly traders, farmers or professionals. Most ethnic Maasai live in the rural areas and only travel to the urban areas for business, administrative issues or social events.

3.4.4 Education

Narok county has a pupil teacher ratio of 33:1 and 496 primary schools with an enrolment of 175,409 pupils with 83% boys' and 73% girls' enrolment rates. The county has 61 secondary schools and a total enrolment of 13,852 students with a 20% and 15% boys' and girls' enrolment rate respectively. The affiliated youth polytechnics are a total of 8 and only one University College (Maasai Mara). In Kilgoris constituency (Lolgorian fall under), there are 274 pre-schools, 154 primaries, 23 Secondary, 6 polytechnics and 3 tertiary colleges.

3.4.5 Health

The county has one of the highest doctor-population ratios in the country at 1:100,953 as well as an equally high mortality rate of 60 per 1000 which is above national mortality rate of 12 per 1000 births. Though these figures are true for all regions from the former Rift Valley province during the 2009 National Census, medical practitioners in the county confirm that the figures are a true reflection if not lower than the actual figures. In Kilgoris constituency, there is one district hospital (Kilgoris town), one a sub-district hospital (Lolgorian town), one mission hospital and 13 health centres.

3.4.6 Agriculture

Agriculture is largely practiced in the areas surrounding the town and is the main economic activity. This sector is comprised of crop and livestock production. Livestock rearing is dominant in the lowlands with Zebu being the main breed of cow reared; grade cows are more prominent in the highland areas adjacent to the town. There are two milk processing Plants with KCC being the major one. This is indicative of the milk production capacity within the area. There has been sub-division of land into uneconomic units in some parts of the county while some large-scale farms remain unutilized.

Other main crops grown in the county are maize, beans, Irish potatoes and horticultural crops. These crops are grown under rain fed, micro-sprinklers and drip irrigation. Maize and wheat are the highest income earning cash crops in the county.The project area that lies within the rural area is dominated by the pastoral Maasai community

and livestock including cows, goats and sheep being herded in search of pasture and water are common sighting in the area.

3.4.7 Trading

Lolgorian is an upcoming Centre currently serving as markets for farm produces but has the potential for the establishing banking and insurance services. Although charcoal burning is illegal, there was evidence of charcoal burning and transportation within the area which suggests trade in charcoal. Because of the fragmentation of land as a result of change of land tenure from group ranches to private land, there has been an increase in deforestation as people cut down trees and clear the land in order to build their houses to settle in. This has reportedly increased the charcoal burning as it is a quick and profitable way of getting rid of the felled trees.

3.4.8 Water supply and sanitation

Lolgorian town is served by water from a borehole, which is drilled within the town. The water system is mainly dispensed through water kiosks and there are few customers connected directly to the pipelines. Water is abstracted from boreholes through suction pipe, then water is lifted using pump Thereafter, it is gravitated to consumers and Water Kiosk.

3.4.9 Mining

Mining activities in Narok County include gold mining in Lolgorian and Kilimapesa in Transmara west Sub-County. Gold mining activities have been ongoing in Lolgorian since the discovery of gold deposits. Goldplat, one of the world's biggest gold companies (also listed at the London Stock Exchange) was awarded the lease to exploit the large gold deposits in the Lolgorian area. The mineral output is at 285 kilograms per year, worth about shillings 1.5 billion. Other quarry and mining activities in Narok County include sand, ballast and building stones.

3.4.10 Tourism

Masai Mara Game Reserve falls within Narok County and straddles across the Kenya– Tanzania border to the south west. Across the border into Tanzania the Game Reserve is known as Serengeti. Wildlife present in the Game Reserve include Elephants, Lions, Cheetahs, Buffaloes, Antelopes, Hyenas, Rhinos, Leopards, Wildebeest and all kind of birds among others. The Game Reserve attracts both local and international tourists visiting for recreation and sport. Maasai Mara Game Reserve and the Mara Triangle have neighbouring group ranches and conservancies. The reserves host several Hotels, tented camps, airstrips and balloon safaris. The reserve has highly contributed to the economic standards of the county through employment in the hotel industry, game ranging, revenue collection, beadwork, curio shops and cultural practices in the Manyattas among others.

3.4.11 Land tenure system in the project area

Land tenure in the area is under group ranches. This is charging over time as the land has been subdivided and allocated to private owners. The land tenure system in the project area is under both private land ownership. The land is owned by Moyoi Group Ranch which has leased the land to the proponent.

3.5 Air Quality Survey

Baseline environmental ambient air quality and noise measurements were done by NEMA approved and certified laboratory, ECOSERV Consultants Limited. The laboratory incorporated a methodology involving; identification of sampling points, on-site data collection at the sampled points, deployment of the air quality measuring equipment to the site and data analysis.

The objective of this assignment was to take baseline measurements of ambient air quality and Noise levels at the proposed site, in compliance with Air Quality regulations, 2014.

This assessment will help to obtain data that can be used to form basis for planning the control measures to eliminate or minimize air quality impacts and noise exposure to workers and general environment during the operations phase of this project.

3.5.1 Air Quality Base line Measurements

The methodology contains procedures followed, analysis and interpretation of the data gathered. The methodology outline for this exercise incorporated the following aspects:

- Identification of sampling points
- On-site data collection of the sampling points
- Deployment of the air quality measuring equipment to the site
- Downloading of data for analysis
- Analysis of the downloaded data

Equipment for Air Quality Measurement

- Multiple Gas Sensors -Crowcon Gaspro 1-5 Sensor Multi Gas detector
- Portable CO_2, NH_3 monitor-G10
- MultiRAE Lite Pumped
- CEL-712 Microdust Pro

3.5.2 Data Collection Sheet

The data collection sheet documented the location, coordinates, date and run time and any additional information of the sampling points.

Table 4: Data collection sheet for air quality sampling points

Parameter	DATE	RUN TIME (HH:MM:SS)
Carbon Monoxide	3rd September 2022	1:02:00
Carbon Dioxide	3rd September 2022	1:02:00
Nitrogen Dioxide	3rd September 2022	1:02:00
Sulphur Dioxide	3rd September 2022	1:01:00
Hydrocarbons	3rd September 2022	1:01:00
Hydrogen Sulphide	3rd September 2022	1:02:00
VOCs	3rd September 2022	1:01:00
Oxygen	3rd September 2022	1:02:00
Ammonia	3rd September 2022	1:00:00
Particulate Matter	3rd September 2022	1:01:00

Plate 1: Photographs of sampling at the site

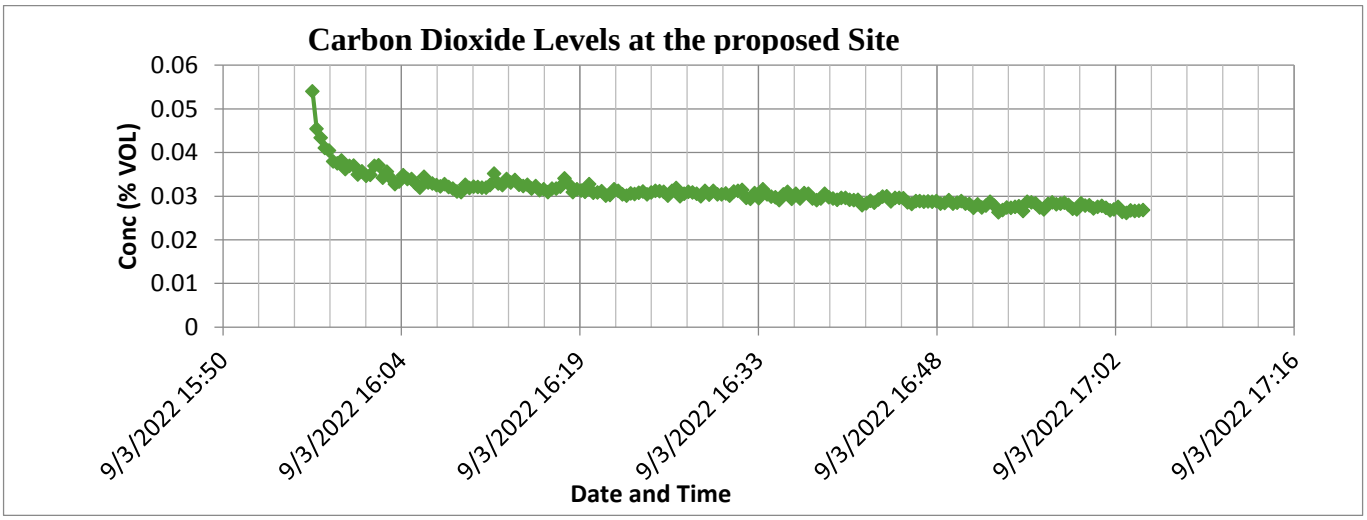
	
Particulate matter (PM_{10}) sampling	Gases sampling

3.5.3 Data analysis and discussions

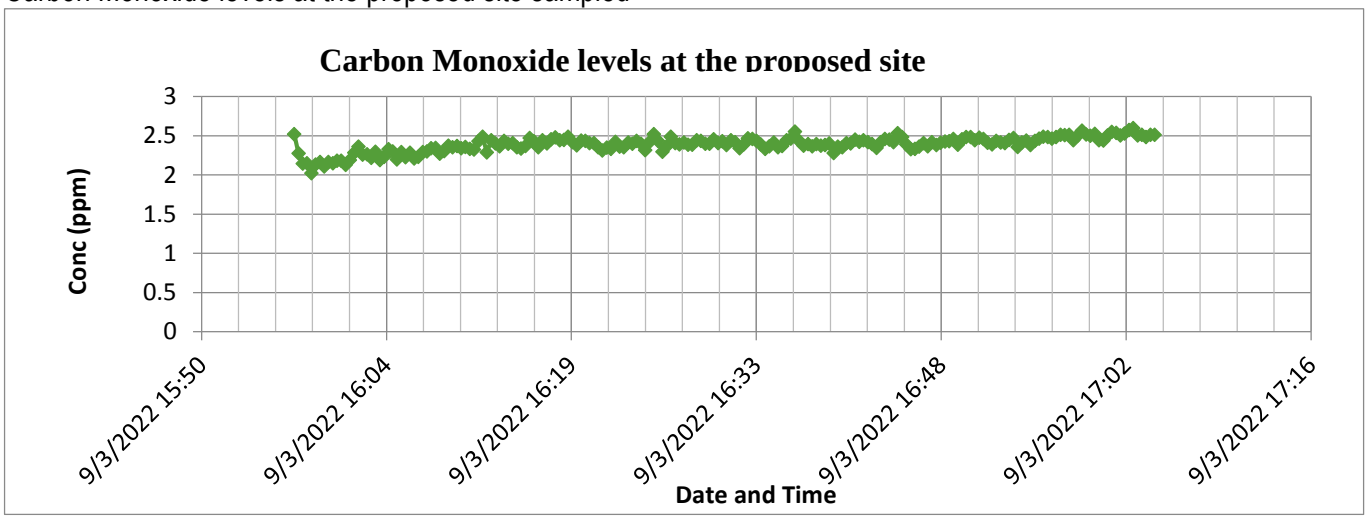
Particulate matter (PM10) and gases Results

Results from the identified sampling sites are given below

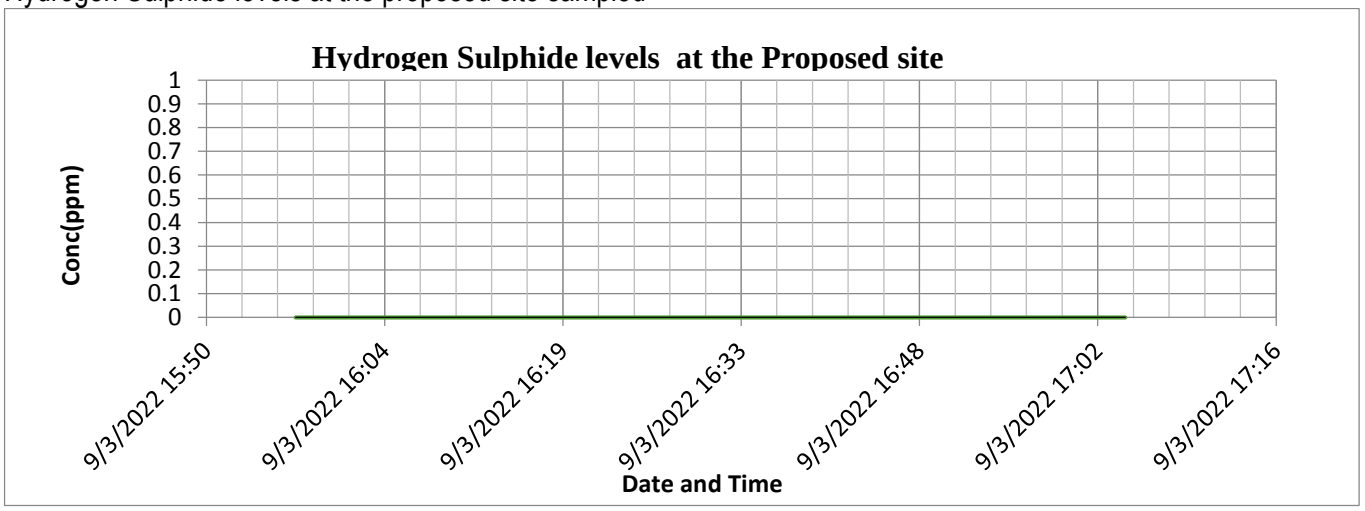
Carbon dioxide levels at the site sampled



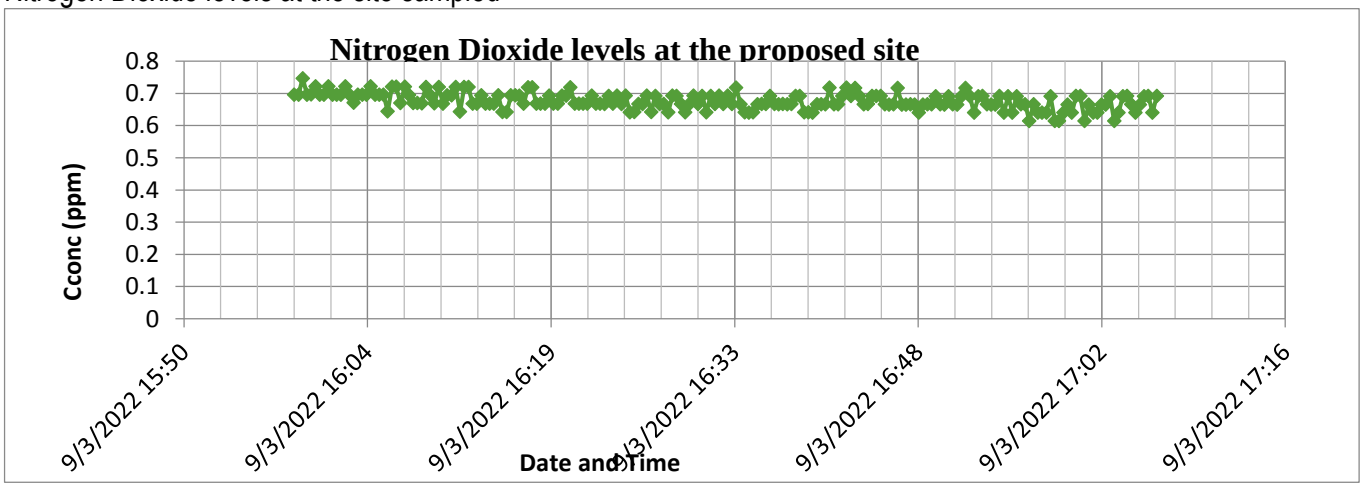
Carbon Monoxide levels at the proposed site sampled



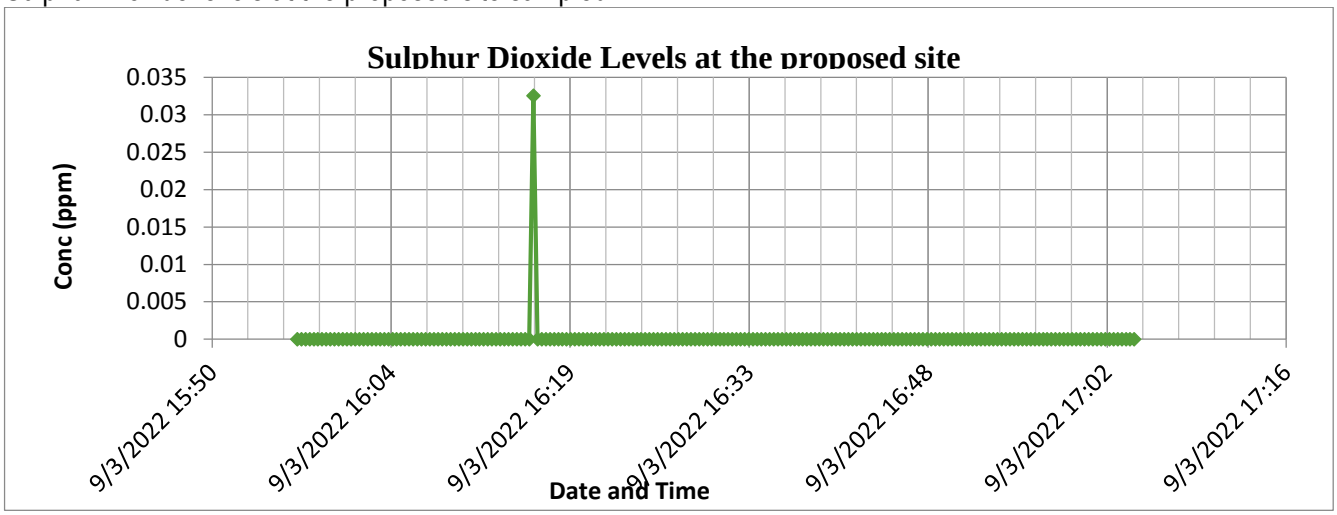
Hydrogen Sulphide levels at the proposed site sampled



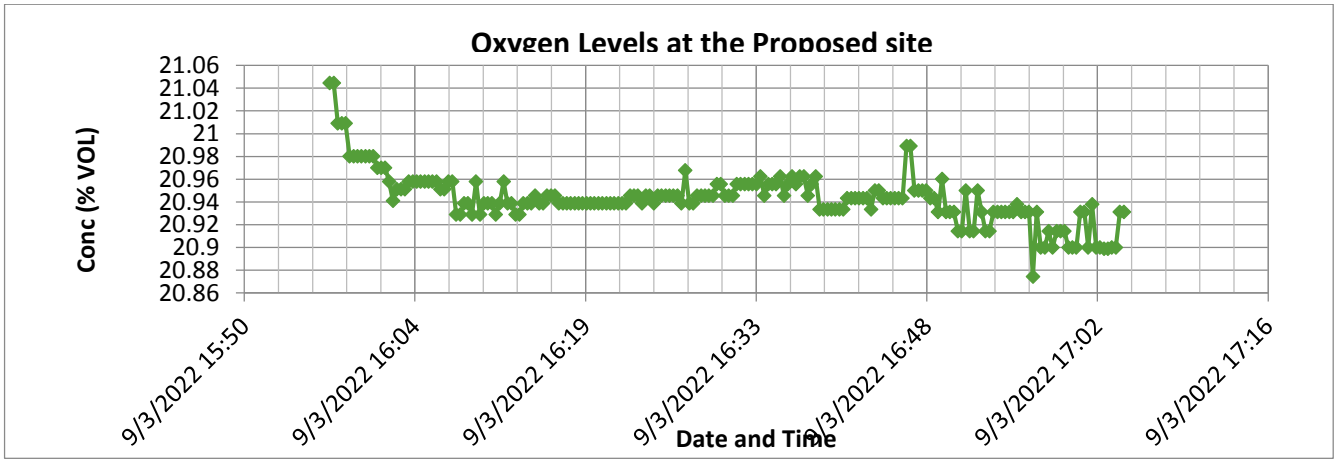
Nitrogen Dioxide levels at the site sampled



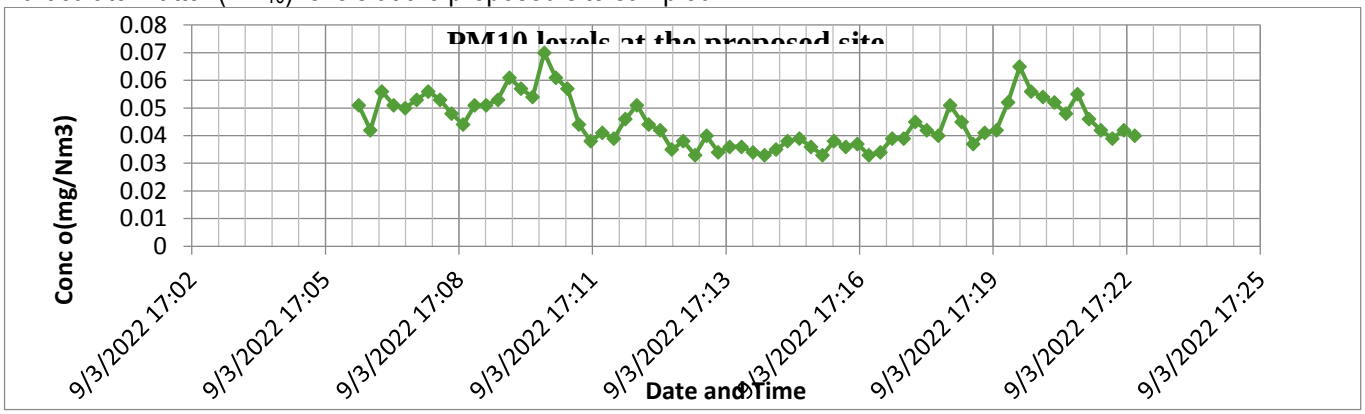
Sulphur Dioxide levels at the proposed site sampled



Oxygen levels at the proposed site sampled



Particulate Matter (PM_{10}) levels at the proposed site sampled



VOCs levels at the proposed site Sampled (Below detectable limits)

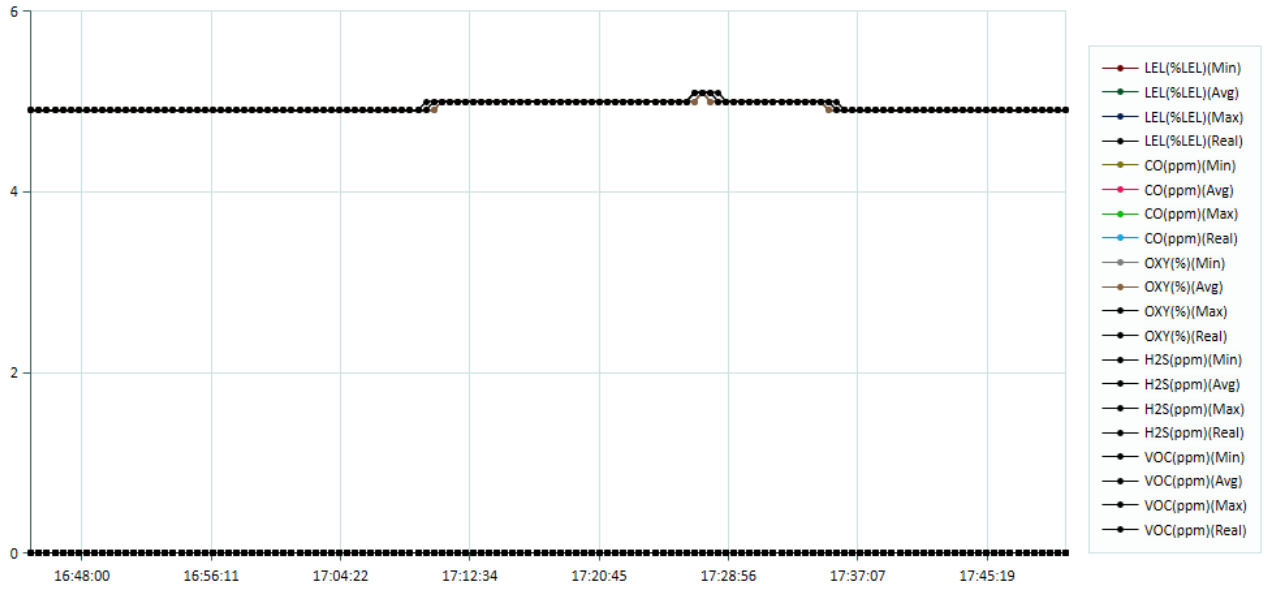


Table 5: Air quality standards

Pollutant	TLV	WHO	OSHA
PM10	10 mg/m^3	50 µg/m^3 24h mean	5 mg/m^3
CO	10 ppm	90 ppm 15 min 25 ppm 1 hr 10 ppm 8 hr	50 ppm
SO2	0.125 mg/m^3	20 µg/m^3 24 h limit 500 µ g/m^3 10 min	5 ppm
VOCs	600 ppm		5000 ppm
H2S	15 ppm Short term limit	150 µg/m^3 24 hr	
NO2		200 µg/m^3 1hr limit	5 ppm

Table 6: Air quality results

Site	Air quality parameters monitored (max recorded)										
	CO (ppm)		NO_2 (ppm)	SO_2 (ppm)	VOCs (ppm)	PM_{10} ($\mu g/m^3$)		HC (ppm)	H2S (ppm)	CO_2 (%VOL)	O_2 (%VOL)
						Average	max				
Proposed Site	2.523		0.747	0.033	BDL	45	70	BDL	BDL	0.038	20.98
NEMA limits (ambient)	8 h	1 h	24 h	24 h	24 h	24 h		INS	24 h		
	5.0mg/m3 4.3ppm	10mg/m3 8.6ppm	$100\mu g/m^3$ 0.05ppm	$125\mu g/m^3$ 0.05ppm	$600\mu g/m^3$ 600ppb	$150\mu g/m^3$		700ppb	$150\mu g/m^3$	NA	NA
NEMA Limits (property boundary)	NA	NA	$150\mu g/m^3$ (24 h)	$125\mu g/m^3$ (24 h)	NA	$70\mu g/m^3$ (24 h)		NA	$50\mu g/m^3$ (24 h)	NA	NA

Note:
NA –Not Applicable
BDL–Belowdetectionlimitofthesensor ND – test not done

3.5.4 Baseline air quality results discussions

Peakcarbon monoxide levels recorded were below the NEMA limit levels for ambient air.
Maximum and average nitrogen dioxide levels recorded during the sampling period exceeded the NEMA limits. NO_2 is formed during photochemical reactions in air, involving emissions from engines which involve combustion of fossil fuels.

The maximum and average sulphur dioxide recorded levels was below the NEMA limit level for property boundary. Sulphur oxides in ambient air are formed from combustion of fossil fuels, particularly diesel and heavier fuels. This is an area that is already forested, but nearby earthen roads that have recently been dug are the likely source of the spike of sulphur dioxide and nitrogen oxides recorded.

Hydrocarbons levels were below the detection limit of the sensors, and thus below the NEMA limit levels for property boundary. Volatile organic compounds (VOCs) recorded at the site were all below the detection limit of the sensors, and thus below the NEMA limit levels for property boundary. Hydrogen sulphide concentration levels for sites recorded were below the detection of the sensors and therefore below the NEMA.

Carbon Dioxide and oxygen levels were also recorded. NEMA does not give any limit levels for these parameters since they are not pollutants. However, the data is recorded and is a good indicator of the air during the day, and the proposed site is surrounded by trees and other vegetation, high and good levels of oxygen was recorded. Carbon dioxide is consumed; oxygen is produced during photosynthesis, demonstrating the importance of forest cover to reduce global warming since carbon dioxide is one of the greenhouse gases.

The average and peak PM_{10} levels recorded during the sampling period for the sampling site were below the NEMA limit levels. However, maximum PM_{10} levels recorded were orders of magnitude higher than the average recorded, which could be as a result of pollen from vegetation in the forest and any suspended particles from exhausts from lorries.

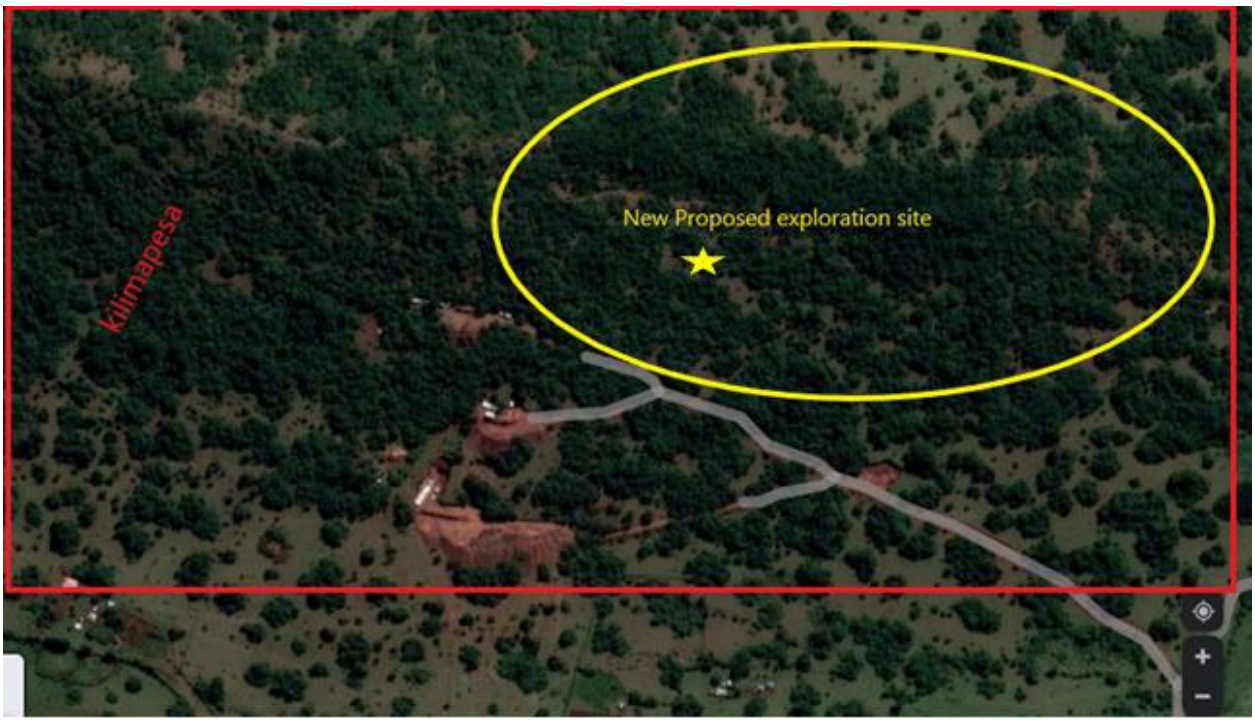
3.6 Noise Base Line Survey

Noise can be defined as unwanted or undesirable sound derived from sources such as industrial set up and operations, Mining and excavation activities, road traffic, construction works, places of Entertainment among others. Noise interferes with conversation and communication, sleep, recreation, general work performance, thought and concentration, relaxation, causes annoyance and induces hearing loss.
Related to noise is vibration, which results from the transmission of low frequency energy through the medium of ground or buildings. Vibration results in small movements of the transmitting medium, which can cause discomfort if the movements are large enough.

3.6.1 Identification of Sampling Points

The sampling point was identified after a site visit conducted by Kilimapesa Gold Pty Limited Environment and Health Department in accordance with the Environmental Management and Co - Ordination (Air Quality) Regulations), 2014 and Noise and Excessive Vibration Pollution Control Regulations, 2009 of Kenya. The Statement of requirement stipulated that actual environmental noise, continuous noise equivalent and peak sound levels be taken within the proposed site with the same points being used for air quality measurements.

Figure 7: Proposed new site for Kilimapesa Gold mining activities



Map 2: Proposed new site for Kilimapesa Gold mining activities (Source: Google map)

3.6.2 Method of Measurement

The sound level meter was set at 1 metre from ground and sample measurements were taken at the proposed new mining site. The table below shows the sampling sites, and their GPS reference together with the date of sampling.

Table 7: The proposed mining site at Kilimapesa, Lolgorian area

PROPOSED LOCATION/SITE	COORDINATES	DATA COLLECTION DATE
1. Proposed gold mining New site	1°13'13.8"S 34°46'25.2"E	3rd September 2022

3.6.3 Noise Meter Level

The equipment that was used for measuring the actual occupational noise levels in this exercise was the Casella CEL-63x Environmental & Occupational Noise Meter. This instrument uses the latest digital signal processing technology to provide a full range of functions, including integrating and real-time octave and 1/3-octave band analysis. It uses a colour screen to show a range of information, including operating menus and messages, warnings, and the results of measurements. The screen is clear and easy to read under all ambient lighting conditions, including total darkness. Measurements captured by the CEL-63x instrument conform to international standards for acoustic measurement. The measurements are saved automatically in high-capacity internal Flash memory. You can transfer the measurement results to a PC where you can manage the results and create reports by using the Casella insight data management software. Audio recording is available on all CEL-63X models. Audio notes are available on all models to allow annotation of measurements.

3.6.4 On-Site Data Collection

Onsite data collected on the acknowledged sampling point was documented on a data collection sheet. The sheet documented the location, coordinates, elevation, run, date and run time and any additional information of the sampling points. The sheet is elaborated in the table below.

Table 8: On-site data collection

Site	Run time	Co-ordinates	Date	Location
Within the proposed new mining site	01:02:41	1°13'13.8"S 34°46'25.2"E	3rd Sept 2022	Kilimapesa

Plate 2: Photographs of the selected sampling sites

Noise level measurements at the proposed site

3.6.5 Results of the Measurements

Table 9: Results Table: Noise measurement

Site	Duration	Noise levels dB(A)		
	hh:mm	LAeq	NEMA	Comments
At a point within the proposed mining area	01:02:41	54.4 dB	60	Within Limit

3.6.6 Discussion of the Baseline Noise Measurements Results

The results of the survey at the proposed site location indicate that the ambient air quality and noise levels was within the recommended limits set by Kenya Government, World Health organization (WHO) and NEMA.

RECOMMENDATIONS

1. Ensure the machinery and trucks that will be used within the site during the operations phase are well serviced and maintained and operated within the applicable levels.
2. Ensure all vehicles accessing the site are operated at the set approved speed limits that are safe, economic and environmentally sound.
3. Enclose dust generating activities and water access paths to reduce wake dust.
4. Reduce engine idle time for vehicles that will be accessing the site
5. Increase the tree cover within the areas surrounding the site
6. Ensure air quality monitoring is done within 12 months after start of operations in accordance with EMCA, 1999, and Air Quality Regulations 2014.
7. Workers in areas that may be prone to higher noise levels when activities commences should be provided with personal hearing protection equipment.
8. Employees should be provided with adequate training so that they understand the risks they may be exposed to, their duties and responsibilities
9. Another ambient air quality and noise survey should be done when the present conditions changes or after one year whichever comes first.

4.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 Introduction

According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 and Section 3 of the Environmental (Impact Assessment and Audit) Regulations 2003 (Legal No. 101), new projects require an Environmental Impact Assessment project report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual Licensing before the development commences. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

4.2 Environmental Policy Framework

Environmental Impact Assessment (EIA) is a methodology used to identify the actual and probable impacts of the projects and programmes on the environment and to recommend alternatives and mitigating measures. The assessment is required at all stages of project development with a view to ensuring environmentally sustainable development for both existing and proposed public and private sector development ventures. The National EIA regulations were issued in accordance with the provisions of Environmental Management and Coordination Act (EMCA) of 1999. The EIA Regulations must be administered, taking into cognizance provisions of EMCA 1999 and other relevant national laws. The intention is to approve and license only those projects that take into consideration all aspects of concern to the public as they impact on health and the quality of the environment.

4.3 Institutional Framework

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions include the National Environmental Council (NEC), National Environmental Management Authority (NEMA), the Forestry Department, Kenya Wildlife Services (KWS) and others. There are also local and international NGOs involved in environmental issues in the country.

4.4 Environmental Legal Framework

4.4.1 Environmental Management and Coordination Act (EMCA), 1999

Environmental Management and Co-ordination Act No. 8 of 1999, provides a legal and institutional framework for the management of the environmental related matters. It is the framework law on environment, which was enacted on the 14th of January 1999 and commenced in January 2002. Topmost in the administration of EMCA is National Environment Council (NEC), which formulates policies, set goals, and promotes environmental protection programmes. The implementing organ is National Environment Management Authority (NEMA). EMCA comprises of the parts covering all aspects of the environment.

The Second Schedule to the Act specifies the projects for which an EIA and environmental audit must be carried out. According to the Act, Section 68, all projects listed in the Second Schedule of the Act must undertake an Environmental Impact Assessment, keep accurate records and make annual reports to NEMA or as NEMA may, in writing, require. The Environmental (Impact Assessment and Audit) Regulations, 2003, provide the basis for procedures for carrying out Environmental Impact Assessments (EIAs) and Environmental Audits (EAs).

The main objectives of the Act are to:

- Provide guidelines for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya;
- Provide a framework legislation for over 70 statutes in Kenya that contain environmental provisions;
- Provide guidelines for environmental impact assessment, environmental audit and monitoring, environmental quality standards and environmental protection orders.

4.4.2 The Environmental (Impact Assessment and Audit) Regulations, 2003

The Environmental (Impact Assessment and Audit) Regulations, 2003 state in Regulation 3 that "the Regulations shall apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act".

Regulation 4(1) further states that: ''…no proponent shall implement a project:

a) likely to have a negative environmental impact;
b) or for which an environmental impact assessment is required under the Act or these Regulations;

unless an environmental impact assessment has been concluded and approved in accordance with these Regulations…''

4.4.3 Waste Management Regulations, 2006

Part II of the Waste Management Regulations 4 (1) states that no person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated receptacle. Regulation 4 (2) further states that a waste generator shall collect, segregate and dispose such waste in the manner provided for under the regulations.

4.4.4 Noise and Excessive Vibrations

Part II of the Noise and Excessive Vibrations regulations, regulation 3 (1) states that Except as otherwise provided in these Regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

Regulation 4 of the Noise and Excessive vibrations: - states that except as otherwise provided in the Regulations, no person shall-

a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or
b) cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source;

4.4.5 Water Quality Regulations, 2006

Part II of the Water Quality Regulations (1) states that every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act. Regulation 4 (2) further states 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.

Regulation 6 (b) further states that no person shall abstract ground water or carry out any activity near any lakes, rivers, streams, springs and wells that is likely to have any adverse impact on the quantity and

quality of the water, without an Environmental Impact Assessment license issued in accordance with the provisions of the Act; or (C) cultivate or undertake any development activity within a minimum of six meters and a maximum of thirty meters from the highest ever recorded flood level, on either side of a river or stream, and as may be determined by the Authority from time to time.

4.4.6 Water Act, 2002

Section 25 (1) of this Act states that a permit shall be required for any of the following purposes:

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

Part II, Section 18, of this Act provides for national monitoring and information system on water resources. Following on this, Sub-section 3 of the same Section, allows the Water Resources Management Authority (WRMA) to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept by a facility operator and the information thereof furnished to the Authority.

4.4.7 Sector Specific Legislation

The Explosives Act

It may be cited as the Explosives Act and commenced on 1st July 1931. It is an Act of parliament to consolidate and amend the law relating to the manufacture, storage, sale, transport, importation, exportation and use of explosives.

Article 7(1) No person shall keep, store or be in possession of any authorized explosive in any premises-

(a) Unless the explosive is kept for private use, and not for sale or other disposal, and in accordance with the rules; or,
(b) Unless the explosive is kept in quantities not exceeding five hundred kilograms in weight, and is stored in an isolated place approved by an inspector under conditions specified in writing by the inspector; or,
(c) Unless the explosive is kept by a person in possession of a license, as provided in Section 8 to deal in explosives, and in accordance with any conditions attached to that license or prescribed by the rules.

Article 9(1) No person shall purchase or otherwise acquire blasting materials except under the authority of, and to the extent authorized in, a written permit issued by an inspector.

Article 11(1) No person shall use, or cause, or cause to be used, any blasting materials-

a) At a depth of ten meters or more, measured from the surface along or down a shaft, adit, well or tunnel, unless he is in possession of a ore issued to him under the Mining Act, or is under the immediate supervision of the holder of such a certificate or
b) No permit shall be issued unless the issuing authority is satisfied that the applicant may be safely entrusted with the use of blasting materials, and that there is necessity for his using the same.

4.4.8 The Occupational Safety and Health Act, 2007

This is an Act of Parliament to make provision for health, safety and welfare of persons employed in factories and other places, and for matters incidental thereto and connected therewith.

Table 10: Safety Requirements for The Project

LEGAL REQUIREMENTS	DESCRIPTION
a) Registration of the workplace with (DOSHS)	• Section 44 of the Occupational Safety and Health Act, 2007 requires that before any person occupies or uses any premises as a workplace he shall apply for the registration of such premises by sending to the Director of Occupational Safety and Health Services a written notice containing the particulars set out in the Fourth Schedule of the Act. When completed, it should be sent to the Director of Occupational Safety and Health Services, Ministry of Labour, Social Security and Services
b) General Register	• This register is kept at the site office of the person undertaking the operations.
c) Notification of accidents	• The particulars of an accident causing death or disablement of a worker must be sent in the prescribed form to the Occupational Health and Safety Officer and entered in the General Register.
d) Section 65- The Occupational Safety and Health ACT, 2007	• No lifting machine shall be used in any workplace, for the first time in that workplace, unless it has been tested and all the parts and working gear of the machine have been thoroughly examined, by a person approved by the Director and a certificate of the test and examination, specifying the safe working load or loads of the machine and signed by the person who carried out the test and examination, has been obtained and is kept available for inspection:
e) Section 6(3) - the Occupational Safety and Health Act, 2007.	• Require the occupier of a workplace to carry out An Occupational Safety and Health Risk Assessment in relation to the safety and health operations of the workplace
f) Rule 36 of the Fire Risk reduction Rules, 2007 (Subsidiary to OSHA, 2007)	• Requires all workplaces to submit a fire safety audit every year which should be conducted by a registered Fire Safety Advisor
g) Section 11- The Occupational Safety and Health ACT, 2007	• Requires all workplaces to conduct and submit to the Directorate of Occupational Safety and Health (DOSHS) annual safety and health audit conducted by a registered safety and health advisor.
h) Sanitary accommodation	• Sufficient and suitable sanitary conveniences must be available for persons employed. These must be kept clean and well lit
i) Prohibition of deduction from wages	• The occupier must not make a deduction from wages in respect of anything he has to do or provide in pursuance of the Factories Act or

	permit any person in his employment to receive payment from other employees for such services

3.4.9 Public Health Act (Cap. 242)

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

Such nuisance or conditions are defined under section 118 as waste pipes, sewers, drainers or refuse pits in such state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health. Any noxious matter or waste water flowing or discharged from any premises into the public street or into the gutter or side channel or watercourse, irrigation channel, or bed not approved for discharge is also deemed as nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

- The Proponent has launched and obtained and shall apply for any other required approvals of the project development and licenses from all relevant Nairobi City County Offices.

Moreover, in the first schedule, the Act enlists the services the services that the any municipality shall provide to its residents which include but not limited to traffic control and parking, water and sanitation, refuse collection, solid waste management, pollution services among others.

5. PUBLIC PARTICIPATION AND CONSULTATION

5.1 Introduction

One of the key information sources used during the EIA exercise was the consultative public participation. Stakeholder engagement was carried out on 9th June 20222 by conducting public baraza at Daniel Saris,s Ranch and via administration of pre-designed questionnaires and by interviewing neighbours surrounding the proposed project site.

The positive and negative views regarding the project were sought from the project site neighbours. The purpose for such interviews was to identify the positive and negative impacts and subsequently promote and mitigate them respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned. The filled questionnaires and stakeholder participation list are appended.

Plate 3: Public meeting

5.2 Analysis of Public Participation

The people interviewed greatly appreciated that the proponent had given them a chance to participate in the decision-making process concerning the proposed project. Most members of the public interviewed were positive about the project. Below are some of the major positive comments from the members of the public.

5.2.1 Positive Impacts

Expected benefits of the project included:

i. Majority of the respondents alluded that the project will create employment opportunities in all the phases but more so during construction phase.
ii. Security of the surrounding area will be enhanced especially due to lighting.
iii. Increased revenue to the government
The governments at both county and national level will benefit in terms of revenue through taxes which will be levied on goods and services purchased during the project construction period. Further, licensing of the project by the county government will generate revenue to the county government.

5.2.2 Concerns from the Public

Suggested issues that the proponent should consider controlling:

a) Water Pollution
Water pollution was a major concern from the public which the proponent assured them that no water pollution will take place. The proposed project is not designed to release effluent and is therefore not a concern.

b) Disposal of waste
Some respondents indicated that project may become offensive if environmental requirements such disposal of generated waste is not adhered to.

c) Noise pollution
Few respondents observed that there will be the problem of noise pollution during the operation phase of the project which will need to be mitigated properly.

These comments can be verified from the public participation comment sheets are attached on this report.

6.0 ANALYSIS OF ALTERNATIVES

The benefits of the proposed project considered against any potential environmental cost. The general principle involved in identifying alternative option(s) to a proposed development is to ensure that the option chosen results in optimal social, environmental and capital benefits not only for the developer, but also for the environment and stakeholders in the area. This section is critical in consideration of an ideal o

The following alternative aspects were considered for the proposed project:

6.1 Alternative site for the project

This isn't an option to be considered since the proponent has an existing special mining license 027 by the Mines and Geological Department for a term of twenty-one (21) years for full and exclusive right to explore, develop and mine Gold resources at Kilimapesa Hill
The proponent Special Prospecting License PL/2018 /0189 will remain unutilized.

6.2 Different project alternative

This isn't a desired option since the project is neighbored by similar mining activities and artisanal mining is sector that create largest impact in the area Different project alternative will be out of place with the surrounding environment.

6.3 No Project alternative

This option implies that the status quo is maintained. Proponent to continue with underground mining. This option is not suitable option for the proponent as exploration has shown that commercial deposit consisting of useful ores are near the surface in some section under the special mining license. Open pit mining is the most suitable method when commercial deposit are found on the surface and has the following advantages over underground mining;

i. Higher productivity (3 – 5 times of Underground method .
ii. Lower productivity costs.
iii. More safe and hygienic working conditions for workers than underground mine
iv. More complete recovery of the mineral.

7.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The impacts that are expected to arise from the proposed project have been identified and discussed in all phases of the proposed project cycle; establishment, operational and decommissioning

7.1 Environmental Impacts During the siting Phase

During the siting and establishment phase, the main impacts will be related to removal and disturbance of flora.

7.1.1 Exploratory Drilling

i. Surface clearing, rock breaking and hauling

Some of the plants that are present at the site will be cleared in order to pave way for the exploration exercise and open pit mining. Movement of vehicles, machines and people on vegetation will result in additional damage to plants because pressure will be exerted on the plants by the heavy vehicles, machines and people and will interfere with biological processes in the plants and could also lead to death of the plants. In addition, with the removal and/or death of fauna:

- There is loss of valuable food and shelter for arthropods and other small animals whose life is depended on these plants for shelter and food leading to their eventual death and/or displacement.
- Soil erosion and siltation are aggravated.
- Habitats of some animals are altered and/or destroyed.

Mitigation

- Re-vegetation of disturbed areas with native plant species
- Use of human labor as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion
- Undertake selective clearance by clearing demarcated areas for exploration
- Give the community priority on use of the removed vegetation for construction or other purpose.
- Create buffer zones with vegetation

ii. Excavation

Excavation just like clearance of vegetation alters and/or destroys habitats of organisms. It also results into loose soil which is prone to both water and wind erosion. Eroded soil silts water bodies and can flood downstream areas. Loosening of soil interferes with soil structure. Most of the excavated soil will be utilized at the site to adjust levels where necessary. However, if excess soil is not properly disposed, it results into nuisance as a solid waste, dust and silt.

Mitigation

- Soil excavated from the project area to be used for re-filling and should not be left exposed to wind or water for long periods.
- The drilling team to avoid steep train during the transportation of material by using alternative routes
- Vegetation should be minimally disrobed during the exploration phase to reduce soil erosion

iii. Compaction

As vehicles, machines and people move on ground, soil is compacted. Compaction has the undesired effect of hindering air and water penetration beneath the soil surface and thus limiting aerobic processes

of soil-dwelling organisms which lowers soil productivity. When water penetration into the soil is interfered with, surface run-off during the rains is enhanced resulting in soil erosion and siltation. Compaction become significant if land used for cultivation is used for movement of vehicles. From the assessment, no agricultural pieces of land are used as access roads.

Mitigation

- Properly demarcate the project area and associated activities are restricted to the demarcated area
- Re-establish vegetation in disturbed areas
- Rip-off areas where compaction will have adversely affected to allow aeration of soil and ease infiltration of water into the soil.
- Use excess soil especially the tailings in filling road potholes or hollow areas at the site among many other uses.

7.1.2 Extraction and/or usage of materials

The proposed project will require significant amounts of materials, fuel will be consumed indirectly through machines. The overall environmental impacts become significant if the amounts required are so large. Many construction materials are components of natural resources and their extraction has an effect of depleting land resources alongside subsequent off-site degradation of the environment.

Mitigation

- The project and material requirements will be evaluated and quantified to ensure that the design optimizes the use of materials.
- Proper planning of transportation of materials will ensure that products of fossil fuels (diesel and petrol) are not excessively consumed.

7.1.3 Safety During Exploration Activities and Open pit mining

Approved and licensed specialists will be contracted to be in charge of specialized operations at the project area. These specialists shall put the following in place in order to ensure safety at the site:

- Supervise all specialty works at the site.
- Adopt proper working procedures when handling tasks and when working with machines and equipment.
- Keep all passages clear at all times.
- All workers must wear appropriate PPE.
- Put in place an appropriate emergency response plan including having emergency telephone numbers (such as ambulance, fire tender and police) properly displayed at places where everybody at the site can see them.
- Support all structures under construction.
- Remove all soil, boulders and other heavy materials from the edges of excavations.
- Remove and dispose all wastes in designated areas whenever they are produced.

7.2 Environmental During Operational Phase

7.2.1 Air Pollution (vapors, exhaust emissions and dust)

Air quality pollutants range from bad odours to toxic hazards and include smells of rotting organic/food wastes, sewer emissions, tobacco smoke and allergens such as moulds. Air pollution from dust is also a common problem in gold processing sites. These dust emissions result from the loading and offloading the tailings. Vehicles especially coming in and out of the site also pose a risk of dust production and

exhaust emission. Exposure to gold and soil dust results in silicosis, respiratory disorders, chest problems and many other diseases

Mitigation

- The machinery and equipment at the site are repaired when they break in order to increase working efficiency.
- In addition:
  i. Dispose the tailings and other wastes regularly to prevent them from accumulating at the site.
  ii. Provide workers in areas concentrated with exhaust emissions, dust and fumes with nose masks covering the mouth and the nose; and goggles to protect the eyes.
  iii. Run and service/maintain machinery and vehicles regularly according to the manufacturer's instructions in order to ensure efficiency in working.
  iv. Use appropriate fuel that is free from adulterate
  v. Sprinkle water on all dust-active areas to suppress dust and/or pave or apply non-toxic soil stabilizers on all unpaved access roads and parking areas.
  vi. Sprinkle water to earthen and dusty ground before sweeping to prevent dust production.

7.2.2 Noise and vibrations

Noise has an impact on the life and health of people whether within or outside any surrounding. Exposure to noise pollution above 60 dBA (can be transmitted to over 20 m away) can affect mood and quality of sleep and can result in stress. Such noise can also result in auditory fatigue (buzzing and ringing in the ear). Exposure to levels beyond 90 dBA (can be transmitted to over 30 m away) represents a hazard to hearing which can also result in moderate to severe deafness. Noise also interferes with communication and is itself a nuisance and therefore lowers working morale.

The main sources of noise include the drilling rigs, generator, the compressor and the vehicular movements. The generator, the compressor and the vehicular movements also produce vibrations. Noise and vibrations are considered significant if the project results in a substantial temporary or permanent increase in ambient levels in the project vicinity especially above levels existing without the project; and exposure of persons to the noise and vibrations.

Mitigation

a) Minimize noise at the sites and in the surrounding areas by:
   i. Sensitizing drivers and machine operators to switch off their engines while they are not in use especially when offloading and loading materials and to avoid hooting especially when passing near noise-sensitive areas such as health facilities, educational institutions, worship places and residential areas among other noise-restricted areas;
   ii. Placing some noisy equipment such as generators in sound-proof rooms or in enclosures to minimize ambient noise; and
   iii. Properly servicing and tuning construction machinery such as generators and other heavy-duty equipment to reduce noise generation.
   iv. Avoid unnecessary ignition and usage of the generator, the compressor and vehicles.
b) Minimize the impacts of temporary construction noise and vibration by:
   i. Posting notices at the sites to inform people of noisy activities.
   ii. Planning the drilling work to take place only during the day and maintaining reasonable working hours of not more than 8 hours within any 24-hours working duration
   iii. Providing ear protective devices to workers and visitors in noisy environments to prevent high frequency noise emitted by the high frequency machines.

7.2.3 Fire

Fire is a reality at the proposed site due to use of drilling machines and equipment's presence of bush at the Kilimapesa Hill. If appropriate measures are not put in place, a fire outbreak can occur and cause great damage to property and even lead to death.

Possible source of fires may include:

i. Lightening;
ii. Leaving flammable material near fire points;
iii. Careless disposal of lighting match sticks or cigarette stabs; and
iv. Poor handling of electrical appliances which may also lead to shocks, electrocution and damage to electrical appliances.

Mitigation

- Carry out routine bush thinning in vulnerable areas, slashing, and other maintenance activities, within and adjacent to rights of way to minimize the risk of fire.
- Declare places with flammable materials as "NO SMOKING ZONES" and display conspicuous notices of the same.
- Install fire extinguishers at strategic locations
- Regularly inspect the fire-fighting equipment
- Establish and mark a "FIRE ASSEMBLY POINT" at a strategic outdoor point at the site.
- Keep the compound clean and free from fire hazards and flammable litter and avoid naked fires and burning things in the open
- Regular train personnel concerning emergencies including those involving fire out-breaks.

7.2.4 Solid wastes

The exploration and open cast mining may result to solid wastes include: household wastes such as food/kitchen waste, used paper wrapping, plastic wrapping and plastic bags; organic wastes such as vegetable and fruit matter and peelings; purchase packaging materials; printed documents such as newspapers; plastics bags and bottles; metallic tins, jar lids and soft drinks cans; glass bottles, jars and flasks; clothing materials; used sanitary towels and bulbs. Below are some of the effects of these solid wastes:

a) Some of these wastes are hazardous.
b) Some waste materials especially the plastic/polythene are not biodegradable hence may cause long-term injurious effects to the environment.
c) Solid wastes can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impacts on animal health or be a potential source of disease pathogens or form breeding grounds for: disease causing vectors such as mosquitoes; rats; cockroaches and lice and other vermin leading to increase in incidence of associated diseases.

Mitigation

- The exploration manager to ensure that the workers dispose any remaining solid waste such as metals, paper, plastics, etc. away from the site at an approved disposal site
- Provide bins for separate collection of wastes into appropriate sorts such as recyclable and no recyclable. These bins should be labeled.
- Use designated areas for repair and maintenance of vehicles and powered machinery to avoid fuel and lubricant spillage on site
- Put in place an efficient, regular and appropriate waste collection and disposal scheme that will prevent the accumulation of wastes at collection areas.

- Where possible material considered as waste may be re-used or recycled or be given to who may consider them useful for others uses.
- Maintain and repair equipment rather than replacing it to reduce waste

7.2.5 Increased traffic flow

There will be influx of traffic to and from the site. These include vehicles facilitating activities and operations at the site including delivering of ore to the plant for processing. Though vehicle traffic is not a major concern, it can cause congestion on the roads which may subsequently results in accidents.

Mitigation

- Place clear signage at the gate to alert drivers to look out for entering and/or exiting vehicles.
- Provide space for use by emergency management vehicles.
- Provide for adequate space at the turning point at the gate to give drivers enough room to maneuver into and out of the project site.

7.2.6 Impacts related to occupational and public health and safety

The following occupational health and safety hazards that may be of concern:

a) Fire hazards
b) Noise and vibrations
c) Congestion
d) Accidents including cuts, pricks and bruises; electrocution from naked electrical cables; and suffocation from gas accumulation or lack of oxygen in confined spaces. Accidents could result from lack of supervision and job training, improper handling of machinery and hand tools and inappropriate carrying out of tasks.
e) Poor sanitation resulting from presence of potential environmental pollutants at the site and

Mitigation

- An Environmental & Safety Officer to be contracted to be in charge of Environmental safety & health issues at the site.
- Secure the site with appropriate fencing for protection; provision of privacy; reduction of cases of trespass and theft; and for control of entry by straying animals and therefore avoid conflicts between people at the site and the people in the neighborhood.
- Post notices at the site informing the public of activities at the site and the need to be aware of potentially dangerous things and spots at the site including open pits.
- Provide hazard notifications, signage and warnings to warn the persons on potential consequences of their actions.
- Supervise all specialty works at the site.
- Remove all soil, boulders and other heavy materials from the edges of the pit.
- Keep all passages clear at all times.
- Provide appropriate PPE including masks, goggles, scarfs, boots and overalls among other protective clothing as spelt out under section 101 (1) of OSHA, 2007 to all workers and sensitize them to use them whenever they are in environments that warrant the use of such PPE especially in all situations where the body and skin are potentially exposed to hazards such as chemicals, harmful dusts, highly infectious wastes, sharp objects, burns and extreme temperature and/or when working in areas that present threatening experiences.
- Have fully equipped First Aid Kits at the site at all times and ensure that trained first aid personnel are available to handle any incidents due to pollution at site.

- Adopt proper working procedures and when working with chemicals, machines and equipment.
- Ensure that trained first aid personnel are available on site at all times to handle emergencies.
- Put in place an appropriate emergency response plan including having emergency contacts (such as ambulance, fire tender and police) conspicuously displayed.
- Control waterborne diseases by ensuring sanitation at the site as outlined in this report and by regularly conducting chemical and bacteriological quality of the water to ascertain its suitability for consumption and treating water before drinking using approved home-based treatment methods such as filtration using life-straw, boiling and use of chemicals such as water guard.
- Ensure presence of sanitary facilities by adding pit latrines or outdoor toilets that can be emptied.
- Always keep sanitary facilities and waste disposal facilities clean.
- Frequently undertake workers through refresher trainings in order to make them have a basic understanding of the tasks under them, the hazards involved, and how to manage them.

7.3 Decommissioning Phase

Gold mining is a temporary and the proposed activities can come to an end after depletion of tailing deposits or if the proponent decides to move to another site. The facility can also close if the operations become unprofitable. At the closure of the operations, the proponent is required by law under the Mining Act, 2016 to ensure that the site will not pose a threat to the health and safety of the environment at that time and in future. At this point, the site can be repurposed into another use or restored to its previous status. The process of closure will adhere to the following steps: shut-down where the number of employees will be reduced gradually; decommissioning where equipment is removed and disposed and structures demolished; rehabilitation; and monitoring (post-closure). If the facility is decommissioned without any mitigation measures, the following are likely

- The site might become a safety hazard due to the presence of a deep open pit and structures.
- There will be massive loss of livelihoods due to the end of jobs at the site.
- Similarly, the hollows at the site especially the ponds might accumulate water and become breeding grounds for water-based disease causing and spreading organisms.

The following will be adhered to during decommissioning:

a) A decommissioning report will be prepared and submitted to NEMA at least three months before decommissioning takes place.
b) Remove any hazardous materials, reshape the land, restore the top soil and plant native plants at the site.
c) The use of the site or the structures may be changed to other appropriate uses after renovation, rehabilitation and some structural changes have taken place. This uses include museums or education centre, an attraction site, a recreation site and a fish farm among others.
d) The decommissioning and alternative land-use options will be facilitated by appropriate professional personnel incorporating environmental experts; planners; public works officers and public health officers among others.
e) Ensure long-term care and monitoring of the site in order to contain any unremoved structures to ensure that they don't endanger the lives of the people.
f) Mitigation for decommissioning phase impacts will follow general guidelines discussed in the decommissioning report.

7.4 Potential Positive impacts

i. Gold: The proposed project will be a source of gold. Gold is a precious and expensive metal.

ii. Creation of employment opportunities: It is estimated that the proposed project will employ many people in the area. This will either be directly or indirectly. These include the workers at the exploration drilling and open pit mining most of who will come from the area; the site manager; and operators of other businesses. The income to be earned will be used for the betterment of peoples' lives and families thus improving their living standards.

iii. Demand for materials: This includes bricks, chemicals, acids and food supplies. The supply of these materials translates into boosting both the local and national economy. The multiplier' effect of this project also translates into increased revenue to the county and national governments in terms of tax and other service charges.

iv. Capital into the economy: The proposed project will inject some capital into the economy.

v. Improved aesthetics: Spill-off developments include improvement in the general aesthetic of the area. This will add to improved development of the local area.

7.5 Summary Environmental Impacts & mitigation

Table 11: Summary of impacts & mitigation

Environmental Impact	Phase	Mitigation Details
Exploratory Drilling		
Potential influx of population may lead to increased natural resource use	All phases	• Influx of population • Provide adequate and appropriate sanitary facilities • Ensure water meter points are metered to ensure monitored and prudent water use • Sensitize workers on sexually transmitted diseases especially STIs and HIV/AIDS
Removal of vegetation (bush clearing and removal of grass cover) during line cutting is a significant cause of soil erosion and possible habitat destruction for local species of birds, mammals and reptiles.	Establishment & sitting phase	• Removal &disturbance of flora • Minimize line width • Re-vegetation of disturbed areas with native plant species • Use of human labor as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion • Undertake selective clearance by clearing demarcated areas for exploration • Give the community priority on use of the removed vegetation for construction or other purpose. • Create buffer zones with vegetation
During trenching and pitting, there will be creation of land scars	Operational phase	• Excavation • Infill after sampling, mapping. • Undertake re-vegetation with native plant species disturbed during the exploration phase to reduce soil erosion

Soil and water contamination by oil spills and drilling wastes	All phases	• Soil & water contamination • Plan emergency response measures in case of accidental oil spills; • Proper maintenance of construction equipment
Solid waste management	Operational phase	• Solid waste management • The exploration manager to ensure that the workers dispose any remaining solid waste such as metals, paper, plastics, etc. away from the site at an approved disposal site • Provide bins for separate collection of wastes into appropriate sorts such as recyclable and nonrecyclable. These bins should be labeled. • Use designated areas for repair and maintenance of vehicles and powered machinery to avoid fuel and lubricant spillage on site • Put in place an efficient, regular and appropriate waste collection and disposal scheme that will prevent the accumulation of wastes at collection areas. • Where possible material considered as waste may be re-used or recycled or be given to who may consider them useful for others uses. • Maintain and repair equipment rather than replacing it to reduce waste
Extraction & use of materials	Establishment phase	• The project and material requirements will be evaluated and quantified to ensure that the design optimizes the use of materials
	Operational phase	• Proper planning of transportation of materials to ensure that products of fossil fuels (diesel and petrol) are not excessively consumed.
Air Pollution	All phase	• Wet/mist all active construction areas as and when necessary to lay dust; • Speed limit within of proponent vehicles should be limited to 10kph to avoid generation of dust • Ensure regular inspection and maintenance of installed generators according to manufacturer's specifications. • Ensure proper handling of hazardous wastes associated with maintenance
Noise & Vibration during drilling	All phases	• Noise & vibration during drilling • Noise generating activity will be strictly limited to daytime i.e. between 8.00 am to 5:00pm. • Posting notices at the sites to inform people of noisy activities. • The proponent to regularly conduct noise assessment studies and keep records. • Use of hearing protection devices e.g. ear mufflers by the employees • Inform neighborhood of any abnormal noise generating activities to minimize disruption to local residents. • The proponent shall comply with the Environmental Management and Co-ordination (Noise and Excessive vibration pollution

		Control) Regulations of 2009 where the maximum permitted noise level is 114dB (A) for mining and quarries. • No noise generation activity at night without noise license
Fire	Operational phase	• Carry out routine bush thinning in vulnerable areas, slashing, and other maintenance activities, within and adjacent to rights of way to minimize the risk of fire. • Declare places with flammable materials as "NO SMOKING ZONES" and display conspicuous notices of the same. • Install fire extinguishers at strategic locations • Regularly inspect the fire-fighting equipment • Establish and mark a "FIRE ASSEMBLY POINT" at a strategic outdoor point at the site. • Keep the compound clean and free from fire hazards and flammable litter and avoid naked fires and burning things in the open • Regular train personnel concerning emergencies including those involving fire out-breaks.
Increased traffic flow	Operational phase	• Place clear signage at the gate to alert drivers to look out for entering and/or exiting vehicles. • Provide space for use by emergency management vehicles. • Provide for adequate space at the turning point at the gate to give drivers enough room to maneuver into and out of the project site.
Occupational Safety & health	All phases	• An Environmental & Safety Officer to be contracted to be in charge of Environmental safety & health issues at the site. • Secure the site with appropriate fencing for protection; provision of privacy; reduction of cases of trespass and theft; and for control of entry by straying animals and therefore avoid conflicts between people at the site and the people in the neighborhood. • Post notices at the site informing the public of activities at the site and the need to be aware of potentially dangerous things and spots at the site including open pits. • Provide hazard notifications, signage and warnings to warn the persons on potential consequences of their actions. • Supervise all specialty works at the site. • Remove all soil, boulders and other heavy materials from the edges of the pit. • Keep all passages clear at all times. • Provide appropriate PPE including masks, goggles, boots and overalls among other protective clothing as spelt out under section 101 (1) of OSHA, 2007 to all workers and sensitize them to use them whenever they are in environments that warrant the use of such PPE especially in all situations where the body and skin are potentially exposed to hazards such as chemicals, harmful dusts, highly infectious wastes, sharp objects, burns and extreme temperature and/or when working in areas that present threatening experiences. • Have fully equipped First Aid Kits at the site at all times and ensure that trained first aid personnel are available to handle any incidents due to pollution at site. • Adopt proper working procedures and when working with chemicals, machines and equipment. • Ensure that trained first aid personnel are available on site at all times to handle emergencies. • Put in place an appropriate emergency response plan including having emergency contacts (such as ambulance, fire tender and police) conspicuously displayed.

		• Control waterborne diseases by ensuring sanitation at the site as outlined in this report and by regularly conducting chemical and bacteriological quality of the water to ascertain its suitability for consumption and treating water before drinking using approved home-based treatment methods such as filtration using life-straw, boiling and use of chemicals such as water guard. • Ensure presence of sanitary facilities by adding pit latrines or outdoor toilets that can be emptied. • Always keep sanitary facilities and waste disposal facilities clean. • Frequently undertake workers through refresher trainings in order to make them have a basic understanding of the tasks under them, the hazards involved, and how to manage them.

Possible Impacts		Recommended Mitigation Measures
Open Cast Mining		
Surface clearing, rock breaking and hauling causing terrestrial habitat alteration and soil erosion	All phases	• Re-vegetation of disturbed areas with native plant species • Use of human labor as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion • Undertake selective clearance by clearing demarcated areas for exploration • Give the community priority on use of the removed vegetation for construction or other purpose. • Create buffer zones with vegetation
Excavation causing loosening of soil which is prone to both water and wind erosion	All phases	• Soil excavated from the project area to be used for back filling in other mining areas within the precincts of Kilimapesa Gold areas of operation and should not be left exposed to wind or water for long periods. • The project shall pursue the zero-waste policy on the management of excavated soils and debris. • The valuable top soil containing organic material, nutrients as well as seeds and the soil fauna should be excavated separately and piled in an appropriate manner for re-use.
Compaction by moment of vehicles, plant, machinery and persons has the undesired effect of hindering air and water penetration beneath the soil surface	All phases	• Properly demarcate the project area and associated activities are restricted to the demarcated area • Re-establish vegetation in disturbed areas • Rip-off areas where compaction will have adversely affected to allow aeration of soil and ease infiltration of water into the soil. • Use excess soil especially the tailings in filling road potholes or hollow areas at the site among many other uses.
Noise and vibration during blasting	All phases	• Noise generating activity will be strictly limited to daytime i.e. between 8.00 am to 5:00pm. • Posting notices at the sites to inform people of noisy activities.

		• The proponent to regularly conduct noise assessment studies and keep records. • Use of hearing protection devices e.g. ear mufflers by the employees • Inform neighborhood of any abnormal noise generating activities to minimize disruption to local residents. • The proponent shall comply with the Environmental Management and Co-ordination (Noise and Excessive vibration pollution Control) Regulations of 2009 where the maximum permitted noise level is 114dB (A) for mining and quarries. • No noise generation activity at night without noise license. • Sensitize truck drivers and plant operators to switch off engines while offloading materials; • Avoid idling vehicle engines or hooting especially when passing through sensitive areas such as churches, residential areas and hospitals;
Air pollution	All phases	• Wet/mist all active construction areas as and when necessary to lay dust; • Speed limit within of proponent vehicles should be limited to 10kph to avoid generation of dust • Ensure regular inspection and maintenance of installed generators according to manufacturer's specifications. • Ensure proper handling of hazardous wastes associated with maintenance;
Acid mine drainage (surface and underground water contamination due to acidity and dissolved metal content)	All phases	• Ensure work areas involving storage , handling and manipulation of chemicals are at a predesigned work area which has an impermeable base and which does not drain as surface runoff or into underground water sources, streams or rivers • Provide accidental spill containment kits for the provided chemicals and instruct workers on safe use of the kits • Ensure all staff and workers are fully aware of the limits to the site for each activity, Standard Operating Procedures, and emergency procedures; • Any contaminated soil should be handled properly as hazardous waste and removed form site for safe disposal;

8.0 Environmental Monitoring & Management Plan

The Environmental Management Plan (EMP) is prepared to show how site-specific concerns and mitigation measures are addressed through the construction, operation and decommissioning phase of the proposed project. The EMP has been developed with proponent knowledge and information available to date. As project commencement and scheduling plans are developed and changed, components of the EMP might require amending. This is therefore a working document, which can be updated whenever new information is received or site conditions change.

8.2 Purpose and Objectives of EMP and Monitoring Plan

The specific objectives of the EMP and monitoring plan are to:

- Serve as a commitment and reference for the contractor to implement the EMP including conditions of approval from NEMA.
- Serve as a guiding document for the environmental and social monitoring activities for the supervising consultant, contractor and the client management including requisite progress reports.
- Provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment.

- Provide instructions to relevant project personnel regarding procedures for protecting the environment and minimizing environmental effects, thereby supporting the project goal of minimal or zero incidents. Document environmental concerns and appropriate protection measures; while ensuring that corrective actions are completed in a timely manner.

8.3 Auditing of the EMP

The proponent and the contractor shall conduct regular audits to the EMP to ensure that the system for implementation of the EMP is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The EMP being used is the up-to-date version;
- Variations to the EMP, non-compliance and corrective actions are documented;
- Appropriate environmental training of personnel is undertaken;
- Emergency procedures are in place and effectively communicated to personnel;
- A register of major incidents (spills, injuries, complaints) is in place and other documentation related to the EMP; and
- Ensure that appropriate corrective and preventive action is taken by the contractor once instructions have been issued.

8.4 Responsibilities of the EMP

In order to ensure the sound development and effective implementation of the ESMP, it will be necessary to identify and define the responsibilities and authority of the various persons and Organizations which will be involved in the project. The following entities should be involved in the implementation of this ESMP:

- Proponent;
- NEMA;
- Contractor;
- Narok County Government; and
- Directorate of Occupational Safety and Health- Narok county

Table12: Mitigation and Management measures for the identified Impacts

Activity	Recommended Mitigation Measures	Responsibility	Monitoring	Frequency	Cost(Ksh)
PLANNING PHASE					
Legislative, regulatory issues	Compliance with relevant legislative and regulatory requirements	Proponent	Permits Licenses	As per relevant legislative and regulatory requirement	1,000,000
Expected Negative Impacts	Recommended mitigation measures	Responsibility	Monitoring	Frequency	Cost (Ksh)
Exploratory Drilling					
Workers influx increased natural resource use	• Provide adequate and appropriate sanitary facilities • Ensure water meter points are metered to ensure monitored and prudent water use • Sensitize workers on sexually transmitted diseases especially STIs and HIV/AIDS	Proponent	• No. of sanitary facilities provided • Water use records • Staff Training records	Continuous	450,000
Flora and fauna Removal of vegetation (bush clearing and removal of grass cover).	• Minimize line width • Re-vegetation of disturbed areas with native plant species • Use of human labor as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion • Selective clearance by clearing demarcated areas for exploration • Community priority on use of the removed vegetation for construction or other purpose. • Create buffer zones with vegetation	Proponent	• Re-vegetation with native plant species • demarcated areas for exploration • community priority on use of the removed vegetation • buffer zones with vegetation	Continuous	Covered within project budget
Trenching & Pitting Creation of land scars	• Infill after sampling, mapping. • Undertake re-vegetation with native plant species disturbed during the exploration phase to reduce soil erosion	Proponent	• Record of infill • Record of re-vegetation	Continuous	Covered within project budget

Soil & Water contamination Contamination by oil spills and drilling waste	• Plan emergency response measures in case of accidental oil spills; • Proper maintenance of construction equipment	Proponent	• No. Spill kit provided at the site • Maintenance records	Continuous	Covered within project budget
Solid waste	• Propper disposal of all waste • Provide bins for separate collection of wastes into appropriate sorts such as recyclable and nonrecyclable. These bins should be labeled. • Use designated areas for repair and maintenance of vehicles and powered machinery to avoid fuel and lubricant spillage on site • Put in place an efficient, regular and appropriate waste collection and disposal scheme that will prevent the accumulation of wastes at collection areas. • Where possible material considered as waste may be re-used or recycled or be given to who may consider them useful for others uses. • Maintain and repair equipment rather than replacing it to reduce waste	Proponent	• Amount of waste on site • Presence of well maintained • receptacles and central collection points • waste records	Continuous	Covered within project budget
Air pollution impact on human health, fauna and flora	• Wet all active construction areas as and when necessary to lay dust;	Proponent	• Complain logs • Air quality reports.	Continuous	Covered within project budget
Noise pollution Drilling activities	• Construction times should be from 8:00am – 5:00 pm; • Clearly label the high noise areas; • Provide PPE (hearing protection) to persons operating within or visiting identified high noise areas; • Inform local residents when construction activities are likely to generate excessive noise in order to • The proponent shall comply with the Environmental Management and Co-ordination (Noise and Excessive vibration pollution Control) Regulations of 2009 where the maximum permitted noise level is 114dB (A) for mining and quarries. • No noise generation activity at night without noise license	Proponent	• Noise levels measurement reports • High noise labels in noisy areas • Use of hearing protection by workers	Daily	250,000

Security	• The project site should be enclosed using suitable walls to beef-up security and to control movement within the site. • There should be guard houses at the gate. • Security guards should always monitor the gate of the facility to keep away the intruders and to control movement within the site. • Contractor should provide adequate security during the construction period when there are no works on the site.	Proponent	Level of crime in the area	Continuous	Covered within project budget
Occupational safety and health	• An Environmental & Safety Officer to be contracted to be in charge of Environmental safety & health issues at the site. • Secure the site • Post notices at the site informing the public of activities at the site and the need to be aware of potentially dangerous things and spots at the site including open pits. • Provide hazard notifications, signage and warnings. • Provide appropriate PPE including masks, goggles, boots and overalls among other protective clothing as spelt out under section 101 (1) of OSHA, 2007 • Have fully equipped First Aid Kits at the site at all times and ensure that trained first aid personnel are available to handle any incidents due to pollution at site. • Adopt proper working procedures and when working with chemicals, machines and equipment. • Ensure that trained first aid personnel are available on site at all times to handle emergencies. • Put in place an appropriate emergency response plan including having emergency contacts (such as ambulance, fire tender and police) conspicuously displayed. • Control waterborne diseases by ensuring sanitation at the site as outlined in this report and by regularly conducting chemical and bacteriological quality of the water • The contractor maintains workers injury benefit act compensation cover.	Proponent	• EHS officer at the site • Compliance with OHSA • Workers using Protective Equipment Presence of Well stocked First Aid Box • Separate and clean washrooms (Gents &Ladies)	Annual	2,000,000

Expected Negative Impacts	Recommended mitigation measures	Responsibility	Monitoring	Frequency	Cost (Ksh)
OPERATIONAL PHASE					
Opencast Mining					
Terrestrial habitat alteration and soil erosion Rock Breaking & hauling	• Re-vegetation of disturbed areas with native plant species • Use of human labor as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion • Undertake selective clearance by clearing demarcated areas for exploration • Give the community priority on use of the removed vegetation for construction or other purpose. • Create buffer zones with vegetation	Proponent	• Re-vegetation with native plant species • demarcated areas for exploration • community priority on use of the removed vegetation buffer zones with vegetation	Continuous	Covered within project budget
Soil Erosion Excavations causing loosening of soil	• The project to pursue the zero-waste policy on the management of excavated soils and debris. • The valuable top soil containing organic material, nutrients as well as seeds and the soil fauna should be excavated separately and piled in an appropriate manner for re-use. The top soil should be spread over the excavated area in order to improve the conditions for development of a vegetation cover thus accelerating the restoration process.	Proponent	• Re-vegetation with native plant species • demarcated areas	Continuous	Covered within project budget
Terrestrial habitat alteration Compaction by movement of vehicles	• Properly demarcate the project area and associated activities are restricted to the demarcated area • Re-establish vegetation in disturbed areas • Rip-off areas where compaction will have adversely affected to allow aeration of soil and ease infiltration of water into the soil. • Use excess soil especially the tailings in filling road potholes or hollow areas at the site among many other uses.	Proponent	• Re-vegetation with native plant species • demarcated areas for exploration	Continuous	Covered within project budget
Noise pollution	• Construction times should be from 8:00am – 5:00 pm; • Clearly label the high noise areas; • Provide PPE (hearing protection) to persons operating within or visiting identified high noise areas; • Inform local residents when construction activities are likely to generate excessive noise in order to	Proponent	• Noise levels measurement reports • High noise labels in noisy areas • Use of hearing protection by workers	Daily	250,000

	• The proponent shall comply with the Environmental Management and Co-ordination (Noise and Excessive vibration pollution Control) Regulations of 2009 where the maximum permitted noise level is 114dB (A) for mining and quarries. • No noise generation activity at night without noise license				
Air pollution impact on human health, fauna and flora	• Wet all active construction areas as and when necessary to lay dust;	Proponent	• Complain logs • Air quality reports.	Continuous	Covered within project budget
Surface and underground water contamination	• Ensure work areas involving storage, handling and manipulation of chemicals are at a predesigned work area which has an impermeable base and which does not drain as surface runoff or into underground water sources, streams or rivers • Provide accidental spill containment kits for the provided chemicals and instruct workers on safe use of the kits • Ensure all staff and workers are fully aware of the limits to the site for each activity, Standard Operating Procedures, and emergency procedures; • Any contaminated soil should be handled properly as hazardous waste and removed form site for safe disposal;	Proponent	• Predesigned work areas • Spill kits • SOPS .	Continuous	500,000
Solid waste	• Propper disposal of all waste • Provide bins for separate collection of wastes into appropriate sorts such as recyclable and nonrecyclable. These bins should be labeled. • Use designated areas for repair and maintenance of vehicles and powered machinery to avoid fuel and lubricant spillage on site • Put in place an efficient, regular and appropriate waste collection and disposal scheme that will prevent the accumulation of wastes at collection areas. • Where possible material considered as waste may be re-used or recycled or be given to who may consider them useful for others uses. • Maintain and repair equipment rather than replacing it to reduce waste	Proponent	• Amount of waste on site • Presence of well maintained • receptacles and central collection points • waste records	Continuous	Covered within project budget

Security	• The project site should be enclosed using suitable walls to beef-up security and to control movement within the site. • There should be guard houses at the gate. • Security guards should always monitor the gate of the facility to keep away the intruders and to control movement within the site. • Contractor should provide adequate security during the construction period when there are no works on the site.	Proponent	Level of crime in the area	Continuous	Covered within project budget
Occupational safety and health	• An Environmental & Safety Officer to be contracted to be in charge of Environmental safety & health issues at the site. • Secure the site • Post notices at the site informing the public of activities at the site and the need to be aware of potentially dangerous things and spots at the site including open pits. • Provide hazard notifications, signage and warnings. • Provide appropriate PPE including masks, goggles, boots and overalls among other protective clothing as spelt out under section 101 (1) of OSHA, 2007 • Have fully equipped First Aid Kits at the site at all times and ensure that trained first aid personnel are available to handle any incidents due to pollution at site. • Adopt proper working procedures and when working with chemicals, machines and equipment. • Ensure that trained first aid personnel are available on site at all times to handle emergencies. • Put in place an appropriate emergency response plan including having emergency contacts (such as ambulance, fire tender and police) conspicuously displayed. • Control waterborne diseases by ensuring sanitation at the site as outlined in this report and by regularly conducting chemical and bacteriological quality of the water • The contractor maintains workers injury benefit act compensation cover.	Proponent	• EHS officer at the site • Compliance with OHSA • Workers using Protective Equipment Presence of Well stocked First Aid Box • Separate and clean washrooms (Gents &Ladies)	Annual	2,000,000

Expected Negative Impacts	Recommended mitigation measures	Responsibility	Monitoring	Frequency	Cost(Ksh)
DECOMMISSIONING PHASE					
Loss of job and income	• Notify the employees in advance on the project closure date and adequately compensate them; • Dismissal procedures to be compliant with Employment Act, 2007; • Provide counselling & alternative skills for alternative activities; • Employer should find alternative means of livelihood for the staff who were employed at the water treatment plant.	Proponent	Documentation as per Employment Act	During Decommissioning g phase	As per Employment act
Noise Pollution Demolition equipment	• Schedule noisy activities to 8:00am – 5:00pm • Use silencers on machines where possible; • Ensure machinery is well maintained to reduce noise emitted	Proponent	Noise reduction measures at the site	During Decommissioning g phase	As a per the decommissioning plan
Air pollution Demolition activities	• Practice dust management techniques, including watering down during drier period; • Provide and enforce the appropriate use of PPE against dust. • Further follow ups should be done				As a per the decommissioning plan
Demolition waste	• Disposal of solid waste in compliance with EMCA (1999) and 2006 Waste Management Regulations; • Segregation of waste to encourage reuse and recycling; • Ensuring that the contracted waste collector is registered with NEMA to collect and dispose wastes; and • Careful disposal of any residual chemicals and wastes from the treatment plant.	Proponent	Waste management plan	During Decommissioning g phase	As a per the decommissioning plan
Restoration of project site	• Implement an appropriate re-vegetation programme to restore the site to its original status	Proponent	Decommissioning plan	During Decommissioning g phase	As a per the decommissioning plan
	• Consider use of indigenous plant species in re-vegetation	Proponent	Decommissioning plan	During Decommissioning g phase	As a per the decommissioning plan

9.0 CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion

Kilimapesa Gold (Pty) Limited is a gold mining company in Kenya wholly owned by Carcal Gold Plc. The company mining activities are based at Lolgorien Town, Trans Mara District, Narok County. The company applied and was granted a Special Mining License 27 by the Mines and Geological Department for a term of twenty-one (21) years from 11th November 2011 for full and exclusive right to explore, develop and mine Gold resources at Kilimapesa Hill, an area of approximately 81.38 hectares of land. The company is currently undertaking underground mining activities with the Ore from Kilimapesa Hill is processed at an existing Ore processing plant and Elution plant located near Lolgorien town. To implement this proposed project, the regulations require an environmental impact assessment to be conducted, report submitted to NEMA for review and subsequent licensing.

The EIA assessment approach included, with respect to the proposed project, the following:

- Description of the proposed project area
- Assessment of project design
- Assessment of project technology and magnitude of operations
- Identification and analysis of environmental impacts and their mitigation measures
- Public consultation
- Legislation and legal framework analysis
- Development of environmental management plan
- Development of environmental monitoring plan and
- Preparation of EIA report

Further, the EIA covered collection and documentation of baseline information for future reference on project activities impacts on the environment. Overall, the EIA concludes that the proposed project is viable and will not adversely affect the environment or the local community for precautionary measures, an EMP was developed to guide the mitigation of the identified key impacts.

9.2 Recommendations

From the EIA report it can be concluded that the project will have minimal impact on the environment, and that measures will be put in place that will minimise any impacts that may occur. However, it is recommended that the EMP developed be strictly followed in order to ensure that such impacts are minimised or eliminated. Some of the measures to be closely monitored include, but are not limited to, the following:

- Minimize vegetation clearance as much as possible
- Minimize noise levels
- Minimise gold ore tailings
- Maximise re-vegetation of the project site
- Provision of PPE and
- Adherence to the EMP and environmental monitoring plan.

10. REFERENCE

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