2024

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED STEEL IRON ORE REFINERY AND PROCESSING

PLANT AND ASSOCIATED FACILITIES OPLOT NO:TAITA TAVETA/MBULIA GROUP RANCH/11, MANGA AREA OFF MOMBASA ROAD , TAITA TAVETA COUNTY, KENYA

CERTIFICATION

Certification by Lead Expert

I hereby certify that this Environmental Social Impact Assessment (ESIA) Study Report for the proposedSteel-Iron Ore Refinery and Processing Plant in Manga area, Taita Taveta County has been done under my supervision and that the assessment criteria, methodology and content reporting conform to the requirements of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

Signed:_____ Names: NEWTON G KARURI
EIA/EA LEAD EXPERT
Reg no 7117

Certification by Proponent

We, **Devki Steel Mills Limited,** confirm that this Environmental Social Impact Assessment (ESIA) Study Report for the proposed Steel-Iron Ore Refinery and Processing Plant in Manga area, Taita Taveta County has been prepared and submitted to NEMA with our authority as the proponent.

Signed for and on behalf of **Devki Steel Mills Limited,**

Name: *Agnes Sila*

Signature: _____

Date: _____

Proponent Contact Details **Devki Steel Mills Limited,**
P.O. Box 33319-00600,
Nairobi, Kenya.

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LIST OF ACRONYMS

DOSHS	Directorate of Occupational Safety and Health Services
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
GoK	Government of Kenya
KFS	Kenya forest service
MGR	Meter Gauge Railway
NEMA	National Environment Management Authority
OSHA	Occupational Safety and Health Act
PPE	Personnel Protective Equipment
SDG	Sustainable Development Goal
TBD	To be determined
TOR	Terms of reference
VOC	Volatile Organic Compounds
WRA	Water Resource Authority
WSB	Water Service Board
WSP	Water Service Providers
WSRB	Water Service Regulatory Board

1. EXECUTIVE SUMMARY

The proponent, Devki Steel Mills Limited, commissioned experts to conduct an Environmental Social Impact Assessment (ESIA) Study and to Report for the proposed Steel Iron Ore Refinery and Processing plant which lies within the Manga area of Taita Taveta County. The ESIA study is prepared in accordance with Section 58 of Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya. The document aims to provide baseline information of the environmental and social conditions of the project area and enable future monitoring of the environmental performance of the project.

In carrying out the ESIA study, the consultants used various methods which are prescribed by the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. These included site visits and observations, photography and public consultations. This stage followed After public participation held on 3rd August, 2024 .

The proposed project features an establishment of Steel Iron ore refinery and processing plant and auxiliary facilities such as access roads, water tanks, site offices, sanitary facilities, generator room, dam layout, weighbridge ,workshop ,substation layout stores and crushing unit.

The proposed project will have both positive and negative impacts. The positive impacts will include stimulation of industrial development in line with Kenya's Vision 2030, mitigation of national and regional demand for aggregates, source of revenue to both the County and National Governments, income generation to the proponent and creation of employment opportunities to both locals and non-locals. However, negative impacts on the environment will also manifest during the pre-establishment and establishment (Planning and Construction), operational and possible decommissioning phases of the aggregate mine.

At the pre-establishment and establishment phase, the possible negative impacts will include environmental risks of obtaining raw materials for construction works, occupational safety and health, water demand and effluent generation, solid waste generation, air and noise pollution.

At the pre-establishment phase, the proponent will obtain a change of user from the County Government of Taita Taveta before commencement of work. To mitigate the impacts of the establishment phase, the contractor will ensure sufficient quantities of materials are procured for the intended works and they are sourced from sites that are licensed as per the Environmental

Management and Coordination Act Cap. 387 Laws of Kenya. The workforce and visitors to the site will be exposed to potential health and safety risks such as injuries and potential accidental falls. To mitigate these impacts, the proponent will register the site as a workplace with the Directorate of Occupational Safety and Health Services (DOSHS), provide and enforce the use of Personal protective Equipment (PPE), provide the correct equipment for the jobs assigned and train the employees on their use, obtain insurance cover for the employees and comply with the provisions of the Occupational Safety and Health Act, 2007. The proponent will also procure and deliver to the site mobile toilets from a NEMA licensed solid waste contractor for use by the workers during the construction phase of the project cycle and ensure compliance with the Environmental Management and Coordination (Water Quality) Regulations, 2006.

Construction of the auxillliary facilities activities and workers are expected to generate solid waste. These will be disposed of by contracting the services of a NEMA licensed waste handlerand ensuring compliance with the Environmental Management and Coordination (Waste Management) Regulations, 2006. Air and noise pollution from construction activities is expected. The report recommends sprinkling of water on excavation areas, provision and enforcement of the use of PPE and ensure compliance with the Air Quality Regulations, 2014 and Noise and Excessive Vibration Pollution (Control) Regulations, 2009.

Constructions operations have the potential to have adverse effects on the environment including land degradation, effects on landscape and visual intrusions, occupational health and safety, increased water demand and wastewater generation, increased energy demand, solid waste generation, air and noise pollution, ground and surface water pollution, impacts of electric blasting, impact on biodiversity and road damage.

Sections of the proposed site that will be cleared to pave way for excavation and other construction activities will disrupt the macro habitat and the species they support. Dust produced from mining activities also have physical effects on the surrounding vegetation such as blocking and damaging internal structures hence impacting on their physiological activities. To reduce the impacts of mining to the ecosystem, the proponent will retain vegetation cover where possible and rehabilitate the mined areas by planting appropriate indigenous trees or approved exotic onesin collaboration with the Kenya Forest Service.

Construction activities pose potential threats to the health and safety of workers on site. This may

be inthe form of dust, fumes, accidents from machinery and equipment, injuries that may result from excavation activities and accidental falls. During rainy seasons, accumulation of water in the Mine pits may pose a threat to community health and safety as they may become important breeding grounds for disease causing pathogens and accidental falls of both human and livestock could lead to drowning. To mitigate this impact, the proponent will provide adequate training to staff on health and safety and ensure use of correct machinery for each assignment given, provide and enforce the use of PPE, regulate access to the site by deploying adequate security measures and fencing where appropriate to protect workers, local community members and livestock from potential accidents, rehabilitate quarried areas and comply with the provisions of the Occupational Safety and Health Act, 2007.

Effluent from domestic water use will be managed through a bio-digester and the proponent will apply and obtain an Effluent Discharge License from NEMA. Solid waste generated will be managed through a NEMA licensed solid waste contractor and compliance with the Environmental Management and Coordination (Waste Management) Regulations, 2006.

The facility will exert pressure on energy for running the machinery and equipment and for lighting and powering of electrical appliances. The study recommends maintenance of machines and equipment to maximize their efficiency on fuel.

Dust from the activities i.e. from the operation and transportation of aggregates will bemitigated by sprinkling water at the site, enforcing the use of PPE to all employees and visitors while at the facility, retaining existing vegetation in areas which are not earmarked for operation to act as dust screens and a buffer zone between the operation area and the settlements and complying with the provisions of the Air Quality Regulations, 2014.

Operations involves several activities that generate significant amount of noise and vibrations. To mitigate the impact of noise, the proponent will use buffer zones by locating the facility away from settlements, enforce the use of earmuffs, increase the number of delay detonators used in a round of blasting, conduct noise mapping to inform mitigation measures, comply with Noise and Excessive Vibration Pollution (Control) Regulations, 2009 and adhere to the provisions of the Explosives Act.

There is a potential for ground and surface water pollution during operations. Removal of the rock

strata can cause the floor to heave and allow for water seepage and hence toxic materials from the mine could seep into the ground water. The activities of the proposed facility will have apotential to pollute the seasonal river that lie within the site. The proponent will ensure that operations are not undertaken to the water table level and in the event of flooding, water will be pumped out of the facility.

Once the operations begins operations, there will be heavy commercial vehicles ferrying aggregates todifferent areas. Overloaded trucks may cause damage on the roads leading to the mine facility reducing their life span. To mitigate this impact the proponent and truck drivers will adhere to the axle load limits set by the Kenya Roads Board.

A decommissioning phase is possible in the event of closure by government agencies due to noncompliance with environmental and health regulations, end of project life, an order by a court of law due to non-compliance with existing regulations and Change of user. Key environmental concerns at this phase will be loss of livelihoods for the employees and income to the proponent. The proponent will prepare and submit a due diligence decommissioning audit report to NEMA for approval at least 3 months in advance.

Public consultations were undertaken using questionnaires administered to neighbors and stakeholders to collect and document their concerns regarding the establishment and subsequent operation of the proposed iron Facility. None of the respondents interviewed objected to proposed project. The main positive impacts identified include job opportunities for the locals, income generation to the proponent, improvement of businesses in the area, improved security, revenue to the government and improved economy. The key environmental concerns that were identified include air and noise pollution.

The study also reviewed various governance frameworks and the most relevant ones are the Constitution of Kenya 2010, Environmental Management and Coordination Act Cap. 387 of the laws of Kenya, Mining Act, 2014, Explosives Act, 2016, Occupational Safety and Health Act, 2007, Public Health Act Cap. 242, Energy Act, 2006, Water Act, 2016, Physical Planning Act, 2012 and Occupiers Liability act Cap 34.

The proposed project is considered important and beneficial to the economic growth of Kenya and is coherent with the Kenya's Vision 2030. This EIA proposes a comprehensive environmental

management and a monitoring plan for the entire project cycle to address negativeenvironmental impacts and improve the environmental performance of the project.

1. PROJECT BACKGROUND INTRODUCTION

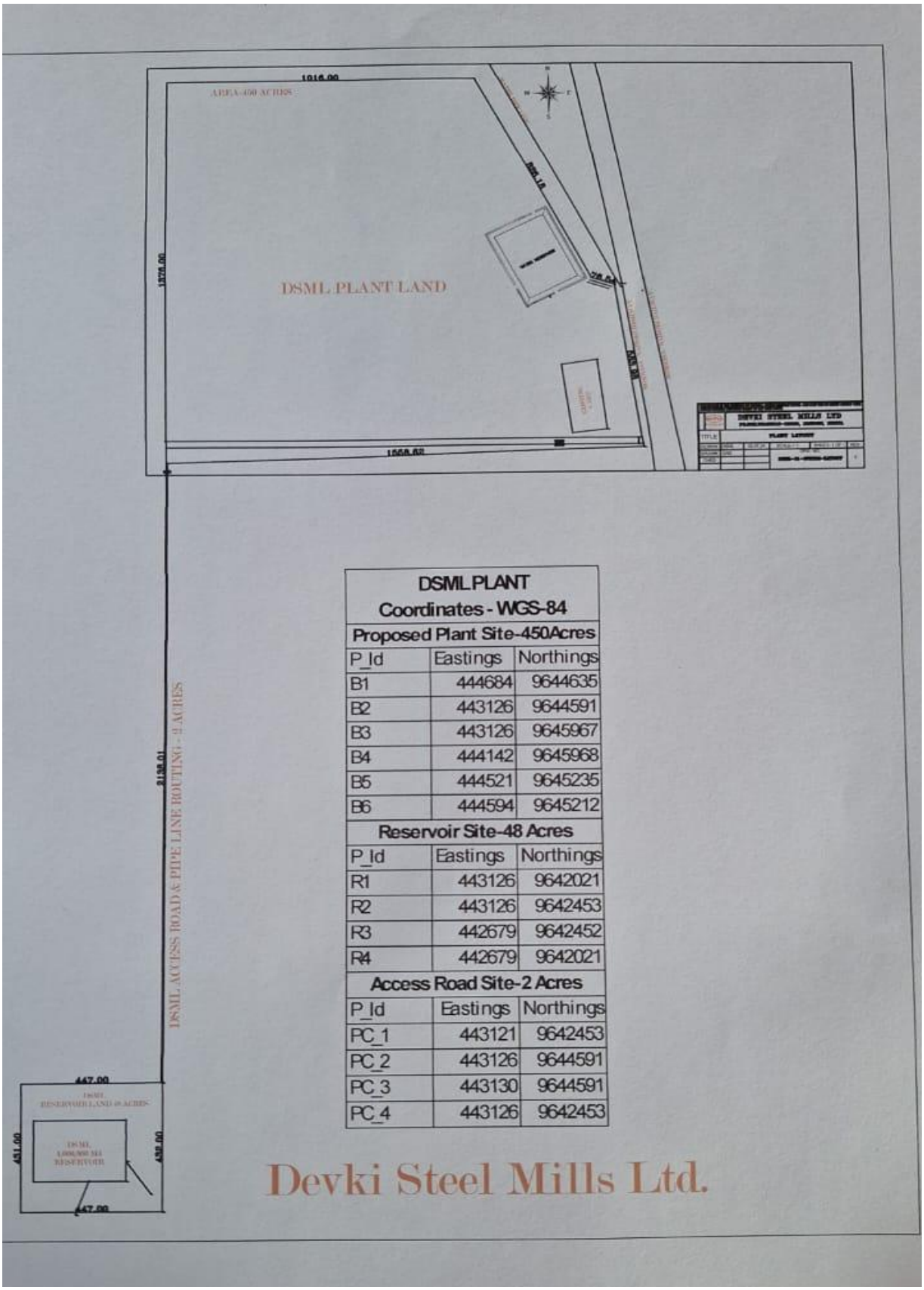
1.1 Introduction

The proponent, Devki Steel Mills Limited, proposes to set up a Steel Iron -Iron Ore Refinery and Processing plant in Manga area, Taita Taveta County and other related facilities including furnace pallet plant, coal gasifier plant, canteen, crushing unit, bentonite process plant, substation layout, toilets, drivers rest room, dam layout, stores, workshop and weighbridge and office. in any form are listed under the Second Schedule (6i) of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya as high-risk projects. Pursuant to Section 58 of the Act, all high-risk projects listed under the Second Schedule should undergo an Environmental Impact Assessment (EIA) Study process.

Subsequently, the proponent commissioned an Environmental Consultant in June 2019 to prepare an EIA Study Report for the project proposal pursuant to Section 58 of EnvironmentalManagement and Coordination Act Cap. 387 of the Laws of Kenya. In addition, the report willprovide a baseline of the environmental and social conditions of the project area and enable future monitoring of the environmental performance of the project.

1.2 Location of the project site

The area of study is located along Mombasa road; in Manga area see the attached coordinates.



DSML PLANT Coordinates - WGS-84		
Proposed Plant Site-450Acres		
P_Id	Eastings	Northings
B1	444684	9644635
B2	443126	9644591
B3	443126	9645967
B4	444142	9645968
B5	444521	9645235
B6	444594	9645212
Reservoir Site-48 Acres		
P_Id	Eastings	Northings
R1	443126	9642021
R2	443126	9642453
R3	442679	9642452
R4	442679	9642021
Access Road Site-2 Acres		
P_Id	Eastings	Northings
PC_1	443121	9642453
PC_2	443126	9644591
PC_3	443130	9644591
PC_4	443126	9642453

The proposed site is currently undeveloped with the vegetation cover dominated by indigenous trees of acacia species and bush

1.3 Communication and Accessibility

The area is easily accessible through a well developed murrum road network which is currently being upgraded to an all weather tarmac road. The road runs from Nairobi to Mombasa towards Voi is the major Trading Centre.

The Steel iron ore refinery and processing plant is served by small motorable murram road that Project design and description

The project features a Steel Iron Ore Refinery and processing plant and auxiliary facilities such as access roads, power, water,site offices, sanitary facilities, generator room among others. The proponent will not undertake mining however will rely on Iron ore mined from Kishushe mines.

1.4 Study approach and methodology

The methods adopted for preparing the ESIA study report were guided by the Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. The consultants prepared a scoping report and Terms of Reference (TORs) as required under Regulation 11 of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003 and submitted them to NEMA for consideration for approval. TheTORs were approved on 7th August 2024 and the consultants began preparation of the ESIA study report.

Site visits were undertaken in 3rd August 2024 for purposes of area reconnaissance, assessing the baseline environmental conditions of the proposed project site and screening of environmentalrisks associated with the proposed development as well as the applicable environmental safeguards and standards. Environmental screening criteria were informed by the Second Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. As per this schedule, the issues considered by the experts included ecological impacts, socioeconomic issues, landscape changes and land use character using the table below.

Table 1.Summary of results of the screening criteria

Criteria	Results
Ecological impacts	• Vegetation clearance and excavations will occur • No endangered species of trees and plants found at the site • There are indigenous tree species at the site • Project has a potential to pollute a nearby river which lies near theproject site
Social-economic considerations	• Income to proponent and employment creation • Meeting demand for construction materials • Revenue to the government through taxes & licenses • The project compliments governments effort to attain economic pillarassociated with development i.e. Vision 2030 • No cultural or heritage issues at the site
Landscape impacts	• The landscape of the area will be altered and new views created
Land uses	• Land cover is predominantly bush and indigenous trees • The current land is unused

1.5 Data collection

The methods for carrying out the study included site visits and observations, consultations withthe neighbors through administration of questionnaire and literature review of relevant documents.

2. BASELINE CONDITIONS OF THE PROJECT SITE

2.1 Overview

Baseline conditions of the project site were assessed and documented for the purposes of determining the future impacts of the proposed project on the environment and the local community. This section details on the environmental, socio-economic and bio-physical characteristics of the site, and the findings of the survey which will form a basis for impact monitoring plans and improvement of the environmental and social performance of the project during implementation.

2.2 Demographics

Taita–Taveta County is a county in Kenya. Located approximately 200 km northwest of Mombasa, and 360 km southeast of Nairobi, it is a port and major gateway to the United Republic of Tanzania through Taveta. The county headquarters are located in Mwatate. It is one of the six counties in the Coastal region of Kenya. Major towns include Voi, Taveta, Mwatate, and Wundanyi. The population was 340,671 persons according to the 2019 national census, with population densities ranging from 14 persons per km2 to more than 117 persons per km2. The county's topography is of varied rainfall and terrain with the lower zones receiving an average of 440 mm of rain per annum and the highland areas receiving up to 1,900 mm of rain. The county ranges in altitude from 500 m above sea level to 2,300 m at Vuria peak, which is the county's highest point.

2.3 Physical and Topographic Features

Taita Taveta County is classified into three major topographical zones, namely:
(i) Upper zone – which comprises Mwambirwa, Taita and Sagalla hills regions with altitudes ranging from 304 meters to 2, 208 meters above sea level. The zone is suitable for horticultural farming.
(ii) Lower zone – which includes plains where the national parks, mines and ranches are found.
(iii) Volcanic foothills zone – which covers the Taveta region with underground water and springs sourcing from Mt. Kilimanjaro.

Rainfall and Climate

Taita Taveta County is mainly dry, with the exception of Taita Hills which are considerably wet. The south-easterly winds influence climate in the area, whereby hilly areas have ideal conditions for moisture condensation which then results in relief rainfall.

Long rains are usually experienced between March and May – where on average, highlands record 265 mm as opposed to the 157 mm in lowlands. Short rains are anticipated between October and December, with annual rainfall being recorded at 1,200 mm (highlands) and 341 mm (lowlands).

Rainfall distribution is usually uneven, with higher rainfall amounts being recorded in highland areas as compared to the lowlands. Annually, mean rainfall is 650 mm. Average temperature in Taita Taveta County is 230C, with lows of 180C in hilly areas (Sagalla, Taita ad Mwambirwa) and rising to about 250C in lower zones.

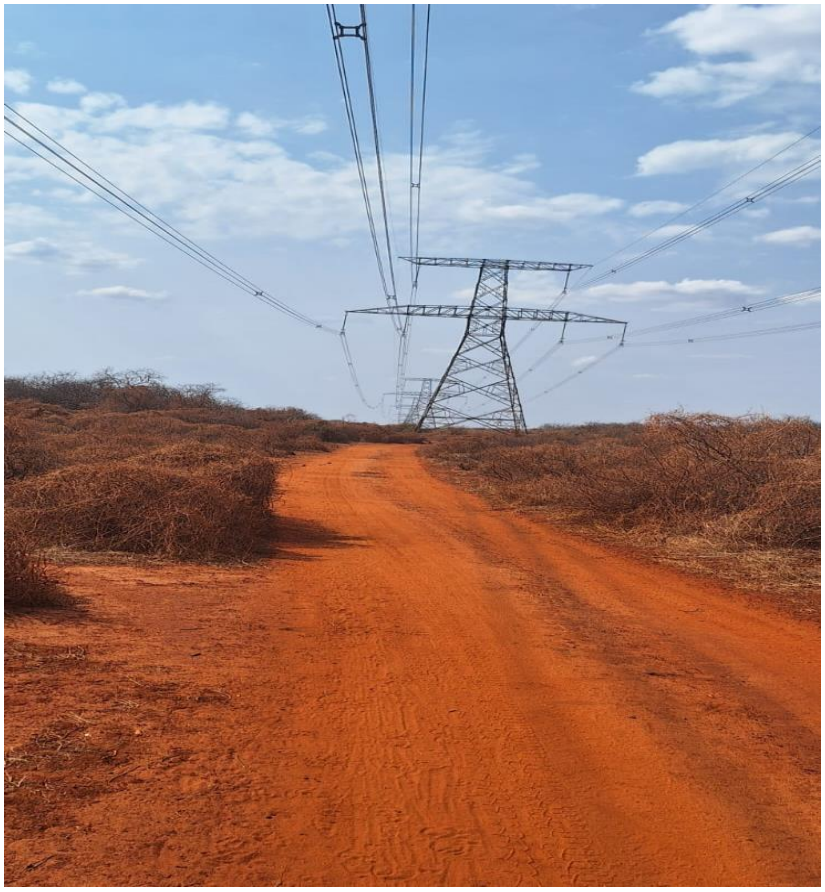
2.4 Land use patterns and socio-economic activities

Taita-Taveta county covers an area of 17,083.9 km2, of which 62% or 11,100 km2 is within Tsavo East and Tsavo West National Parks. The remaining 5,876 km2 consists of small scale farms, ranches, sisal estates, water bodies (such as Lakes Chala and Jipe in Taveta and Mzima springs), and the hilltop forests.

The lowland areas of the county outside the national parks are farms, ranches, estates, and wildlife sanctuaries which receive an average of 440 mm of rain per annum whereas the highlands receive up to 1900 mm. Altitudes range from 500 m above sea level to almost 2300 m at the highest point in the county of Vuria Peak. The county has approximately 25 ranches for cattle grazing. The three operating sisal estates in the county are Teita Sisal Estate, Voi Sisal Estate and Taveta Sisal Estate. Many ranches have ventured into wildlife tourism and conservation. The Taita Hills and Saltlick Lodges sanctuary are among the well known tourism attractions in Taita Taveta.

There are 48 forests which have survived on hill tops in Taita-Taveta county of which 28 are gazetted and are under government protection and management. They range in size from small 500 square metre patches with a few remnant trees to modestly vast 2 square kilometre indigenous and exotic forest mountains. These forests are part of the unique Eastern Arc range of forests found mostly in eastern Tanzania with the Taita Hills forming the only Kenyan portion of that forest type.

Taita Hills forest holds a unique biodiversity with 13 taxa of plants and 9 taxa of animals found only in the Taita Hills and nowhere else in the world. In addition, 22 plant species found in the Taita Hills forests are typical of the Eastern Arc forests. Within these beautiful indigenous forests, bubbles of clean water flow to the lowland areas catering for both human economic activities and wildlife.



Access and power supply

3. POLICY, LEGISLATIVE AND REGULATORY FRAMEWORKS

3.1 Introduction

This section identifies the most pertinent legislation and regulations and standards governing the environmental quality, solid and liquid waste management, health and safety, protection of sensitive areas, land use control at the national and local levels and ecological and socio- economic issues.

3.2 Social Issues

There is no legal instrument in the country that addresses social issues in development interventions. However, over the years, the Kenya Government has recognized the importance of entrenching social dimensions of development in its development agenda. Notably, development initiatives are required to deliberately ensure that the marginalized and more vulnerable people in society are actively involved in development processes. Thus the new constitution has emphasized on the need for public participation and awareness on any development initiatives.

3.3 Environmental Issues

It is the Government's policy that the rights of its citizens to clean and health environment aremet. In return, every person has responsibility to protect and manage the environment. In this regard, the Government enacted the EMCA (2015) and the Environmental Impact Assessmentand Audit Regulations (2003) to provide a framework law for the coordinated management ofenvironment.

Both the EMCA and the EIA regulations require EIA to be undertaken for certain new projects. The umbrella body administering this requirement is NEMA. The Authority has a designated Environmental Committees to oversee the implementation of the EMCA at the Provincial and District levels. With the observance of international laws by organizations such as the World Bank, it's now possible to factor social impacts of proposed development projects.

3.4 Applicable Laws and Regulatory Frameworks

3.4.1 Environmental Management and Coordination Act 2015:

Part 6 of the EMCA (2015) of Kenya, provides for environmental impact assessment. This is in agreement with Principle 17 of the Rio Declaration which extends the rule of prior assessment of potentially harmful activities to include those activities which have impacts solely within a state:

"Environmental Impact Assessment (EIA), as a national instrument, shall be undertaken for

proposed activities that are likely to have a significant adverse impact on the environment andare subject to a decision of a competent National authority."

The EMCA 2015 provides under the **Second Schedule**, a list of projects that must undergo screening for EIA. The proposed iron ore mine project falls under this schedule and as suchrequires that an EIA Project Report be undertaken and submitted to NEMA for review. The expert review by NEMA of the project report shall then advice on whether the proposed project requires a full EIA study or not. EIA is undertaken by registered experts and their report is submitted to NEMA. Both the project report and the EIA report are open to review by the publicand individuals.

The EMCA Section 68 and 69 also states that the proponent must submit an Environmental Audit Report one year after commencement of the project, and thereafter undertake Self Audits.

The mandate of NEMA is to "exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment"

The functions of NEMA under the Act are:

Coordination of the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations;

- Prepare and issue an annual report on the state of the environment in Kenya;
- Monitor and assess activities, including activities being carried out by relevant leadagencies, in order to ensure that the environment is not degraded by such activities;
- Public education and awareness creation on environmental matters;
- Compliance and enforcement of environmental legislation;
- Enhancement of the effectiveness of the Provincial and District EnvironmentCommittees;
- Development of linkages involving the private sector, inter-governmental organizations,non-governmental organizations and government agencies of other states, on issues related to the environment; and
- Coordination and development of the necessary capacity for environmental management.

3.4.2 Environmental (Impact Assessment) and Audit Regulations, 2003:

These Regulations stipulate how an EIA will be undertaken and what the EIA study report should contain. It also provides regulations on Environmental Audits (EA), which the proposedproject proponent will be required to undertake. The Regulations are presently under review.

3.4.3 Environmental Management and Co-ordination (Water Quality) Regulations 2006:

The New Water Quality Regulations provide for the protection of lakes, rivers, streams, springs, wells, and other water sources. The regulations also stipulate that all industries should refrain from any actions, which may directly or indirectly cause water pollution. All industries are therefore

required to refrain from discharging effluent into water bodies. This regulation gives a minimum distance from a water body for which any development may be undertaken and as suchaffect the proposed projects with regards to the choice of line route.

3.4.4 Environmental Management and Co-ordination (Waste Management) Regulations 2015:

The Waste Management Regulations sets out standards for handling, transportation and disposalof various types of wastes. The regulations stipulate the need for facilities to undertake, in orderof preference, waste minimization or cleaner production, waste segregation, recycling or composting. These regulations provide guidelines on how to store, transport and dispose any wastes generated during the pre-establishment and establishment phases of the mine. Some of these wastes may fall under the hazardous wastes category and thus require particular disposal arrangements.

3.4.5 Environmental Management and Co-ordination (Noise and Excessive Vibrations) Regulations2015:

These have recently been gazette. The regulations define noise as any undesirable sound that is intrinsically objectionable or that may cause adverse effects on human health or the environment. The regulations prohibit any person from making or causing 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.

3.4.6 Environmental Management and Co-ordination (Fossil Fuel Emission Control) Regulations2015:

The Fossil Fuel Emission Control Regulations provide for acceptable emission standards in Kenya. Section 4 of the regulations states that any internal combustion engine for motor vehiclesand generators must comply with the emission standards provided for in the First Schedule of those regulations. Hence anyone who operates such engines whether on the road, street, public highway or any premises, which emits smoke in excess of the emissions standard in the First Schedule, contravenes the regulations and is liable to prosecution. Section 8 provides that any person intending to use any fuel catalysts other than those permitted by the authority to disclose it and seek prior approval. Establishments that use generators as alternative sources of energy must take account of the regulation on the emission standards.

3.4.7 Environmental Management and Coordination (Air Quality) Regulations, 2015:

These regulations provide for the safeguarding of the ambient air quality and give guidelines to prevent and control air pollution. The first and seventh schedules of the regulations provide a list with associated emission limits of prohibited, controlled, and un-controlled air pollutants. The regulations also give ambient air quality tolerance limits. The regulations will be particularly relevant to the construction works (including transportation) and also to operational mine site.

3.4.8 The Water Act 2002:

The Water Act, 2002, provides for the management, development, conservation, use and control of water resources and for the acquisition and regulation of rights to use water, to provide for the

regulation and management of water supply and sewerage services. The Act focuses on two key sub-sectors- Water Resources Management (WRM) and Water and Sanitation Services (WSS). The Water Act 2002, commenced by virtue of Legal Notice No. 31 of 18th March 2003 and Legal Notice No. 158 of 29th August 2003, provided for a reformed legal/institutional framework for the management and development of Kenya's water resources and the provisionof water services. The Act establishes relevant authorities and creates catchment management bodies and seven regional service boards. It specifies "public participation", in relation to any application made, or action proposed to be taken. The act further provides for the strategic management of the water resources.

3.4.9 The Public Health Act (Cap 242):

Health and hygiene are particularly important where communities congregate for a shared resource such as water. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. Part IX Section 115 of the Act states that no person/ institution shall cause nuisance or condition liable tobe injurious or dangerous to human health. Such nuisance or conditions are defined under Section 118, waste pipes, sewers, drains or refuse pits in such a 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 a public street or into the gutter or side channel or water house, irrigation channel or bed not approved for discharge is alsodeemed as a nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbor rats or other vermin. This will be of particular relevance to any temporary worker camps set up during the construction phase of the project.

3.4.10 The Physical Planning Act, 1996:

Local Authorities are empowered under section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section allows for prohibition or controls the use and development of land and buildings in the interest of proper and orderly development of an area. Section 30 states that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation for any building without development permission granted by the respective local authority. Finally, section 36 states that, if in connection with a development application, the local authority is of the opinion that the proposed development activity will haveinjurious impact on the environment, the applicant shall be required to submit, together with the application, an EIA report. EMCA, 2015 echoes the same by requiring that such an EIA is approved by NEMA and should be followed by annual environmental audits.

3.4.11 Way Leaves Act (Cap. 292):

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

ongoing activity. Where the line touches buildings or interferes with people's livelihoods, the Act requires written consent of affected parties and compensation thereof.

3.4.12 Land Acquisition Act (Cap. 295):

This Act provides for the compulsory or otherwise acquisition of land from private ownership for the benefit of the general public. For the acquisition to take place, the minister responsible must issue a gazette notice. The Act also provides for full compensation to the affected parties. This provision is not applicable to the proposed project for the land is already in place and belongs to the proponent.

3.4.13 The Lakes and River Act, Cap 409, Laws of Kenya:

This Act provides for protection of rivers, lakes and associated flora and fauna. Part IV of the Act specifies that the Minister may make rules for the protecting bird or animal life on or in a lake or river. It is not anticipated that the proposed project will have any adverse effects to the streams close by. Measures have been proposed to mitigate any potential impacts with respect topollution and waste management.

3.4.14 National Museums and Heritage Act 2006:

The Act gives provision for an area of land of cultural significance to be set-aside or acquired under compulsory provision and declared a protected area under Sections 34 and 35 of the Act. This provides for the gazettement of national monuments. Monuments gazetted under this Act fall under the management of the National Museums of Kenya. Several of these monuments include forests of cultural and biodiversity significance. It is therefore appropriate for the proponent to check whether the proposed project falls with sacred sites, ruins, caves or areas of national significance before construction.

3.4.15 The Antiquities and Monuments Act, 1983 Cap 215:

The Act aims to preserve Kenya's national heritage by empowering the National Museums of Kenya to collect, document, preserve and enhance knowledge, appreciation, management and the use of these resources for the benefit of Kenya and the world. Through the National Museums of Kenya, many sites are protected by law by having them gazetted under the Act.

3.4.16 The Local Government Act, Cap 265, Laws of Kenya:

This provides for making by-laws and institutions by the Local County Councils. By-laws canbe made on the governance of a project under the provisions of this Act.

3.4.17 Labour Laws of Kenya including employment Act 2007:

This is the revised employment act in Kenya, repealing the former employment Act Cap 226. It deals with new employment conditions of employment and the rights of workers including for paternity leave for fathers. All workers, including those employed during the construction phase, will be employed under this Act which includes provision with respect to minimum wage, working conditions and time, and also in the resolution of disputes.

3.4.18 The Factories and Other Places of Work Act (Cap 514):

This is the core legislation governing requirements for occupational health and safety at the place of work. The Factories Act identifies up to 43 requirements which include; observing high standards of cleanliness, avoiding overcrowding, constructing and maintaining adequate

ventilation, and providing and maintaining suitable natural or artificial lighting, as appropriate.

This will be once again of particular relevance to all the phases of the work.

3.4.19 The Penal Code (Cap. 63):

Section 191 of the Penal Code states that any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use, is guilty of an offence. Section 192 of the same act says a person who makes or violates the atmosphere in any place to make it noxious to health of persons/institution in dwellings or business premises in the neighborhood or those passing by, commits an offence punishable by law.

3.4.20 Traffic Act Cap 403:

The Traffic Act prohibits air pollution through Section 51 which requires that motor vehicle use proper fuels. The Act requires that every vehicle be so constructed and used as not to emit any smoke, or visible vapor. The amendment further prohibits the use of any stationary internal combustion engine, discharging exhaust gas into the atmosphere without treatment.

3.4.21 National Environmental Action Plan (NEAP)

According to the Kenya National Environmental Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from development programmes that disregarded environmental sustainability. Established in 1990, the plan's effort was to integrate environmental considerations into the country's economic and social development. Under the NEAP process EIA was introduced and is nowadays a requirement for any proposed project.

3.4.22 National Policy on Water Resources Management and Development

While the National Policy on Water Resources Management and Development (1999) enhancesa systematic development of water facilities in all sectors for the promotion of the country's socioeconomic progress, it also recognizes the by-products of these processes as wastewater. It, therefore, calls for the development of appropriate sanitation systems to protect people's health and water resources from pollution. The project's internal wastewater system will be connectedto a septic tank proposed by the proponent. This will ensure safe wastewater disposal.

3.4.23 Occupation Health and Safety Act (OSHA), 2007

The Act makes provision for the health, safety and welfare of persons on work places. The provision requires that all practicable measures be taken to protect persons in work places from potential Hazards. The provisions of the Act are also relevant to the management of hazardous and non-hazardous wastes, which may arise from/in workplaces.

For developments such as construction projects, the Act is important as it requires project proponents to have adequate management procedures of occupational safety and health at the work places. For safe construction works, the contractor and project managers should ensure the following:

- Provision of personal protective equipment (PPE), fire safety, electrical safety, and other precautions essential for safe construction work.

- Provision of physical barriers and solid separators (dust barriers, hazard barriers,temporary walkways, among others, as explained in the extract of the Act.)

- Inspection of equipment to ensure that they are in good working condition before beginning a job. In addition, the contractor/proponent will ensure that regular inspections and maintenance of the equipment are conducted accordingly.

3.4.24 Land Planning Act Cap. 303

The operative clauses of this Act are contained in the Development and Use of Land (planning) Regulations, which provide that land be dealt with either under an area plan or a town plan, superintended by an interim planning authority. Under this Act, all developments or any form of land use in the designated areas are subject to approval by the interim planning authority or the Central Authority (the overall governing body under the Act) in the absence of an interim planning authority. The Central Authority decides instances when the proposal is to be referred to the relevant Local Authority.

Any change of use or actual development without authority is prohibited. Similarly, depositionof refuse, scrap or waste materials in a designated area without the consent of the planning authority or the relevant local authority is prohibited under this Act.

Thus, project proponent is subjected to seek legal permission before commencing the projectfrom the relevant local authority.

3.4.25 Building code 2000

This provides the basic rules, guidelines and standards that must be observed during construction. It is a comprehensive document, which every developer/proponents/ contractorshould have. All approvals shall be sought and regular monitoring will follow to ensure compliance.

3.5 International Conventions Applicable in Kenya:

Kenya has ratified various international conventions on environment that are applicable to this study. Conventions are agreements that are legally binding on states that have become parties to them. Kenya has the International Convention on Biological Diversity (1992) which promotes the protection of ecosystems and natural habitats, respects the traditional lifestyles of indigenous communities, and promotes the sustainable use of resources. The importance of wetlands and water birds are also covered under the Ramsar Convention 1971, which governs wetlands of international importance.

4. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Overview

The proposed project will have both socio-economic benefits and associated negative environmental impacts. The purpose of the EIA process is to therefore systematically assess the value of the benefits against the environmental concerns and provide measures to avoid preventor reduce the magnitude of the impacts. The mitigation measures are based on the underlying principle of EIA that everyone is entitled to a clean and healthy environment and a duty to enhance and safeguard the environment.

4.2 Positive impacts of the proposed project

The following are the positive impacts of the proposed development.

4.2.1 Simulation of industrial development coherent with Kenya's Vision 2030

The project ensures industrialization and development through the utilization of the country's mineral resources to catalyze diversified industrial development. This is in line with the Kenya Vision 2030 which aims at harnessing the mineral resources for industrial development and transforming Kenya into a newly industrializing middle income country.

4.2.2 Mitigating national and regional demand for metallic products

The establishment of the facility will increase production of iron which will help mitigate the deficit in national and regional demand as well as provide adequate raw materials for infrastructural industries.

4.2.3 Creation of employment opportunities

This proposed project will provide short term and long term employment opportunities for various experts and person(s) that will be hired during the planning and implementation activities. This will include both skilled and unskilled personnel especially from the local population. Hence, the experts and the local community members will derive income from theproject.

4.2.4 Source of revenue to the government

Both the County and National government will generate revenue in form of taxes generated during the acquisition of licenses and operations of the facility and also PAYE remitted from the employees' salaries.

4.2.5 Source of income to the proponent

The proposed facility through its operations will accrue income to the proponent enabling expansion of business and creating more employment opportunities for Kenyans.

4.3 Negative environmental impacts

Alongside the project benefits, there will are potential negative environmental impacts at the three phases of the project cycle. These are pre-establishment and establishment, operational and

possible decommissioning phases. The proceeding sections discuss each of these phases' impacts on the environmental and the livelihoods of the local community.

4.3.1 Pre-establishment phase

4.3.1.1 Change in land use

The land is unused but minor herding takes place. However, the proponent proposes to set up an iron ore mine which is inconsistent with the current land use.

Mitigation measure

- The proponent will apply and obtain a change of user from the County Government ofTaita Taveta.

4.3.1.2 Environmental risks of obtaining raw materials

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

Mitigation measures

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

4.3.1.3 Occupational safety and health

The workforce and visitors to the site will be exposed to potential health and safety risks such as injuries that may result from accidental falls and the use of construction tools and equipment with a potential to cause injury, permanent disability or death. Further, workers may be exposedto high noise levels and dust which may cause health problems.

Mitigation measures

- Register the site as a work place with the Directorate of Occupational Safety and HealthServices (DOSHS)
- Provide adequate and appropriate PPE and enforce their use
- Provide employees with correct tools and equipment for the jobs assigned and train ontheir use
- Obtain insurance cover for the workers at the site
- Provide first aid services and an emergency vehicle at the site
- Regulate the entry of visitors to the site by deploying adequate security measures
- Ensure moving parts of machines and sharp surfaces are securely protected with guardsto avoid unnecessary contacts and injuries during construction phase
- Comply with the provisions of the Occupational Safety and Health Act 2007

4.3.1.4 Water demand and effluent generation

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

Mitigation measure

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

4.3.1.5 Solid waste generation

The workforce at the site and activities undertaken during site preparation and construction of auxiliary facilities are expected to generate significant quantities of solid waste such as cuttings, plastic materials and rejected materials among others. The proponent will therefore ensure proper management of solid waste to avoid potential risks associated with poor disposal.

Mitigation measures

- Procure and strategically place adequate solid waste collection bins with a capacity for segregation within the construction site
- Create awareness on best waste management practices among the workers i.e. on the process of solid waste collection, segregation and proper disposal
- Procure a sizeable central solid waste collection bin with chambers to accommodate separated waste
- Procure the services of a NEMA licensed waste handler to dispose the solid waste
- Comply with the Environmental Management and Coordination (Waste Management) Regulations, 2006

4.3.1.6 Air pollution

Sources of air pollution during the construction activities and installation of the plant will result mainly from excavation works, mixing of aggregates and from movement of vehicles carrying construction materials. If generated in large quantities, dust may present a respiratory hazard, cause eye irritation or visual intrusion. It will potentially affect the workers, visitors to the project site and the neighbors if it is in excess of 100 µg/m3.

Mitigation measures

- Restricting the speed of trucks and other vehicles accessing the project site to 40km/hr
- Sprinkling water on excavation areas
- Provision and enforcement of appropriate PPE to workers such as dust masks
- Develop and implement an air quality monitoring plan to ensure compliance with thelimits set under Schedule 1 of the Environmental Management and Coordination (AirQuality) Regulations, 2014

4.3.1.7 Noise pollution

Noise and vibration emanating from vehicle accessing the site, excavation works and machinery operations may be a concern during operations at the site. Noise may lead to hearing impairments which will reduce the workmanship of the employees and also affect their finances due to treatment and medication. Construction sites such as the proposed mine which are near residential areas can only emit noise levels of up to 60 dB(A) during the day and 35dB (A) during the night as per the Second Schedule of the Environmental Management and Coordination (Noise And Excessive Vibration Pollution) (Control) Regulations, 2009. Some of the project activities such as use of heavy machinery and equipment may produce noise levels which are above these limits and are a health hazard. While the noise at this stage is inevitable itsimpact can be mitigated in the following ways

Mitigation measures

- Provision and enforcement of appropriate PPE to workers such as ear muffs
- Truck drivers will be sensitized to avoid unnecessary hooting or running of vehicleengines
- Minimizing the frequency of transport of construction materials
- Compliance to the Environmental Management And Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009

4.4 Operational phase impacts

4.4.1 Land degradation

This mainly results from stripping of the topsoil and excavation to expose the rock strata. This will tamper with the soil structure exposing the site to possible landslides and soil erosion as wellas interrupting the continuity of open space.

Mitigation measures

- Treat the mine faces by initializing stabilization of the quarry pits walls through steppingof the faces to prevent erosion. This also reduces the risk of loose boulders falling from mine faces during blasting
- Restore the affected areas through rehabilitation of decommissioned mine pits and planting of indigenous plant species which create a stable final landform with acceptablepost-mining land use capability

4.4.2 Removal and disposal of mine overburden

Establishment of the quarry will result in generation of overburden comprised of top soils, vegetation and rock rumble. If inappropriately disposed, the overburden becomes an eyesoreapart from harboring insects and disease causing vectors.

Mitigation measure

- Reusing overburden as backfilling material during site rehabilitation and restoration

4.4.3 Effects on landscape and visual intrusions

Stockpiles and quarry waste piling have a negative effect on the landscape by causing visual intrusion. Blasting activities usually destroy the original landscape of the affected area leaving behind huge depressions and a potential point of collecting water forming artificial ponds. These water pools have a potential to be hazardous and pose a threat to health. There is also a huge possibility that many of the surface features that were present before mining activities cannot be replaced after the process has ended.

Mitigation measures

- Take into consideration the existing landforms and vegetative cover in sitting before drilling and excavation
- Locate stockpiles, overburden, mine waste & haul routes away from sensitive landscape& visual receptors
- Backfill the mine pits where applicable using the overburden generated during excavation

4.4.4 Impact on biodiversity

Sections of the proposed site will be cleared to pave way for excavation and other quarrying activities. Quarrying activities disrupts the macro habitat and the species they support. There are species that are resistant to such disturbances while others are adversely affected to the extent of completely disappearing from the mining zone. Endemic plant and animal species are most affected since they are very sensitive and they require specific environmental conditions, even the slightest disruption of their habitats can result in extinction or put them at high risk of being wiped out.

Dust produced will also have physical effects on the surrounding vegetation such as blocking and damaging internal structures hence impacting on their physiological activities. Vegetation provide habitat for organisms. They also protect ground surface from wind and water erosion andstabilizes other physical environmental attributes such as microclimate, water and soil moisture regimes which in turn influence organisms' abundance.

Mitigation measures

- Retain vegetation cover where possible within the site
- Rehabilitate the quarried areas and plant appropriate indigenous trees or approved exotic ones in collaboration with the Kenya Forest Service

4.4.5 Occupational health and safety

Mining activities pose potential threats to the health and safety of workers on site. This may be in the form of dust from excavation works, fumes from machinery and vehicles accessing the site, accidents from machinery and equipment, injuries that may result from excavation activities and accidental falls. The pits may also pose a threat to community health and safety as they may become important breeding grounds for disease causing pathogens especially during the rainy

seasons, and accidental falls of both human and livestock in the water pools could lead to drowning.

Mitigation measures

- Register the site as a workplace with the Directorate of Occupational Health and Safety
- Provide adequate training to staff on health and safety
- Provide and enforce appropriate PPE among workers and visitors to the site
- Provide a fully equipped first aid box, first aid services and emergency vehicle at the site
- Provide the correct equipment to employees for the jobs assigned and trained on their use
- Designate a fire assembly point within the facility
- Set-up a fire safety plan for the facility
- Regulate access to the site by deploying adequate security measures and fencing where appropriate to protect workers, local community members and livestock from potential accidents
- Backfill the quarried areas to reduce the risk of becoming breeding ground for disease causing pathogens
- Ensure compliance with the provisions of the Occupational Safety and Health Act, 2007

4.4.5.1 Water demand and effluent generation

The mine will exert pressure on water for washing of vehicles and machinery, sanitation purposes, dust suppression and general housekeeping around the area during operations. 70% of the domestic water use will be generated as effluent while the rest will seep into the ground areaswithin the site. Effluent generated will need to be disposed off appropriately.

Mitigation measures

- Install a bio-digester to manage effluent
- Undertake quarterly analysis of the effluent
- Compliance with Environmental Management and Coordination (Water Quality) Regulations, 2006

4.4.5.2 Energy demand

The operations of the mine will increase the demand on energy for running the machinery and equipment and for lighting and powering of electrical appliances. Energy supply for development will be obtained from generators and solar systems.

Mitigation measure

- Maintenance of machinery and equipment in a serviceable and good working order to maximize their efficiency on fuel

4.4.5.3 Solid waste generation

The facility will generate solid waste mostly in form of explosives packaging, oil and grease containers used for maintenance of machinery and overburden among others. These have a potential of pollution if not disposed off appropriately. The proponent will therefore ensure proper management of solid waste during the operation of the quarry through the following measures.

Mitigation measures

- Procure and strategically place adequate solid waste collection bins with a capacity for segregation within the site
- Create awareness on best waste management practices among the workers i.e. on the process of solid waste collection, segregation and proper disposal
- Procure a sizeable central solid waste collection bin with chambers to accommodate separated waste
- Procure the services of a NEMA licensed waste handler to dispose the solid waste
- Re-use mine waste and soil materials piled at the site to refill (restore) the excavatedareas that exist as a result of mining
- Complying with the Environmental Management and Coordination (Waste Management) Regulations, 2006

4.4.5.4 Air pollution

Dust from construction activities is a major source of air pollution. Which requires soil to be removedwhich eventually causes the particles to become airborne through road traffic and wind erosion. The unrefined particles can be composed of toxic materials and ultimately affect the human health causing respiratory diseases. Blasting and crushing of the boulders will also produce lots of dust. In addition fumes and hydrocarbons produced by the heavy commercial vehicles and heavy machinery may lead to respiratory complications.

Mitigation measures

- Sprinkling water at the site to suppress dust
- Provision and enforcement of appropriate PPE to workers such as dust masks
- Retaining existing vegetation in areas which are not earmarked for open cast mining toact as dust screens and a buffer zone between the quarry area and the settlements
- Develop and implement an air quality monitoring plan to ensure compliance with thelimits set under Schedule 1 of the Environmental Management and Coordination (AirQuality) Regulations, 2014

4.4.5.5 Noise pollution

Mining involves several activities that generate significant amount of noise. These include blasting, use of powered machineries to transport the aggregates and processing plants that will crush and grade the materials. Excessive vibrations are mainly from drilling and crushing of the boulders is a nuisance and cause further disturbance to the environment.

Mitigation measures

- Use buffer zones by locating the quarry facility away from settlements
- Provide and enforce the use of earmuffs to all workers and visitors accessing noisy areasof the facility
- Increase the number of delay detonators used in a round of blasting so as to yieldminimal ground vibrations and noise
- Conduct noise mapping to inform mitigation measures 5. Comply with the Environmental Management And Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

4.4.5.6 Impacts of electric blasting

Blasting has both safety and health concerns during its deployment and eventual use of explosives. It exposes workers to airborne hazards from naturally occurring gases, chemical vapors and principal hazard such as noise, segmental vibration and heat. Susceptible structures to ground vibrations cause disturbances to the occupants.

Mitigation measures

- All loading and firing shall be directed and supervised by competent person(s) thoroughly experienced in this field and accredited accordingly
- Employing qualified personnel to handle and store the explosives
- Providing and enforcing the use of earmuffs to all workers and visitors to the facility
- Increasing the number of delay detonators used in a round of blasting
- Adhere to the provisions of the Explosives Act, 2016

4.4.5.7 Ground and surface water pollution

Mining activities present potential ground and surface water pollution. The hydrogeology regime will be affected by the distinct aspects of surface mineral extraction and associated activities which will result in groundwater pollution. Removal of the rock strata can cause the floor to heave and allow for water seepage. Sometimes quarries are dug below the water table and hence toxic materials could seep into the ground water. The activities of the proposed quarry will have a potential to pollute the river that lies approximately 1km from the proposed site. Surface water pollution can be caused by acid mine drainage and loading of Sediment, debris and impurities from soil erosion or surface runoff.

Mitigation measures

- Ensure that blasting and drilling are not undertaken to the water table level
- In the event of flooding, water will be pumped out of the mines to avoid acid rock drainage and dissolution. In case of any contamination, pumped water will be treated toneutralize the contaminants
- Secure the site with an impermeable boundary wall to ensure that the mining tailings and overburden are contained within the site

- Maintain maximum existing vegetation coverage and plant more trees along the boundary wall to act as buffers

4.4.5.8 Impact of heavy trucks on roads

Once the mine begins operations, there will be heavy commercial vehicles ferrying aggregates to different areas. Overloaded trucks may cause damage on the roads. To mitigate this impact the proponent and truck drivers will adhere to the axle load limits set by the Kenya Roads Board.

4.4.5.9 Decommissioning phase impacts

The lifespan of the mining is dependent on the quantities of the rock deposit, technology used to mine and financial sustainability of the business. Other circumstances that may warrant decommissioning include withdrawal or expiry of licenses issued by government agencies, closure by government agencies, court orders and natural calamities. The proponent will prepare and submit a due diligence decommissioning audit report to NEMA for approval at least three (3)months in advance. The impact at this phase will include the following:

1. Creation of an ecologically vulnerable land
2. Economic decline
3. Insecurity
4. Safety and health risks
5. Waste generation

4.4.5.10 Creation of an ecologically vulnerable land

At this phase, destruction of various fauna and flora at the site is evident. Quarrying activities also have a direct impact on the land by leaving pits and heaps of waste material. Excavation, drilling and blasting will tamper with the soil structure exposing the site to possible landslides and soil erosion. Additionally, the terrain of the site would be against the topography of the area.

Mitigation measures

- Construct contour banks to protect disturbed areas from erosion prior to stabilization
- Rip along the contoured slopes and immediate re-vegetation to increase slope stability
- Promote re-vegetation through the encouragement of the natural process of secondary succession

4.4.5.11 Economic decline

Employment opportunities and the County and National economic gain from the investment activity will be lost in the event of decommissioning of the proposed project.

Mitigation measures

- Train employees on alternative livelihoods prior to decommissioning
- Pay terminal benefits to all employees
- Comply with the Labor laws

4.4.5.12 Insecurity

Insecurity will result from the site when it's abandoned succeeding the decommissioning. Unoccupied structures and uncovered pits within the site will act as criminal dens and the security boost that had been provided by the facility to the local community would be lost.

Mitigation measure

- The proponent will contract a reputable security firm to man the site.

4.4.5.13 Safety and health risks

Any remaining structures will collapse and the open pits will accumulate water overtime. There will be environmental hazards stemming from the exposed left over substances which may cause soil and water contamination and/or generate noxious odor. Possible dust emission and accidents during rehabilitation of the site could also pose a health and safety hazard to workers and general public.

Mitigation measures

- Ensure the process of rehabilitation is supervised by competent personnel
- Install signage to warn person(s) of the ongoing activities
- Provide adequate and appropriate PPE and enforce their use
- Ensure first aid kit are be available on site
- Ensure workers are given the correct hand tools and equipment for the jobs assigned

4.4.5.14 Waste generation

Demolition activities will result in generation of both solid waste and effluent. The main sources of solid waste will include demolition waste from the auxiliary facilities. Effluent generated will also need to be disposed off appropriately.

Mitigation measures

- Contract a licensed construction company to carry out demolitions
- Reuse and recycle demolition waste and equipment as far as practical
- Contract a NEMA licensed waste handler to handle and dispose both solid waste andeffluent generated

4.5 Impact analysis

Potential project impacts are predicted and quantified to the extent possible. The magnitude of impacts on resources such as water and air or receptors such as people, communities, wildlife species and habitats is defined. Magnitude is a function of the following impact characteristics;

1. Type of impact (direct, indirect, and induced)
2. Size, scale or intensity of impact
3. Nature of the change compared to baseline conditions (what is affected and how)

4. Geographical extent and distribution (e.g. local, regional, international) 5. Durationand/or frequency (e.g. temporary, short-term, long term, permanent)

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

The levels of impacts are defined using the following terms

1. **Negligible impact (very low)…0…** - Where a resource or receptor would not be affected by aparticular activity or the predicted effect is deemed to be imperceptible or is indistinguishable from natural background variations.

2. **Less than significant impact (Low)...1…-** Is a minor impact where a resource or receptor would experience a noticeable effect but the impact magnitude is sufficiently low (with or without mitigation) and /or the resource or receptor is of low sensitivity. In either case, a lessthan significant impact must be sufficiently below applicable standard threshold limits.

3. **Potentially significant impact (moderate)…2…** - A moderate impact that meets applicable standards but comes near the threshold limit. The emphasis for such moderate impacts is to demonstrate that the impact has been reduced to a level that is as minor as reasonably practicable so that the impact does not exceed standard threshold limits.

4. **Significant impact (high)….3…** - One where an applicable standard threshold limit would orcould be exceeded, or if a highly valued or very scarce resource would be substantially affected

All the Environmental impacts have been weighted to be of moderate magnitude, Blasting however has the highest impact

4.6 Rehabilitation Plan

Rehabilitation will involve the following:

- Re-profiling-reinstate soils to a more stable landform
- Contouring the site- Land form reinstatement involves surface contouring to create astable land formation consistent with the surrounding land form.
- Re-vegetation-The re-vegetation of the site will involve direct seeding of native species.This species selection is guided by soil conditions, micro-climate and aspect of the new land form.

5. PUBLIC CONSULTATION AND PARTICIPATION

5.1 Introduction

The following section describes the public consultation. The aim of consultation is to ensure that stakeholder interests are identified during the ESIA study and that stakeholder views, and in particular those of PAPs, are taken into account at the project planning stage. Stakeholders' views are also important in shaping the development of the ESMP. Public consultation is a key component in the EIA process since it;

- Ensures that the process is open and transparent
- Provides valuable sources of information on key impacts, potential mitigationmeasures and possible alternatives
- Ensures that the proposed project meets the community needs
- Ensures that the project is legitimate and it is a way of ensuring that conflicts canbe addressed before the Authority makes a decision
- Assists in informed decision making - Promoted better implementation of theproject once the authority has made a decision on the proposed project
- Enlightens the community on the opportunities and benefits arising

The main findings and feedback from these events is summarized within this section whilecopies of the lists of attendees at the various consultations are provided in this report.

5.2 Stakeholder/ Public Consultation and Participation

This is a very important and an integral part of the ESIA process, which are a legal requirement and a very important tool for collection of the data and especially the baseline/background information. The ESIA helps bring out the contentious issues and gives a chance to those who may be affected by a proposed project to give their views, inputs and opinions and any significant issue is addressed at the initiation stage. This enables evaluation of the public and neighbors views and is thus a very important part of the study. Questionnaires, interviews and Focused Group Discussions (FGDs) with members of immediate community such a youth and women were used to collect their views.

5.3 Questionnaires and Interviews

Some of the targeted stakeholders did not respond while others refused to complete the questionnaires. Others were cautious and wanted to give their views without completing the questionnaires arguing that they do not wish to have their names indicated. Almost all the respondents were positive. Majority was reluctant to fill in their details in the questionnaires and preferred to give oral submissions.

5.4 Baraza

The Baraza started with a word of prayer and immediately followed by a brief introduction by the participators who were 30 in total. The chief introduced the EIA team. The Lead Expert gavea brief introduction on the proposed construction of the new courts. The participants were not given a chance to view the questions before the discussion started. The questions were centered on their views on the appropriateness of the proposed new mine its potential negative positive or no impacts, suggestions on mitigation measures. The discussions were allowed to flow freely but focusing on the issue at hand. The women and youth who were a bit reserved in the discussion were highly encouraged to contribute in the discussion. The Baraza gave the following feedback; Most of the respondents endorsed the project and the most emerging issue was employment creation for the youth and women. They also indicated various potential benefits including increase in residential premises, enhancement of security or otherwise, utilization of the land waslong overdue. However, they raised some issues regarding pressure on existing infrastructure, noise, potential pollution, dust and safety (during construction), enhanced social crime risks they recommended should be controlled to the minimum. They also mentioned the need for safe and adequate drive way, sounds drainage system and solid waste management. They indicated the obvious advantages including potentially better housing, creation employment, and promotion of development in the area and enhancing the utility of the land and urbanization. They indicated that issues of infrastructure should be addressed by the respective service providers in conjunction with the proponents beforehand e.g. power provider should assess the requirements and install the necessary equipment and facilities.

The issues raised and many others foreseeable have been adequately addressed in the report andin the ESMP

6. ANALYSIS OF PROJECT ALTERNATIVES

6.1 Overview

The environmental management plans proposed for the entire project cycle are considered adequate to mitigate the identified potential negative environmental and social impacts. However it is important to analyze the possible alternatives to the project to inform decision making by relevant government agencies and improve the environmental performance of the project. For the proposed project, four alternatives are feasible as follows;

I. The 'No Project' alternative
II. The 'Yes Project' alternative
III. Alternative site
IV. Alternative project

6.2 The 'No Project' alternative

Under this alternative the project will not be implemented and hence the status quo will be retained. This alternative represents the ideal mitigation measure for the negative environmental and social impacts as they will not occur as a result of the project. Conversely, the positive impacts of the project which include simulation of industrial development coherent with Kenya'sVision 2030, increased production of mineral resources, creation of employment opportunities and revenue generation to the government will be lost. This alternative is therefore not viable.

6.3 The 'Yes Project' alternative

This alternative envisions that the proposed project will be implemented as proposed in its entirety. It is the best alternative in mitigating the potential loss of benefits to the proponent, the community and the Government of Kenya. In addition, the project will improve the developmentranking of Taita Taveta County.

6.4 Alternative site

An alternative site could be considered for the proposed iron ore refinery and processing facility if the proposed project would present serious environmental challenges that cannot be reasonably be effectively managed. However, the proposed mitigation measures are considered adequate to minimize theimpacts to levels that do not warrant significant environmental damage. Additionally, the proposed site is considered suitable as it has sufficient and substantial rock deposit quantities. Hence, this alternative is not considered viable.

6.5 Alternative project

An alternative project such as a social amenity facility, a farm or a ranch could be possible in the event a mine is not feasible. There is availability of adequate land and substantial rock deposit quantities suitable for mining activities and this project is deemed economically viable compared to other project alternatives. Thus, an alternative project is not viable.

7. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 Introduction

This Environmental and Social Management Plan (ESMP) provides a logical framework within which the negative environmental and social impacts identified during the ESIA study can be mitigated and any beneficial environment effects can be enhanced. Monitoring and management practices as well as cost estimates included as applicable. Responsibilities and time frames for the implementation of the various aspects of the ESMP will be identified.

The actions have been grouped according to the various phases of the project cycle i.e. Planning, Construction, Operation, and Decommissioning. This categorization shall improve the implementation of the suggested mitigation measures throughout the project cycle. Each phase has a distinct set of activities that will need to be undertaken.

7.2 ESMP for Planning Phase

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

ESMP for planning stage

Environmental/ social impact	Proposed mitigation and aspects for monitoring	Actors	Monitoring	Estimated Cost	Frequency of Monitoring
Uncontrolled and incompatible development that is out of character with its context	Plan and obtain development permission for the project from relevant authorities	Registered Physical Planner and architect	Project approvals; routine inspections	10% of project cost	Random
Lack of Environmental Awareness on proposed project	Provide project information at entry to the project site.	Proponent, County Government of Taita Taveta, NEMA	Routine inspections; Sign boards and notices at project	150,000	Random

			site		
Uncontrolled site demarcation	Survey of plot and establishment/confirmation of beacons before commencement of construction.	Proponent, surveyor	Survey plan; site inspections	200,000	Once
Uncontrolled construction contrary to approved plans and of poor workmanship	Appointment of a qualified project manager and contractor	Proponent; Project Manager	Verification ; inspection	450,000	Routine
Mismanagement of site operations contrary to conditions of approval.	Appointment of project manager Appointment of Clerk of Works	Proponent; Project Manager	Verification ; inspection	2,050,000	Routine
Vulnerability to accidents and hazards during project implementation	Obtaining insurance to cover all accidents including Workmen's Compensation.	Proponent	Verification ; Inspection	300,000	Once

7.3 ESMP for Construction Phase

The phase included the construction of the extraction plant. This will be done in accordance with the mine design and plan. A contractor will conduct the works with supervision and oversight from the proponent. The Construction Environmental Management Plan below indicates the likely environmental impacts, which were anticipated from the project, and it indicates ways of mitigating them.

Table 3; ESMP for Construction Phase

Environmental/ social impact	Proposed mitigation and aspects for monitoring	Actors	Monitoring	Estimated Cost	Frequency of Monitoring
Noise and vibration	• Equip workers with standard noise attenuation features • Inform neighbours of any abnormal sound and response measures • Compliance with noise and excessive vibration regulation • No discretionary use of noisy machineries • No construction work at night	Contractor, workers	Inspection	20,000	Daily
Air pollution and dust	• Provision of PPE`s which must beworn • Suppression of stockpile by spraying water • Reduce speed of vehicle on site & on road linked to the site	contractor	Routine inspection	10,000	**Weekly**

Solid waste	• Use of durable long lasting materials • Provide facilities of proper handling of waste on site • Perishable materials should be purchased only when needed • Use building materials with minimal packaging • Carefully budget for constructionmaterial	Contractor, workers	Routine inspection	20,000	Daily
Vegetation	• Demarcate project area to be affected by the construction works to restrict disturbance to actual project area • Re-vegetate disturbed area through a proper landscaping & planting trees along the fence andin compound once the construction is complete (at least 10% of site be vegetated) • Location of project plant & components in area with least vegetation	Contractor and proponent	Observation of the ground vegetation cover	20,000	One-off

Health and safety risk	• Site shall be fenced and security services provided on site • Construction workers , visitors and everyone on site shall wear PPE`s • Reduce employees` exposure to dust and noise at the workplace • Have a well-stocked /equipped firstaid box on site • Close supervision of work • Construction of pit latrine forworkers • Instruct the workers on safety and health issues before the work begins every morning • Construction of warning signs shall be in place to warn public to avoid construction site • Adherence to standard	Contractor and proponent	Routine inspection	60,000	daily

	operational procedures and emergency procedures • Project vehicles to observe speed limits • Safety slogans should be strategically posted as a reminder to employees				
Water use	• Ensure efficient use of water and reuse where necessary • Construction workers shall be sensitized to avoid irresponsible water use • Harvest rain water	Contractor and his workers	Routine Inspection	50,000	Weekly
Energy use	• Ensure responsible energy use by switching off energy consuming Equipment or appliances when they are not in use • Planning of transportation schedule • Monitor energy use	Contractor and his workers	Routine inspection and maintenance	Nil	Monthly

7.4 ESMP for Operation Phase

The phase included the operation of the Facility. The Operation EnvironmentalManagement Plan below indicates the likely environmental impacts, which were anticipatedfrom the project, and it indicates ways of mitigating them.

ESMP for Operation Phase

Environmental /social impact	Proposed mitigation and aspects for monitoring	Actors	Monitoring	EstimatedCost	Frequency of Monitoring
Air pollution from dust andfumes	• Ore transportation vehicles shall be covered • Ore will be transported using a dump tank • Suppress dust within the project site	Project management	Inspection Routine maintenance	120,000	Weekly
	• Locate dust and fume generating activities where prevailing winds will blow it away from the premise and neighbouring settlement. • Every person working on the site must wear nose masks. • Introduce vegetation on bare grounds alongthe fence to act as windbreakers and air cleaner • Regular maintenance of all equipment`s onsite				

Vegetation loss	• Replant areas where vegetation was unnecessarily removed • Landscaping and planting all disturbedareas • Planting and grassing should be done just before the rains or irrigated on dry spells	Contractor; project manager	Observation	150,000	Random
Occupational health and safety	• ovide scaffolding to facilitate safe operations at high level • Every person on site must wear appropriate and adequate PPE`S relevant to where theywork • Sensitize and train workers on nature of environment they are working in, occupational health and safety • Firefighting equipment be provided and strategically placed • Provision of a fully stocked first aid box and a person trained on its application be employed • Incidence and	Proponents / workers	Inspection	300,000	Daily

	accident record shall be kept • Only frequently inspected road-worthy vehicles and well- trained drivers will bepermitted • Develop an emergency response plan • and enlighten the staff on safety measures and procedures through training • Strict adherence to factory and other				

	places of work Act andall occupational health and safety rules and regulation • Instruct all workers on safety health issues every day before work begins • Provide right tools, operations, instructions& manuals during work/operation phase • Engage the services of qualified personnel in the processing • Processing area (barren tanks, laboratory &leach tank areas shall be enclosed) • Sensitize staff on social/health issues such as drugs and HIV/AIDS • Ensure machinery and equipment`s servicing and maintenance as per schedules and legal requirements  • Medical examinationof employees before, during and after their employment will be ensured • Working equipment`s and their postures shallbe user friendly				

	• Put speed control bumps on the road linked to the site to the main road to control speed • Hygienic conditions at work will be maintained and enforced • Working procedures be implemented to minimize near miss and incidence • Water for consumption be provided for employees and it be located far from processing area to prevent its contamination • An antidote chemical to be in place on site tobe used in case of any accidental poisoning				
Waste generation and management	• Adapt on site sound waste management system to ensure proper solid disposal	Project management	Routine inspection	50,000	

	and collection facilities • Disposal of the waste shall be appropriately without compromising the environment and community in the recipient area • Segregation of waste before disposal • Reuse of waste material where possible				
Energy consumption	• Use of energy saving bulbs • Switching off unnecessary light • Servicing the generatorand other energy consuming /utilizing equipment`s regularly • Using alternative sources of energy especially renewable ones such as solar in lighting should be considered	Project management	Observation	100,000	
Security	• Provide security guards and facilities during the entire project cycle • The premise will be fenced and security personnel put in place	Project management	Observation	300,000	

Environment al audits	• Monitoring will involve measurements, observations, evaluations, assessment of changes in water quality, waste management, noise levels, and contractor safety etc.	Contractor/ proponent; NEMA	Inspection ; assessment	300,000 annually	Random
HIV/AIDS	• Develop programmes to sensitizing the community and workers on HIV/AIDS and /or other sexually transmitted diseases(STDs) • Develop appropriate training and awareness materials for Information, Education and Communication (IEC) on HIV/AIDS • Identify other players (local CBOs, NGOs and government organizations)on HIV/AIDS for enhanced collaboration • Have programmes that will distribute condoms to the workers and the community	project management and County government	Enforcement		

7.5 ESMP for Decommissioning Phase

This will be the final stage of the project, the phase will take place after the mining operations have taken place and the ore has been depleted. Decommissioning will involve demolishing thestructures and rehabilitating the land to its original position.

Table 5; ESMP for decommissioning phase

Environmental/ social impact	Proposed mitigation and aspects for monitoring	Actors	Frequency of Monitoring
Planning decommissioning	Inform the relevant authoritiesand employees on decommissioning and submit a decommissioning plan for approval	The proponent	3 months before Decommissioning
Removal of structures	All structures that will not be used for other purposes must beremoved and recycled as much as possible or disposed	The proponent Decommissioning Contractor	One off
Demolition and other decommissioning related wastes	Where recycling/reuse of the equipment and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site Disposing shall be in accordance with the environmental legislation	The proponent Decommissioning Contractor	One off
Covering/filling of excavations on site	All excavations shall be refilled with gangue rocks	Decommissioning contractor	One off
Public health concerns	• Provide suitable PPE`Sto workers • Provide first Aid Kit • Promote & maintain a safe work place • Dismantle all electrical connections • Check potential hazards	Decommissioning contractor	One off

	and risks to workers andthe public • Fence off all dangerous areas		
Rehabilitation of project site: Vegetation disturbance Land deformation, soil erosion, drainage problem	• Monitoring and inspection of the area forindication of erosion will be conducted and appropriate measure taken to correct any occurrence • Comprehensive landscaping • Implement an appropriate re-vegetation Program to restore the site to its original status • During the vegetation period appropriate surface water run-off controls will be taken toprevent surface erosion	Decommissioning contractor	One off

7.6 Possible displacement and relocation of people

The land for the proposed facility was a community ranch sold to developer on a willing buyer seller agreement no displacement and relocation took place.

However, these factors will be monitored closely and mitigated on as per the Environmental and Social Management Plan (ESMP). Physical planning will be carried out not only on the proposed location but also on the possible transport routes to ensure that the roads to be used are not on private lands.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

The proposed project is considered important and beneficial as it has the advantage of optimaluse of land, stimulation of industrial development coherent with Kenya's Vision 2030 and revenue generation to the government. Additionally, it will provide raw materials for construction and socio-economic benefits to the proponent and the residents of Manga area.

However, there will be negative impacts at all phases of the project cycle. The main concerns include habitat degradation, pollution of environmental media and health and safety concerns.

These impacts are found mitigatable and hence the EIA proposes a comprehensive Environmental Management Plans and Monitoring plans to improve the environmentalperformance during the entire project cycle.

8.2 Recommendations

The main recommendation of the EIA is the need for concerted implementation of the EMP and Monitoring Plans by the proponent. These include;

1. Register the site as a work place with Directorate of Occupational Safety and HealthServices
2. Install a bio-digester
3. Provide adequate and enforce the use of PPE
4. Procuring a sizeable central solid waste collection bin with chambers to accommodateseparated wastes
5. All loading and firing of explosives to be directed and supervised by competent person(s)
6. Comply with the provisions of the Mining Act, 2016
7. Adhere to the provisions of the Explosives Act Cap 115 5. Comply with Environmental Management and Coordination (Air Quality) Regulations, 2014
8. Comply with the provisions of the Occupational Safety and Health Act, 2007
9. Comply with the Environmental Management and Coordination (Water Quality)Regulations, 2006
10. Comply with the Environmental Management and Coordination (Waste Management) Regulations, 2006

On the basis of a commitment by the proponent to implement the proposed mitigation measures and the Environmental Management Plan, we recommend the issuance of an EIA License as per the Environmental Management and Coordination Act Cap. 387 of Kenya Laws and Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003.

9. REFERENCES

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9. Republic of Kenya (2003), Legal Notice No. 101: The Environmental (ImpactAssessment and Audit) Regulations, 2003.

10. APPENDICES

1. Certificate of Incorporation for Devki Steel Mills Limited
2. K.R.A PIN Certificate for Devki Steel Mills Limited
3. Land ownership documents
4. Approval of the scoping report and Terms of Reference for the study
5. Consultation questionnaires
6. Practicing Licenses for EIA