

**ENVIRONMENTAL IMPACT ASSESSMENT FOR THE
CONSTRUCTION OF GOLD ORE PROCESSING AND
WASHING FACILITIES FOR UMOJA WA WENYE MASHAMBA
ILINDI SITE LOCATED IN MWIME VILLAGE, ZONGOMERA
WARD, KAHAMA DISTRICT IN SHINYANGA REGION**

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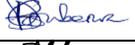
I declare the following:

- Undersigned have conducted the study professionally using acceptable methodologies.
- The study findings are correct to the best of our knowledge and have not been altered in any manner.
- The mitigating measures proposed (whenever relevant), to the best of our knowledge are reliable, practical, and adequate to comply with the relevant legal requirements; and
- Eng. Anael Macha shall be accountable for any misleading information in any part of this report

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ABBREVIATION AND MEANINGS

AIDS	Acquire Immune Deficiency Syndrome
As	Arsenic
ASGM	Artisanal and Small-scale Gold Miners
ASM	Small-Scale Mining
Ca	Calcium
Ca	Calcium
CBD	Convention on Biological Diversity
CBOs	Community-Based Organizations
Cd	Cadmium
CECL	City Engineering Company Limited
CHWs	Community Health Workers
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
Cl	Chlorine
CR	Critically Endangered
Cr	Chromium
CRDB	Cooperative and Rural Development Bank
Cu	Copper
DCDO	District Community Development Officer
DD	Data Deficiency
DED	District Executive Directors
DEMO	District Environment Management Officer
DMO	District Medical Officer
DPLO	District Planning and Land Officer
E&S	Environmental and Social
EA	Environmental Audit
EHO	Environmental Health Officer
EHPMP	Environmental Health and Pollution Management Project
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environment Management Act
EN	Endangered
EPP	Environmental Protection Plan
EPRP	Emergency Preparedness and Response Plan
ERT	Emergency Response Team
ESCBA	Environmental and Social Cost Benefit Analysis
ESCP	Environmental and Social Commitment Plan
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
EW	Extinct in the Wild
EX	Extinct
FDI	Foreign Direct Investment

Fe	Iron
FGD	Focus Group Discussion
GBV	Gender-Based Violence
GCLA	Government Chemist Laboratory Authority
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GoT	Government of Tanzania
GPS	Global Position System
GRM	Grievance Redress Mechanism
HIV	Human Immunodeficiency Virus
HSE	Health and Safety Expert
ICGLR	International Conference on the Great Lakes Regions
IFC	International Finance Corporation
IIED	International Institute for Environment and Development
IPIECA	International Petroleum Industry Environmental Conservation Association
IUCN	International Union of Conservation of Nature
K	Potassium
KASHWASA	Kahama Shinyanga Water Supply and Sanitation Authority
KUWASA	Kahama Urban Water Supply and Sanitation Authority
LC	Least Concern
LGAs	Local Government Authorities
LMP	Labor Management Plan
LSM	Large-Scale Mining
Ltd	Limited
MC	Municipal Council
Mg	Magnesium
MOI	Medical Officer In charge
MRO	Mines Resident Officer
NA	Not Available
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGOs	Non-Governmental Organizations
Ni	Nickel
NMB	National Microfinance Bank
NT	Near Threatened
OECD	Organization for Economic Co-operation and Development
OFC	Optic-Fiber Cable
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Authority
Pb	Lead
PIT	Project Implementation Team
PML	Primary Mining License
PPE	Personal Protective Equipment
RAS	Regional Administrative Secretary
RC	Regional Commissioner
RE	Revised

RFO	Regional Fire Officer
RHO	Regional Health Officer
RINR	Regional Initiative against the Illegal Exploitation of Natural Resources
RMO	Regional Medical Officer
RMO (Mines)	Resident Mines Officer
ROM	Run of Mine
RPC	Regional Police Commander
Sb	Antimony
SEA	Strategic Environmental Assessment
SEP	Stakeholder Engagement Plan
SMCL	State Mining Corporation Limited
SO4	Sulphate
SWAT	Soil and Water Assessment Tool
TANESCO	Tanzania Electric Supply Company Limited
TCB	Tanzania Commercial Bank
TFS	Tanzania Forest Service Agency
TMPs	Traditional Medical Practitioners
ToR	Terms of Reference
UN	United Nations
URT	United Republic of Tanzania
VAC	Violence Against Children
VC	Village Councils
VEO	Village Executive Officers
VPO	Vice President Office
VU	Vulnerable
WB	World Bank
WDC	Ward Development Committee
Zn	Zinc

°C	degrees Celsius
cm	centimeter
dBA	decibels
g	gram
kg	Kilogram
kg	Kilogram
km	Kilometre
km	kilometer
km/h	Kilometer per hour
Km ²	Kilometre square
m	meter
mg/kg	milligram per kilogram
mg/L	Milligram per liter
mg/Nm ³	Milligrams per cubic meter

EXECUTIVE SUMMARY

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INTRODUCTION

This report presents the Environmental and Social Impact Assessment (ESIA) for the development of gold ores processing and washing facilities under the Tanzania Environmental Health and Pollution Management Project (EHPMP). Given Tanzania's significant role in Africa's gold mining sector, addressing the extensive use of mercury in Artisanal and Small-scale Gold Mining (ASGM) is critical due to its severe health and environmental risks. The Tanzanian government aims to mitigate mercury-related issues by establishing demonstration centers in Shinyanga and Singida regions, focusing on training miners and introducing alternative technologies that minimize mercury usage. With an estimated 1.5 million individuals engaged directly in ASGM, along with millions relying on it for their livelihoods, the project is designed to educate miners on safer practices, thus protecting vulnerable populations, particularly women and children.

The assessment identified key environmental and social risks related to mercury usage, including health impacts on local communities and ecological degradation. Recommended mitigation measures emphasize the adoption of safer technologies, community education, and the provision of Personal Protective Equipment (PPE). By transforming ASGM practices towards sustainable methods, the EHPMP aims to reduce health risks and enhance livelihood standards in affected regions, establishing a foundation for responsible environmental management and socio-economic development in Tanzania.

PROJECT DESCRIPTION

This chapter outlines the accessibility of the project, land utilization, and ownership, as well as the activities planned for project implementation. The selection of the site took into account the criteria outlined in the IFC 2012 Environmental and Social Standard 5, with input from the Mining Commission. The chosen site, Umoja wa wenye mashaba lindi, falls within an active Artisanal and Small-scale Gold Mining (ASGM) zone licensed under the revised Mining Act of 2010. Additionally, a minimum distance of 60 meters from natural water sources, mandated by the Environmental Management Act (EMA) of 2004, and 200 meters from residential areas, as stipulated by the Mining Act of 2010, was considered.

Waste management practices involve the disposal of waste in shallow pits or on designated land areas, with recyclable materials being sold to prominent collectors in Kahama town. Furthermore, the project area is situated away from environmentally sensitive regions.

LEGAL REQUIREMENTS

Several policies and legislations set out the legal and regulatory requirements that are relevant to the proposed project. Additionally, there are pertinent standards governing environmental management and protection, health, and safety. Relevant policies and legislations about the development of the project mainly environmental management in terms of quality, health and safety, pollution of ground and surface water, pollution of soil, land, and land use control among others, were examined to ensure that the proposed development project meets and abides by these regulations.

The proposed project is subject to various policies, legislation, standards, regulations, and guidelines to ensure legal and regulatory compliance. These include policies such as

- The National Environmental Policy (2021)
- National Mineral Policy (2009)
- National Health Policy (URT, 2003)

- Construction Industry Policy (2003)
- National Land Policy (1997)
- National Gender Policy (2002), Energy Policy (2015)
- National Water Policy (URT, 2002)
- National Mineral Policy (2009)

Additionally, legislation and Regulations were included in this report such as the

- Environmental Management Act 2004
- Mining Act, 2010 and its revision of 2019
- The Water Resources Management Act, 2009
- The Occupational Safety and Health Act 2015
- The Fire and Rescue Force Act 2008
- The Public Health Act 2009
- The HIV/AIDS Prevention and Control Act, 2008
- The Employment and Labor Relations Act 2009
- Workers Compensation Act, 2008
- The Tanzania Extractive Industries (Transparency and Accountability) Act No. 21 of 2015
- Water Resources Management (Dam Safety) Regulation, 2013
- Environmental Impact Assessment and Audit (Amendment) Regulations (2018), Environmental Management (Air Quality Standards) Regulations, 2007
- Environmental Management (Soil Quality Standards) Regulations, 2007,
- Environmental Management (Water Quality Standards) Regulations, 2007
- Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations, 2015.

The following institutions involved in this project are the Vice President's Office (Division of Environment), the Ministry of Minerals, the Ministry of Water, NEMC, the National Environmental Advisory Committee, the Minister Responsible for Environment, Commissioner for Minerals, the Regional Secretariat, the Residence Mine Officer, NGOs/CBOs, Environmental Management Committee, councils (District, Ward, and Village).

ENVIRONMENTAL BASELINE INFORMATION

This chapter provides an overview of the environmental baseline conditions for the proposed project site in Mwime Village, Shinyanga Region, which will inform the assessment of potential environmental and social risks associated with the project. Data was collected at national, regional, and local levels, utilizing a combination of desktop studies, site investigations, and stakeholder engagement to gather pertinent information regarding the physical, biological, and socio-economic environment. The analysis revealed that Kahama has a tropical savannah climate characterized by distinct wet and dry seasons, with average temperatures ranging from 17°C to 32°C. Additionally, findings on soil samples indicated low levels of mercury and cadmium, while assessments of seismicity revealed a low potential for seismic hazards in the area. Notably, the recorded noise levels at Mwime exceeded environmental management standards, highlighting a potential concern for the local community and the project's impact on the physical environment.

Within the biological environment, a biodiversity assessment revealed that there were no endemic or threatened species at the project site, with no critical habitats requiring special management or protection identified. Common plant species included both native and non-native species, with the area primarily impacted by human activities such as mining and agriculture. The methodology employed for assessing flora and fauna involved site surveys, literature reviews, and consultations with local stakeholders. The findings indicated that the

disturbed nature of the area has led to limited ecological diversity, which could suggest minimal ecological impact from the proposed project.

The socio-economic baseline section provides an overview of the demographic characteristics, infrastructure, and economic activities within the Kahama Municipal Council, particularly focusing on Zongomera Ward. The area hosts a population primarily engaged in agriculture, livestock keeping, and small businesses, with significant involvement in mining activities impacting local livelihoods. Although there are health and educational facilities, challenges with equipment and resources persist. The analysis highlighted concerns around gender-based violence, child welfare, and the transient nature of the population due to mining activities, emphasizing the need for sustainable practices and strategies that address both community and environmental health as the project progresses.

STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT

In summary, broad consultation was made involving various institutions and key stakeholders including the following.

- Mining Commissioner
- Ministry of water
- Regional Commissioner
- Zonal NEMC Office – Central zone
- Tanganyika Basin Water Board
- Resident Mines Officer (RMO) office
- Umoja wa Wenye Mashamba Ilindi Site
- Shinyanga Regional office
- Kahama Municipal Council
- Government Chemistry Laboratory Agency (GCLA)
- Fire and Rescue offices
- Zongomera wards
- Mwime Villages Council
- Occupational Safety and Health Authority (OSHA) Central Zone

Major issues raised are:

- NEMC should begin implementing this project as it will provide significant support to small-scale miners by understanding and implementing essential safety measures
- NEMC should establish a proper procedure once the construction of those gold ores and washing facilities is completed, especially in the project management aspect, to avoid challenges in the future
- NEMC should work very closely with the Fire department in the respective areas to minimize risks that will likely occur
- The NEMC must collaborate with other institutions in conducting research in small miner's areas to determine the cause of mortality related to mercury exposure
- NEMC should develop local expertise to ensure the project's sustainability after completion.
- The demonstration center should comply with all the requirements

ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS

The section outlines the identification and assessment of potential environmental and social impacts associated with the proposed project across its life cycle: mobilization, construction, operation, and decommissioning. The Environmental and Social (E&S) screening processes, as covered in the project's Environmental and Social Commitment Plan (ESCP), have effectively

mitigated many risks; however, key concerns persist. These issues include the management of hazardous waste, noise pollution, dust generation, employee health and safety, and the adequacy of terms for worker employment. Detailed observations highlighted the potential for significant impacts in noise and health risks, particularly in areas with sensitive receptors like health centres and schools.

The assessment, based on established risk criteria, categorized several potential impacts with varying likelihoods and severities. Notable risks identified during the operational phase included the generation of harmful noise, dust exposure, employee safety linked to hazardous materials, and water resource management challenges due to contamination risks. Alternatives such as VAT leaching and direct smelting were evaluated for their potential to eliminate the use of mercury, with the latter presenting operational challenges despite its environmental advantages. The use of retorts for mercury separation was proposed as an innovative approach, emphasizing resource recovery and highlighting the balance of operational feasibility against environmental safety.

IMPACT MITIGATION AND ENHANCEMENT MEASURES

This chapter focuses on the essential impact mitigation and enhancement measures proposed for the project, outlining strategies to minimize negative effects during the mobilization, construction, operation, and decommissioning phases. The identified impacts can largely be addressed through established practices, regulatory compliance, and the implementation of safety protocols, many of which are supported by current legislation and industry best practices. Key mitigation measures for the construction phase include managing dust and noise levels, ensuring effective waste management, and safeguarding employee and community health through adequate training, personal protective equipment (PPE), and supervision. The chapter emphasizes the importance of community awareness and collaboration to create a safer and more efficient operational environment.

During the operations phase, the document highlights the critical need to reduce reliance on harmful chemicals like mercury. Strategies proposed to achieve this include optimizing processing techniques to enhance recovery rates, transitioning to mechanical methods to lessen labour-intensive tasks, and providing a supportive environment for workers with dependent children. The chapter also provides mitigation measures for the decommissioning phase, focusing on dust and chemical management, waste disposal, and habitat restoration. It stresses the importance of using qualified personnel and ensuring compliance with safety protocols to protect workers and the surrounding environment, as well as the necessity of employing native plant species in re-vegetation efforts to prevent the introduction of invasive species. Overall, the chapter outlines a framework designed to address potential environmental and social impacts while enhancing community benefits and operational efficiency.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The chapter presents the Environmental and Social Management Plan (ESMP), a framework designed to manage the social and environmental impacts identified throughout the lifecycle of the proposed project. The ESMP specifies mitigation actions, outlines the necessary organizational capacity and resources for implementation, and ensures compliance with relevant legislation. The primary goals of the plan are to minimize negative impacts and enhance the overall benefits of the project. The project implementor, in collaboration with the National Environmental Management Council (NEMC) and the Mine Commission, is responsible for executing the ESMP while monitoring its effectiveness and ensuring that

adequate resources are allocated. A detailed cost estimation is provided, allowing for effective budgeting and planning.

The ESMP includes specific mitigation measures tailored to various project phases, such as construction, operations, and decommissioning. For example, during the construction phase, measures addressing dust generation and potential accidents have been established, including the provision of personal protective equipment (PPE), worker training, and proper waste management practices. Similarly, during operations, the plan emphasizes reducing health and safety risks associated with chemical use and Labor practices. The decommissioning phase focuses on minimizing environmental disruption through effective waste management and the use of native plant species for site rehabilitation. By clearly delineating responsibilities, targets, and associated costs, the ESMP serves as a vital tool for ensuring that environmental and social considerations are integrated into project execution, thus providing a pathway toward sustainable development.

ENVIRONMENTAL AND SOCIAL MONITORING PLAN

Chapter Nine outlines the Environmental and Social Monitoring Plan (ESMP), which is critical for assessing the effectiveness of mitigation measures implemented throughout the project lifecycle. This monitoring program is designed to quickly identify deviations from environmental standards and expected trends, thereby allowing for timely adjustments to management strategies. The responsibility for environmental and occupational health safety monitoring rests with the Health, Safety, and Environment (HSE) Manager, who will collaborate with various departments to ensure compliance with monitoring protocols. Key aspects of the monitoring plan include evaluating water quality, noise levels, dust emissions, and operational health and safety data. The monitoring will involve on-site sampling by HSE experts, with samples analyzed in accredited laboratories and compared against established environmental quality standards. The implementation of the monitoring plan is budgeted at TZS 10,500,000 annually, ensuring sufficient resources are allocated to uphold and track the project's environmental objectives effectively.

EMERGENCY PREPAREDNESS AND RESPONSE PLAN (EPRP)

The chapter introduces the Emergency Preparedness and Response Plan (EPRP) specifically designed for Artisanal Small-Scale Gold Mining (ASGM) operations. Recognizing the inherent hazards associated with mining activities, the EPRP outlines a structured approach to effectively prepare for, respond to, and recover from various emergencies such as fire outbreaks, pit wall collapses, mercury exposure, equipment accidents, and medical emergencies. By establishing clear guidelines, roles, and responsibilities for all personnel involved, the EPRP aims to protect human life, minimize environmental impacts, and ensure efficient emergency response. The plan emphasizes preparedness through regular training and drills, fostering a culture of safety within the operational environment.

The framework of the EPRP includes the formation of an Emergency Response Team (ERT) comprised of designated individuals assigned specific roles during emergencies. Key objectives include safeguarding miners and local communities, reducing property damage, and enhancing communication during emergencies. The plan details prevention measures, immediate response procedures, resource management, and post-emergency actions to ensure thorough recovery and learning from incidents. Regular updates and training reinforce the commitment to safety and preparedness, making the EPRP a vital component in promoting resilience within the ASGM sector.

COST-BENEFIT ANALYSIS OF THE PROJECT

The entire investment allocated for this project amounts to 109,000,000 TZS, which will be utilized not only for project implementation but also for impact management and monitoring processes. Given that certain impacts may only manifest during the construction phase, associated costs will be short-term, particularly if mitigation measures are well executed and the project's benefits significantly surpass its costs.

SUMMARY AND CONCLUSION

The closure plan aims to establish safe, stable final landforms with self-sustaining vegetation similar to that in the surrounding landscape. The project implementation team will develop a decommissioning plan outlining the necessary activities for the Gold Ore Processing and Washing Facilities that will be involved in the decommissioning process. Additionally, an environmental study will be conducted to assess potential impacts and propose mitigation measures during the decommissioning phase, which will be submitted for approval by NEMC and other regulatory bodies. Upon successful completion of the decommissioning activities outlined in the plan, NEMC will issue a certificate of surrender by Section 37(1) of the EIA and EA Regulations of 2005.

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1 CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Tanzania stands as one of Africa's leading gold producers, with a rich history of over a century in Artisanal and Small-scale Gold Mining (ASGM). The mining sector is currently contributing 5.2% of the country's Gross Domestic Product (GDP), the bigger share being gold. The Tanzanian gold mining sector comprises two subsectors: the Large-Scale Mining (LSM) subsector, which is associated with large Foreign Direct Investment (FDI), infrastructure development, technology transfer, high productivity, and high export earnings. The second subsector is Artisanal and Small-Scale Mining (ASM) and it often involves local miners using basic methods to extract near-surface deposits. ASM is associated with low investment and low productivity, but it accounts for most of the sector's employment and is more accessible to the poor, especially in rural areas.

Artisanal and small-scale gold mining (ASGM) in Tanzania has resulted into significant environmental and social impacts due to long history of using mercury with little or no measures taken. Mercury is a common chemical in small-scale gold mining, is employed to separate gold from other minerals due to its unique ability to bind with gold and form an amalgam. Unfortunately, this process leads to substantial mercury emissions, contributing to about 37% of global mercury emissions. The adverse effects of mercury are most pronounced during the amalgamation process and open burning, especially when miners lack appropriate Personal Protective Equipment (PPEs) or retorts. Effectively managing mercury in ASGM gold extraction operations is crucial to mitigate health and environmental risks to ASGM and surrounding communities including biodiversity and human being as well.

The Tanzanian government has taken steps to address these issues through the Tanzania Environmental Health and Pollution Management Project (EHPMP). The EHPMP has been initiated as one of the measures to reduce the health risks associated with the unsafe use of mercury in Artisanal and Small-scale Gold Mining (ASGM). It aims to strengthen the institutional capacity to manage and regulate mercury use in the ASGM and to introduce alternative technologies to mercury for gold recovery in the ASGM subsector that can be adopted and accepted by the ASG miners, service providers, Local communities surrounding the mining sites and Regulators. The government of Tanzania through Environmental Health, and Pollution Management Project (EHPMP) has received a grant from Global Environmental Facility (GEF) through a Grant Aid Agreement signed by the Government of Tanzania (GoT) and the World Bank (WB) to construct mineral processing centres in the seven (7) selected regions that have the greatest concentration of ASGM i.e., Geita, Mara, Mwanza, Shinyanga, Singida, Mbeya and Songwe. The project is divided into several Lots. This project covers the Lot 1, proposed demonstration minerals centers in Shinyanga and Singida Regions.

The National Environmental Management Council (NEMC) is the Project Implementation Team (PIT) for the construction of the gold ores processing and washing facilities project. NEMC in collaboration with the Mining Commission intends to construct mineral processing centers equipped with Personal Protective Equipment (PPE) to be used as demonstration centers for the safe handling of Mercury in Artisanal and Small-scale Gold Mining (ASGM) sites in each 7 selected regions found in Tanzania mainland.

To align with the Project Environmental and Social Commitment Plan (ESCP) requirements and the Environment Management Act of 2004, the Project Implementation Team (PIT) under the National Environment Management Council (NEMC) has engaged an Individual Environmental Expert, Eng. Anael Macha, to undertake an Environmental Impact Assessment

(EIA) of the proposed demonstration minerals centers in Shinyanga hence this study covering one of the site in Shinyanga for Umona wa wenye Mashamba ilindi sited located in Mwime village.

1.2 PROJECT RATIONALE

ASGM in Tanzania contributed about 90% of the total employment in the mining sector and contributed 30% of total gold production (42 tonnes) in the year 2020/2021. For many of these mining is a way of life supporting a variety of livelihoods. A study commissioned by ILED on the interaction of ASM and agriculture estimated the number of active ASM participants in Tanzania to be around 1.5 million (service providers, financiers, surface rights holders, and miners) with 9 million people depending on the sub-sector for their livelihoods. This is close to the numbers reported in the National Action Plan on ASGM which states a total of about 1.2 million people are engaged in ASGM activities in Tanzania with an estimate of 7.2 million people (equivalent to 13% of the total national population) depending indirectly on ASGM.

The gold processing and recovery method deployed by ASGM is dominated by the use of mercury due to its affordability, and ease of use. ASGM has been using it for many years, and they are familiar/experienced with its supply chains and use. Mercury is used to separate gold from other minerals/materials in the mined ore due to its ability to bind to gold and form an amalgam. Mercury is released into the environment during amalgamation, separation of amalgamation from pan water, removal of excess mercury, and burning of the remaining amalgam to evaporate the mercury and produce a gold sponge. Mercury fumes are colorless and odorless hence one does not notice that they have been exposed. The problem is worsened when gold shops are located in urban areas where many people can be unknowingly exposed. In addition to the acute inhalation concern, this mercury is emitted to the atmosphere and circulates the world causing global pollution of ecosystems and the food chain - particularly fish.

The major exposure of mercury in the ASGM communities occurs during the amalgamation process burning as it is undertaken without wearing appropriate Personal Protective Equipment (PPEs) with bare hands and no respiratory protection or encasing of fumes during open burning of the amalgam to remove the mercury and remain with the pure gold. The baseline situational analysis included in the ASGM National Action Plan states that national mercury consumption by ASGM is about 13.2 - 24.4 tons per year. The EHPMP Project implementation document also states that available literature indicates that in ASGM for every 1kg of gold recovered about 2 kg of mercury is used and most of it is released into the environment.

Minamata initial assessment survey done by the United Republic of Tanzania (URT) in 2016/2017 indicated that gold extraction with mercury amalgamation processes contributed to releasing mercury of 602 kg/annum to air; 520 kg/annum to water; and 642 kg/annum to land. It is also reported that manually squeezed amalgam usually contains 40-60% mercury. The report also indicated that ASGM is the most affected subsector, where about 1.5 million people were estimated to be at mercury exposure risk, of which 20-30% were women including about 75,000 children.

Mercury is a powerful neurotoxin that is harmful to people, but especially to developing fetuses, and young children. Once emitted, mercury can travel great distances through the atmosphere, causing global contamination of ecosystems, fish, birds, mammals, and the human food chain Millions of miners, infants, children, women of childbearing age (potentially

pregnant), and breastfeeding women, work or live in ASGM communities and are at risk of mercury exposure¹.

Due to the importance of ASGM in supporting both the country's GDP and livelihoods, this project has been initiated to assist in reducing the risks while looking for alternative technologies.

¹ [AGC Practical-Guide-on-Reducing-Mercury-in-ASGM_en.pdf \(artisanalgold.org\)](#)

1.3 ESIA OBJECTIVES

1.3.1 Main Objectives

The main objective of this study is to undertake an exercise for the development of ASGM gold processing and washing facilities for two main aims:

- i. To obtain an EIA certificate by the Environmental Impact Assessment and Audit Regulations of 2005 as Amended in 2018
- ii. To comply with the financiers' requirements which have been narrated in the project Environmental and Social Management Commitment Plan

1.3.2 Specific Objectives of this study as adopted from ESMF Annex III are:

Specific Objectives of this study as adopted from ESMF Annex III are:

- Establish the baseline conditions of the study area through a combination of desk review of data provided by NEMC, consultations, and site visits taking account of any committed development projects that could change the baseline in the future;
- Identify environmental constraints and opportunities associated with the study area which may influence, or be affected by the proposed technologies;
- Identify and assess any environmental impacts (both positive and negative) which could result from the proposed project;
- Identify and incorporate into project design and operation, features and measures to avoid or mitigate adverse impacts and enhance beneficial impacts; and
- Assess the level of significance of all residual effects (direct and indirect, adverse and beneficial, short-term and long-term, permanent and temporary) taking into account the proposed mitigation measures

The ESIA process and subsequent EIS documentation were undertaken in accordance with the requirements of the EMA and the Environmental Impact Assessment and Audit Regulations, 2005 and the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018.

1.4 METHODOLOGY

The methodologies that were adopted for the study involved desktop document review, interviews and use of software including GIS for mapping; Soil and Water Assessment Tool (SWAT) for delineating catchments and defining streams; Excel for data analysis and Word for reporting were also applied; and observation during site visit for collecting biophysical and socio-economic information.

1.4.1 Document Review

Several documents were reviewed to obtain information pertaining to the project design, components, and activities; baseline physical, biological, and socio-economic environment; legislative environment; environmental standards; ASGM norms; Use of Mercury best practices; similar activities impact; best practices in baseline data collection, stakeholder engagement, and impact assessment; best practices in related impacts mitigation. Documentation that was covered include:

- Project design document and operational manual (once available); Project ESMF, ESCP, SEP, LMP

- Principal Act and subsidiary regulations governing Mining, Environment Management, Water, Public Health, Chemicals, Gender and Child Labor;
- International standards including The World Bank Environmental and Social Standards, General and Mining EHS Standards; Minamata Convention on Mercury; and UN Global Mercury Assessment.
- Local studies on ASGM practices and impacts including the National Action Plan for Artisanal and Small-Scale Gold Mining 2020-2025, Artisanal and small-scale mining in Tanzania – Evidence to inform an 'action dialogue.

1.4.2 Site Visit

The project team visited the four sites included in this study to get firsthand information on the site and surrounding environmental conditions by observation: stakeholder consultation and field surveys. No field measurements and sample collection were undertaken to establish the flora, fauna, Noise and vibration, water quality, air quality, and soil quality as this activity was already undertaken by the PIT during site selection and preparatory works and was provided by NEMC to the consultant as per contract. Field surveys were mainly to identify and map the different environmental components e.g. vegetation, surface and groundwater sources, mining pits, processing and washing facilities, health facilities and stakeholder consultations.

1.4.2.1 Stakeholder Identification and Consultation

Identifying individuals or groups with a vested interest in the project provides insights into vulnerable or influential stakeholders. Stakeholder engagement facilitates the disclosure of project information and the incorporation of stakeholders' perspectives, concerns, and impacts into the project design and Environmental and Social Management Plan (ESMP). The project's Stakeholder Engagement Plan serves as the primary document guiding stakeholder identification, categorization, and engagement at the project sites. To ensure that the engagement is transparent, timely, and informed, the team sent notifications (such as official letters, notices, emails, or phone calls) with the agenda to be discussed prior the engagement.

As presented in Annex I, the SEP show the identified stakeholders that has been consulted in this study including host communities, LGAs at the village, ward, district, and regional levels; and sectoral regulators e.g. Forests, Water, for health and gender matters RMO, DMO, medical personnel, police, NGOs, local schools, local health facilities, and ASGM groups. Consultation methods applied included consultative meetings, interviews; focus group discussions; and meetings depending on the stakeholder category and availability.

1.4.2.2 Field Surveys

To establish the existing hydrology, hydrogeology, vegetation, and biodiversity abundance and variability in the area random and transect walks and interviews with community members were undertaken. The community members utilize the ecosystem services in various ways e.g. wood/timber gathering, herbs by herbalists, hunters, and fishermen. GPS coordinates and photographs will be taken for reference once back in the office and for inclusion in the study.

1.4.3 Impact Identification and Risk Assessment

Some of the potential impacts of this project as narrated in section 3.1 of the ESMF for this project were included. Due to its simplicity, the Leopold Matrix will be used to identify the

Valuable Ecosystem Components that will interact with the project. The criteria used for impact assessment will at minimum include type (+/-), scale, duration, magnitude, reversibility, and probability of occurrence. The Consultant considered Table 1 and Annex II included in the project ESMF for significance rankings. Matrices that aid in assigning a value to the criteria for impact assessment to establish significance may also be adopted as long as they align with ESMF Annex II included in Appendix IV.

1.4.4 Mitigation, ESMP, and Monitoring

Statutory requirements (particularly the EIA and Audit Regulations of 2005 as Amended in 2018, Mining (Environmental Protection for Small Scale Miners Regulations of 2010, Industrial and Consumer Chemicals (Management and Control) Regulations of 2020), WB ESMF, best practices and guidelines for similar projects and context were the main criteria used to propose mitigation, management, and monitoring requirements for the project. The proposed mitigation measures considered the receiving environment, technological feasibility, local applicability, and social acceptance of the proposal project. The ESMP chapter is presented as per Annex IV of the ESMF however, as already the EIS report which adopted the format required in ESMF Annex III, item 2: Project Description will not be repeated in the ESMP section.

1.5 SCOPE OF THE PROJECT AREA

The scope of this study is as guided by the Environmental Impact Assessment and Audit Regulations of 2005 and its Amendment of 2018, the terms of reference (ToR) and scoping report that were approved by NEMC on 05th April 2024 via screening decision letter with reference number HD./145/205/28/02. The ToR approval letter from NEMC is appended in Appendix II of this report.

1.5.1 Spatial Boundaries

The spatial boundaries cover the geographical spread of the impacts regardless of whether they are short-term or long-term. The spatial scale considers the receptor environmental component and can be local or broader. Two zones of impact namely the core impact zone and the influence impact zone were considered.

- The core impact zone: The core impact zone includes the areas immediately bordering the project area. In this case, this project will include the site where the gold ore processed and washing facilities will be built and the immediate physical environment that the project may impact.
- The influence impact zone: This encompasses the area beyond the anticipated project area that may be positively or negatively impacted by the project, i.e., economic losses/benefits and resources that may result from the project operation.

1.5.2 Temporal Boundaries

The project will be divided into four phases: the mobilization, construction, operation, and decommissioning phases, as illustrated in section 2.5.

1.5.3 Institutional Boundaries

Institutional boundaries in this context pertain to the institutions and sectoral boundaries within which the project is situated or mandated. The project involves the construction of gold ores processing and washing facilities to be used as demonstration centers by ASGM around

Mwime village. The relevant institutions and administrative units of interest in Tanzania are listed below.

- Mining Commissioner
- Ministry of water
- Regional Commissioner
- Zonal NEMC Office – Central zone
- Tanganyika Basin Water Board
- Resident Mines Officer (RMO) office
- Umoja wa Wenye Mashamba Ilindi Site
- Shinyanga Regional office
- Kahama Municipal Council
- Government Chemistry Laboratory Agency (GCLA)
- Fire and Rescue offices
- Zongomera wards
- Mwime Villages Council
- Occupational Safety and Health Authority (OSHA) Central Zone

These institutions have been consulted, as they are key stakeholders with a vested interest in the safe development and operation of this project.

1.6 TERMS OF REFERENCE

The terms of reference for this study were narrated in the project ESCP. It stated that at minimum the project should cover the requirements under the Environmental Impact Assessment and Audit Regulations and the World Bank Environmental and Social Standards specifically:

- ESS 1: Assessment and Management of Environment Risks and Impacts
- ESS 2 Labor and Working Conditions
- ESS 3: Resource Efficiency and Pollution Prevention
- ESS 4: Community Health and Safety
- ESS 10: Stakeholder Engagement and Information Disclosure

1.7 PRELIMINARY STUDIES

NEMC conducted environmental baseline studies for the sites and collected data about air, soil, water, and noise quality. Furthermore, some stakeholder engagement relevant to the preliminary studies was done covering Regional Administrative Secretaries, Miners' Associations Leaders, LGA (Village to District Level), PML Owners, Miners, and Resident Mines Officers (RMO).

1.8 STRUCTURE OF THE REPORT

This report is structured as was prescribed in the Project ESCP Annex III and to comply with the requirement of Regulation 6 (EIA Regulations 2018 amendments) as follows;

- **Chapter One:** contains the introduction on the background information of the proposed project, its rationale, and the proposed project implementation arrangements.
- **Chapter Two:** contains the project description, in which there is a description of the location and relevant components of the project and their activities.

- **Chapter Three:** illustrates policy, legal, and administrative framework, which are the relevant Tanzanian environmental policies and legislation applicable to the existing projects including WB ESS and General EHS Guidelines.
- **Chapter Four:** describes the area of influence and relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences.
- **Chapter Five:** expresses the consultation exercise at the project area detailing the list of stakeholders consulted and the issues raised Stakeholder engagement plan, Grievance Redress System
- **Chapter Six:** describes the environmental impact assessment and identification of relevant environmental and social risks and impacts of the project. This will include the environmental and social risks and impacts specifically identified in ESS2–8, and any other environmental and social risks and impacts arising as a consequence of the specific nature and context of the project, including the risks and impacts identified in ESS1, paragraph 28. It should include positive environmental and social outcomes as well. of Alternatives.
- **Chapter Seven:** describes mitigation measures for the potential negative impacts. Identifies mitigation measures to manage the environmental and social impacts and significant residual negative impacts that cannot be mitigated and, to the extent possible, assesses the acceptability of those residual negative impacts. Identifies differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable. Assesses the feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of proposed mitigation measures, and their suitability under local conditions; and the institutional, training, and monitoring requirements for the proposed mitigation measures. Specifies issues that do not require further attention, providing the basis for this determination. Covers Environmental and workers' health and safety measures. Includes a monitoring plan identifying parameters to be monitored, frequency, and responsible authority.
- **Chapter Eight:** presents the Environmental and Social Management Plan (ESMP). Identifies key measures and actions and the timeframe required for the project to meet the requirements of the ESSs. This will be used in developing the Environmental and Social Management Plan (ESMP).
- **Chapter Nine:** presents the Environmental Monitoring Plan that contains the proposed institutions to carry out the monitoring activities, the monitoring indicators, the time frame, and the proposed budget for monitoring.
- **Chapter Ten:** gives the cost-benefit analysis of the project.
- **Chapter Eleven:** provides the conceptual decommissioning plan for the proposed project.
- **Chapter Twelve** gives the summary and conclusion of the assessment.

ANNEXES

- List of the individuals or organizations that prepared or contributed to the environmental and social assessment.
- References—setting out the written materials both published and unpublished, that have been used.
- Design drawings
- Record of meetings, consultations, and surveys with stakeholders, including those with affected people and other interested parties

2 CHAPTER TWO: PROJECT DESCRIPTION

2.1 PROJECT LOCATION AND ACCESSIBILITY

The Umoja wa Wenye Mashamba Ilindi Site is located at coordinates (03052'43.4' 'S, 32036'50.2'' E) administratively being within Ilindi hamlet, Mwime Village, Zongomera Ward in Kahama district, Shinyanga Region. The site can be accessed through a 7 km all-weather earth road off the main Kahama - Isaka highway as indicated in Figure 2-1.

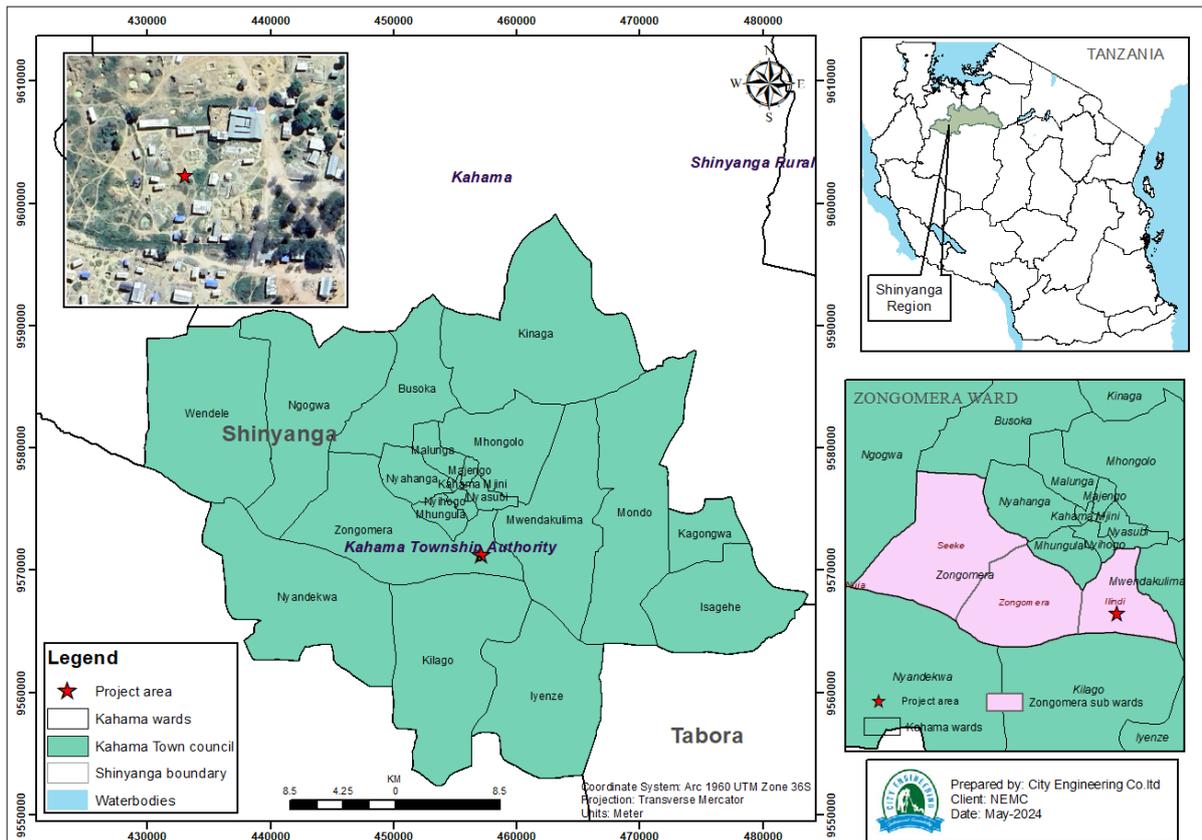


Figure 2-1: Administrative Location of Mwime Site Owned by Umoja wa Mashamba Ilindi

Source: City Engineering 2023

2.2 LAND USE AND OWNERSHIP

The land on which the proposed project will be implemented is owned by Umoja wa Wenye Mashamba Ilindi, who consented to the area being used for the project as per the attached Minutes of the meeting from the Ilindi Development Committee. The Primary mining license PML0059KHM is also 100% owned by Umoja wa Wenye Mashamba Ilindi, covering 7.29 hectares. PML No. 0432KHM was granted on 03/03/2020 and will expire on 02/03/2027.

2.3 EXISTING SITUATION

The mining operations at Ilindi – Mwime site PMLs started in 2015 and have been operational to date. The mining method is underground, with over 100 mining pits (Maduara), where 30 are active. The underground mine pits developed have an average mining depth ranging from 10M – 120 M. The daily mining production rate is between 142 and 571 tonnes of gold ore, equivalent to 1000 – 4000 bags of 80 kg each. The site has more than 1000 people involved in daily small-scale mining operations.

The area allocated by the cooperative for the construction of the Gold Ores Facility is situated within a well-established zone characterized by mixed land uses, including mining, mineral processing, and related trading activities. The core project area was formerly used for ASGM processing activities and was abandoned (Figure 2.2), with remnants of the floor, toilets, and some of the wash bay. The proposed gold processing plant area will make use of a 40m long by 15m wide abandoned area. To the left of the proposed project site, at the back and right, you'll find the mining and processing sites, while to the front, it faces the street road. The site selection report stated that the area was selected to demonstrate the reuse of the abandoned processing areas and reduce disturbances in an affected area.



Figure 2-2: Appearance of Mwime Site Proposed to accommodate the Gold Ores Plant
Source: Site Visit -City Engineering Co. Ltd, 2023

The project site is away from sensitive environmental features (i.e., not within a protective area, at least 60m from natural water sources as per Environmental Management Act (EMA) 2004 and at least 200m from residential as per Mining Act 2010). However, there is a petroleum pipeline located more than 60m from the PML.

2.4 CURRENT STATUS OF GOLD PROCESSING OPERATIONS

The current ore processing process is the conventional crush–mill–extract process common in ASGM operations. The process flow is as indicated in Figure 2-3 with the VAT leaching of tailings occurring offsite. The mining site has eleven (11) gold ore processing and washing bay facilities (Mialo) and eleven (11) crushers to crush and grind ore materials. All crushers and gold processing and washing bay facilities are within the PML and it is preferred that processing is done within the site, either by utilizing the existing processing facilities or free to build their own. The available amalgamation pools were enclosed within houses made of mud/pole walls and roofed with corrugated iron sheets. Amalgam burning was said to be done via a charcoal stove just outside the amalgamation pool building.

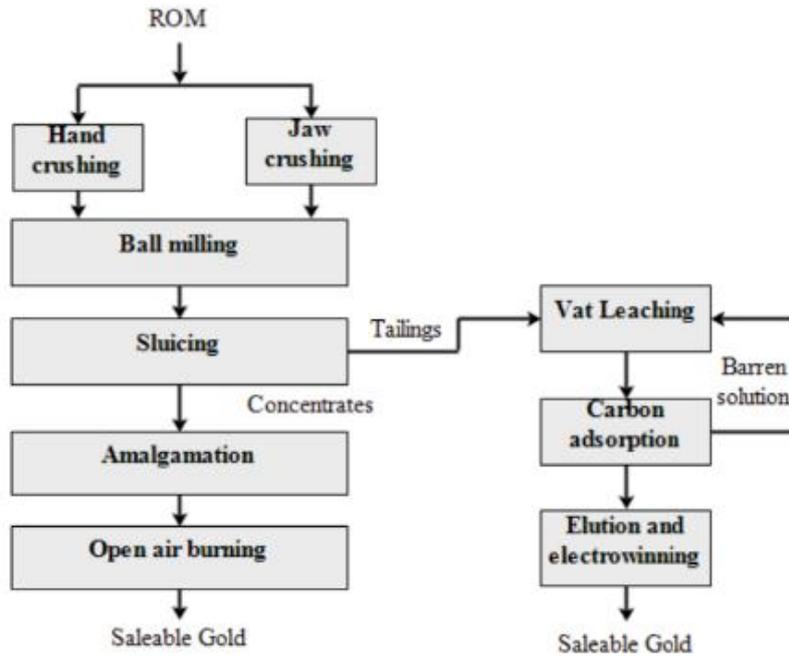


Figure 2-3: Current Gold Ores Processing Flowsheet at ASGM Sites²

Source: Site Visit

2.4.1 Gold Ore Processing

2.4.1.1 Hand Crushing

This is the initial stage, where miners manually crush large pieces of ore into smaller fragments of 20.0cm. This is done by using simple tools such as hand hammers to minimize ores sizes into smaller pieces enough to be processed into a jaw crusher.

2.4.1.2 Jaw Crusher

After hand crushing, the smaller pieces of ore, approximately 20cm in size, are fed into a jaw crusher. This mechanical device uses two metal plates to further crush the ore into finer particles. The jaw crusher has one stationary plate and one moving plate that oscillates back and forth, crushing the ore against the stationary plate to produce particles about 0.25cm in size.

2.4.1.3 Milling

Once the ore has been crushed, it is transferred to a ball milling machine with are made about 25 to 40 mm thick where it grinds the ore into a fine powder. The milling process increases the surface area of the gold particles, making it easier to extract the gold.

2.4.1.4 Sluicing

The milled ore is then subjected to sluicing, then fine ore powder is mixed with water and passed through a sluice box, which is a long, inclined trough. As the slurry flows down the sluice

² [\(PDF\) Situational Analysis of Gold Processing Practices at Artisanal and Small-Scale Gold Mining in Tanzania \(researchgate.net\)](#)

box, gold particles trapped and settle to the bottom, while the rest of residuals flows out of the box. Sluicing through a commonly used gravity concentration method helps concentrate the gold particles, separating them from other metals and wastes.

2.4.1.5 Amalgamation

In the amalgamation stage, gold concentrates are mixed with mercury and panned for several minutes to produce gold amalgam. Amalgam is formed after mercury binds to the gold. Amalgam formed will contain mercury which will be squeezed using a piece of cloth for further processes.

2.4.1.6 Open Burning

The final stage which followed by the open-air burning of gold amalgam using the charcoal stove to remove and release the remaining mercury in the form of vapor and produce the sealable gold products.

2.4.2 VAT Leaching

Once the ore has gone through the conventional crush-mill-extract process, the remaining tailings, which contain residual gold, are subjected to chemical leaching. In VAT leaching, these tailings are collected by medium or larger miners and placed in large tanks where a cyanide solution is added. The cyanide solution percolates through the tailings, dissolving the remaining gold. Chemical leaching allows for the recovery of gold that might not have been fully extracted during the initial stages. However, it requires careful handling and management to prevent environmental contamination and ensure worker safety. This process is conducted away from Umoja wa wenye mashamba Ilindi site.

2.5 PROPOSED GOLD ORES PROCESSING FACILITIES

Figure 2-1 (Site layout) and Appendix IV (Conceptual design) present the proposed facilities for gold ore processing. The design will include the following components: -

- Crushing area
- Electric motors or Diesel Engine
- Oil spillage compartments
- Water tank
- Mercury contaminated tailings Storage area
- Amalgamation Pond
- Mercury contaminated water storage area
- Tailings storage area
- Sluice Box
- Sluice Table
- Baffle walls
- Settling Pond

Different phases and associated activities to establish the proposed project are detailed described in sections below.

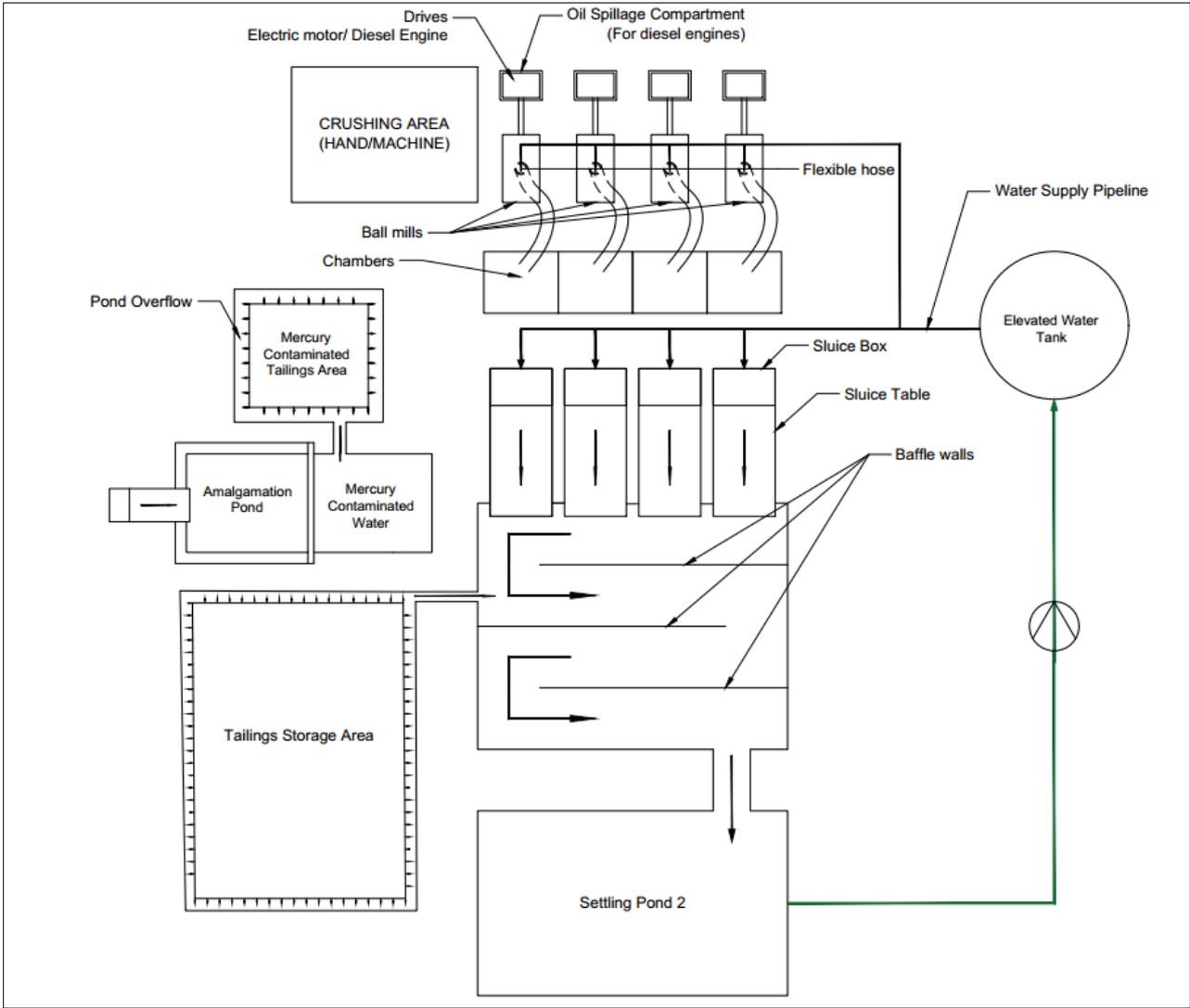


Figure 2-4: Gold Ore Processing Plant Layout

(Source: CECL, 2024)

2.6 PROJECT PHASE AND ACTIVITIES

The proposed project is structured into several phases; the pre-construction, Mobilization and Design, construction, operational, and decommissioning phase. Each phase contains a unique set of activities essential for successful implementation of the project. These phases serve as the blueprint for navigating the project towards its intended outcomes.

2.6.1 Pre-construction phase

This stage involved site investigations including environmental baseline studies conducted by the National Environmental Management Council (NEMC) to gather data on air, soil, and water quality, noise, and vibration at various sites. Additionally, stakeholder engagement initiatives were undertaken, involving Regional Administrative Secretaries, Miners' Associations Leaders, Local Government Authorities spanning from village to district levels, PML Owners, Miners, and Resident Mines Officers (RMO). Subsequently, the Project Implementation Team (PIT) conducted a site selection exercise in July and August 2022. Sites provided by the Mining

Commission were within active Artisanal and Small-Scale Gold Mining (ASGM) areas, including licensed sites under the Mining Act of 2010 (revised in 2019) and recognized Gold Rushes.

2.6.1.1 Site Selection

The project site screening by PIT was done to align with project ESCP requirement through following the exclusion criteria that the project sites will NOT:

- i. Require land acquisition, loss of access to natural resources, or cause involuntary physical and/or economic displacement of households including those without legally recognizable rights to the land;
- ii. Utilize land traditionally owned or under customary use or occupation or have a collective attachment to indigenous and vulnerable people as defined in ESS7;
- iii. Utilize land with outstanding land disputes;
- iv. Be a significant source of pollution such as having runoff or leading to negative health and environmental effects,
- v. Be located in a degraded area,
- vi. Be located close to areas important for biodiversity. For example, not be situated in critical habitats, natural habitats, or other legally protected areas;
- vii. Be in locations where forced or child labor is present;
- viii. Be close to a riparian zone;
- ix. Have a high ground water table;
- x. Be inaccessible by road
- xi. The site for locating the demonstration pilot will be selected in consultation with the stakeholders and will be one that is easily accessible to artisanal small-scale miners.

The PIT conducted a site selection exercise in July and August 2022 to align with these requirements. The selected sites including Umoja wa wenye Mashamba Ilindi were provided by the Mining Commission and they were in areas within active ASGM areas some of which have been licensed under the Mining Act of 2010 as revised in 2019 whereas others are Gold Rushes but recognized by the Mining Commission. The criteria used were: how active the site was, the number of miners (not less than 100), mining pits, washing bays, PMLs, and their production capacity, their historical profiles (period of operation), and issues related to surface rights (Land ownership, surface rights conflicts status, closeness to water bodies, residential and protected areas).

2.6.2 Mobilization and Design Phase

In the mobilization phase, the groundwork for the project is laid out. This involves detailed planning and preparation to ensure everything is in place before construction begins. The activities in this phase will include, site clearance by clearing the land where the facilities will be built, labor force mobilization gathering and organizing the workforce, including both skilled and unskilled labor, equipment and machinery transporting, and setting up the necessary construction equipment and machinery on-site also involves obtaining all necessary permits and ensuring compliance with legal regulations, construction material preparation organizing and storing of the materials needed, such as sand and building supplies.

Additional is at this phase where the design of the gold ore processing and washing facilities will be undertaken of which the gold process flow sheet will be generated and developed to

enhance artisanal and small-scale miners achieve high gold recovery rates without harming their health, communities' health or the environment.

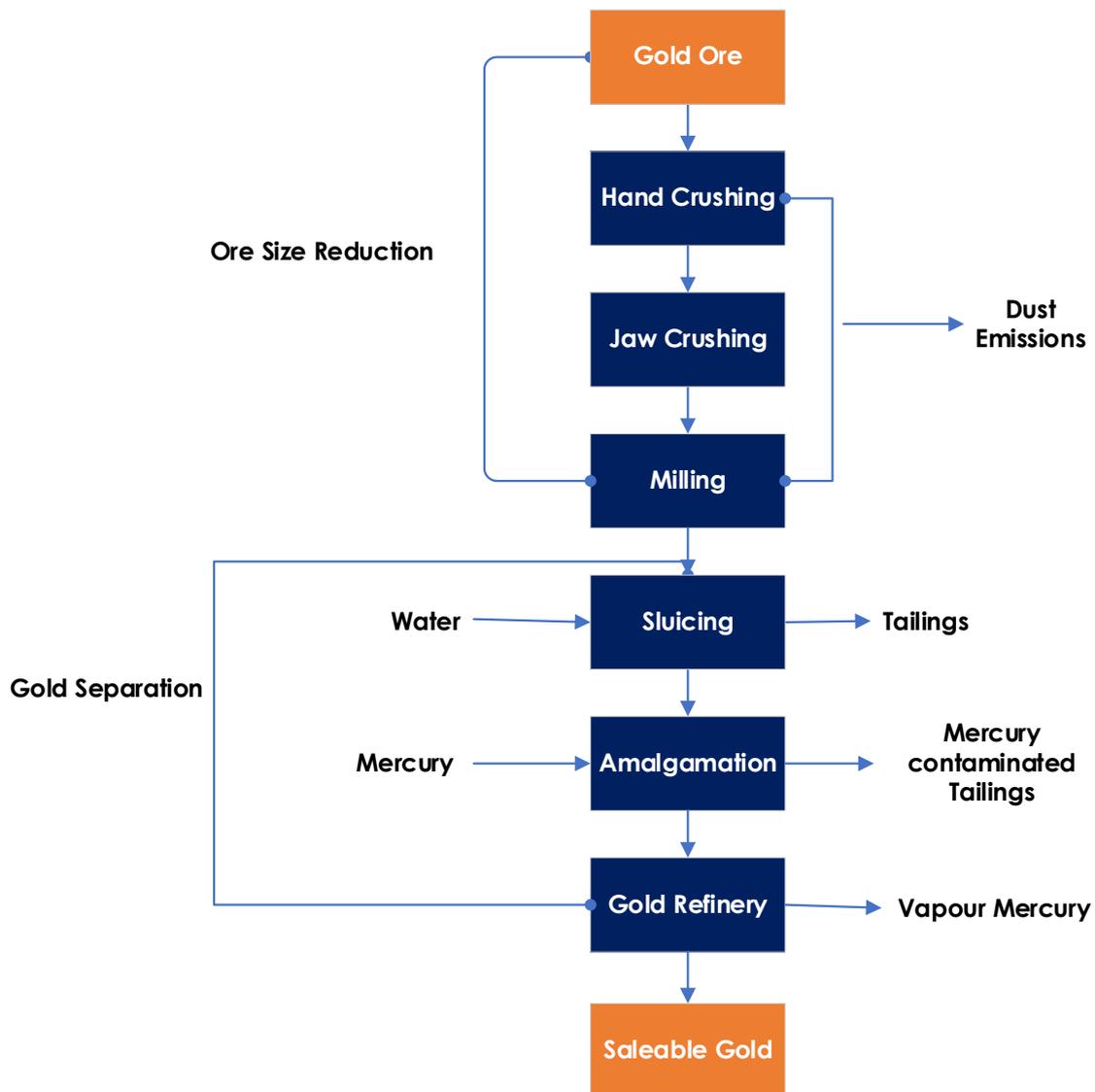


Figure 2-5: Proposed Gold Ores Processing Flowsheet

Source: City Engineering Co. Ltd

2.6.3 Construction phase

During this crucial stage, the construction of gold ore processing and washing facilities entails a series of planned activities aimed at ensuring operational efficiency and environmental sustainability. Activities will include the establishment of foundational elements such as crushers, sluices, VAT leaching tanks, drainage, amalgamation pools, and smelting chambers vital for ore processing. Additionally, efforts are focused on the rehabilitation of degraded land through strategic landscaping and tree-planting initiatives, promoting ecological balance. Logistics management becomes paramount, facilitating the continuous transit of supplies and personnel to and from the site, and optimizing productivity. The deployment of heavy equipment is carefully to streamline construction processes, this phase underscores a

commitment to excellence, sustainability, and responsible resource management, laying the groundwork for future success.

2.6.4 Operational phase

In the operational phase of gold ore processing, a systematic series of activities is conducted to extract and refine precious metals with efficiency and precision. Some of the key activities involved at operational phase includes;

- i. **Crushing:** this stage involves crushing of ore into desirable size either manually and using machines. Initially, the process begins with ore drying to reduce moisture content and improve processing efficiency. Subsequently, hand hammer crushing is employed to break down the ore into smaller particles suitable for further processing. At the site, the process of hand hammer crushing normally is done women (commonly known wamama wapiga ukunga). Following this, grinding and milling operations are carried out using crushers to achieve the desired particle size distribution necessary for effective extraction. A reliable power supply is essential to sustain these operations. Additionally, upgrading tools, such as using hand hammers that minimize vibrations, and providing personal protective equipment (PPE), like breathable masks, to reduce health risks is essential.
- ii. **Sluicing:** this process involves separation of desired metal (gold particles) from minerals and other impurities. A gravity concentration method is a common method employed at this stage. This follows once the ore reaches the desired particle size. This process requires careful monitoring and adjustment to optimize recovery rates while minimizing losses. Approximately 30% of gold particles is recovered through this process.
- iii. **Amalgamation:** the stage mixing of gold particles with mercury to form an amalgam. The process is carried out through panning or washing. At this stage awareness raising is important to improve effective running of the process. To facilitate end quick end of the process, sometimes ASGM use their own hands. At this stage amalgam is formed which contains a mixture of gold and mercury.
- iv. **Smelting:** This a stage amalgam undergoes a purification process to remove mercury and impurities through controlled heating, ensuring high-quality gold refinement. Smoke produced during this stage odorless and can be east inhaled without some noticing. Hence improvement of smelting chambers to prevent smoke emission

Throughout these operations, adherence to industry standards and safety protocols is essential. Continuous monitoring and quality control measures are implemented to ensure product integrity and environmental compliance. The operational phase of gold ore processing represents a culmination of strategic planning, technological application, and skilled execution aimed at achieving efficient extraction and refining of gold.

2.6.5 Decommissioning Phase

This marks the conclusive stage of the proposed project, where two potential scenarios are clarified: significant rehabilitation or enhancement of project structures, and the restoration of the project site to its original state. Activities encompassed within this phase entail the dismantling of redundant structures, demolition of existing infrastructure, and the careful management of resulting materials and operational areas. Throughout these processes, utmost consideration will be given to environmental, health, and safety standards, ensuring the well-being of personnel, the community, and the surrounding physical environment. A preliminary decommissioning plan will be devised to facilitate the inventorying of all components scheduled for removal or disposal, thereby aiding in the formulation of the final decommissioning plan for approval.

2.7 PROJECT UTILITIES

2.7.1 Human Resources

Currently, the Ilindi site has more than 1000 people involved in daily small-scale mining operations. The only permanent employees consist of the Mine Manager, the HSE Officer, and the Fundi. Most of the workers engaged do not have formal contracts and are paid a day wage which is also attached to performance targets.

For the Gold Ores Construction, the Labor Management Plan (LMP) has estimated that

- 10 employees will be needed to construct each wash
- 20 employees will be needed to construct the VAT Leaching Plants
- 30 employees will be needed for the rehabilitation of degraded mining areas (these will be the same used for site clearance)
- 15 employees will be needed for tree planting
- 20 employees will be needed for fabrication work

Therefore, it is estimated that a total of 95 workers will be needed. However, there is a strict rule that migrant workers will be limited and contracting will be done locally. Also, the few skilled workers e.g. construction supervisors and fabrication crew will not be housed onsite but will seek rental accommodation within proximity.

2.7.2 Water Sources

Water used for gold ore processing operations is obtained from the mined underground pits and natural wells found around the mining sites. Dewatering activities were observed during the site visit indicating abundant groundwater which was confirmed by the interviews. This practice will continue during all phases of the project.

2.8 WASTE MANAGEMENT

2.8.1 Solid wastes

Solid wastes including domestic wastes, worn-out gloves, papers, and plastic bags and bottles at the Umoja wa wenye Mashamba Ilindi site are either disposed of on land or in shallow pits. Due to the proximity to Kahama town, recyclable wastes like metal balls, crusher parts, plastic bottles, and worn plastic containers are collected by street vendors who sell them to large collectors in Kahama town.

2.8.2 Liquid Waste

Construction activities may generate liquid waste, such as wastewater from sluicing process, concrete mixing, equipment cleaning, and site drainage. During operation the contaminated runoff can carry pollutants into water sources, affecting water quality and polluting environment.

The main hazardous waste expected to be generated at Umoja wa wenye Mashamba Ilindi are tailings. Tailings will be generated during sluicing, and amalgamation process. Some tailings will be mercury free, and some will contain mercury. Tailings can pose significant environmental risks if not properly managed, including soil and water contamination from residual chemicals. Proper containment measures implementation can help prevent the release of harmful substances into the environment.

Domestic waste should be managed onsite using pit latrine or septic tank and soak way system

2.8.3 Dust Emissions

It is expected that there will be potential for dust emission during site clearance and excavations using earth-moving equipment. Additionally, dust is also expected to be emitted during the ore size reduction stage in the crushing and milling process. To minimize the risk of dust at the site and its vicinity, Workers will be provided with dust masks and safety clothes to protect them from inhaling dust and skin contact. Fencing will serve to reduce the amount of dust that has the potential to enter and exit the site, especially during windy weather. By implementing these measures, dust emissions can be effectively controlled, safeguarding workers' health and minimizing environmental impact.

3 CHAPTER THREE: ADMINISTRATIVE INSTITUTIONAL AND REGULATION FRAMEWORK

3.1 INTRODUCTION

Mining operations involve various components, including processing and washing facilities, that are engineered structures designed to process gold ore and extract gold. The utilization of mercury in Artisanal and Small-scale Gold Mining (ASGM) has led to environmental health and pollution concerns in the surrounding mining areas and communities. In response, The Tanzania Environmental Health and Pollution Management Project (EHPMP) has initiated measures to mitigate the health risks associated with the unsafe use of mercury in Artisanal and Small-scale Gold Mining (ASGM). These efforts involve enhancing institutional capacity to regulate mercury use in ASGM and introducing alternative technologies for gold recovery at Umoja wa wenye mashamba Ilindi Site. This progress aims to sustain gold production, ensure smooth plant operation, and safeguard the environment and people within and outside the mining area. Therefore, NEMC is constructing Gold Ore Processing and Washing Facilities, recognizing their pivotal role in supporting operational activities.

Moreover, NEMC is committed to ensuring social and environmental responsibilities actively contribute to sustainable development and environmental protection, as part of this commitment NEMC is undertaking an Environmental and Social Impact Assessment (ESIA) for the proposed construction of the Gold Ore Processing and Washing Facilities to ensure sustainable environmental during the mining production process for Artisanal and Small-scale Gold Mining (ASGM) at *Umoja wa wenye mashamba Ilindi Site*.

Along with this, this chapter outlines an overview of the Tanzania administrative framework, key legislative requirements, and relevant international best practices applicable to the proposed construction of the Gold Ore Processing and Washing Facilities at *Umoja wa wenye mashamba Ilindi Site*.

3.2 ADMINISTRATIVE INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

3.2.1 Introduction

The National Environmental Policy recognizes the need for a multi-focus approach in the management of the environment through existing administrative institutional mechanisms. It also seeks to enhance the coordination and cooperation of the institutionally distinct bodies with overlapping mandates. The institutional arrangement for environmental management in Tanzania is well spelled out in the EMA (2004). There are several institutions mentioned by the Act, of which the Minister Responsible for the Environment is overall in charge of the administration of all matters relating to the environment. The institutional framework structure is provided based on key relevant sectors related to the undertaken project figure 3-2.

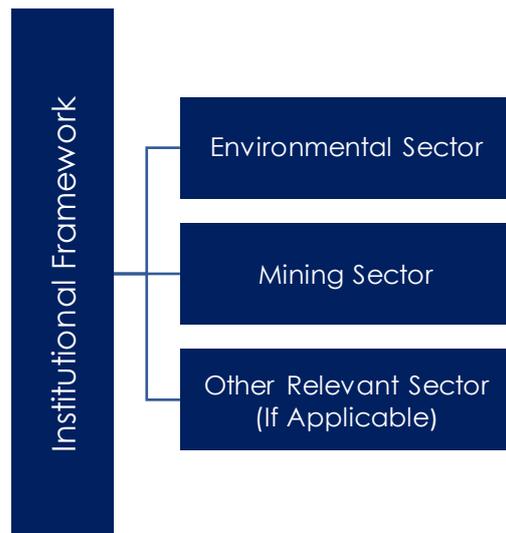


Figure 3-1: Institutional Framework Structure

3.2.2 Environment Management Administration Framework

Currently, the administrative framework for environmental management is as described in Part III of the Environment Management Act of 2004. However, this project also encompasses issues relating to Labor, chemicals, and occupational health and safety, and hence its administration framework is as adopted from the ESCP.

Table 3-1: Institutional Arrangement for Environmental Management

Institution	Role
National Environment Management Council (NEMC)	<p>The National Environment Management Council (NEMC) will be the primary agency responsible for the satisfactory implementation and monitoring of the ESMF. In doing this, NEMC will work in close association with relevant regional, district or local level – the Local Government Authorities (LGA).</p> <p>As per Environmental Management Act No. 20 of 2004, NEMC will be responsible for review and monitoring of Environmental Impact Assessments (EIA), and enforcing compliance to the project approved ESMP</p>
Vice President's Office (Division of Environment)	<p>This Division has the overall responsibility of planning and implementation on all environmental matters, including approvals of SEA and EIA certificates. It also formulates environment management regulations and provides related permits i.e. Hazardous Waste Management Permits</p>
Ministry of Minerals (MoM) Through the Mining Commission (MC) which has officers at the Regional (RMO) and project site (MRO) level	<ul style="list-style-type: none"> • Enforce the requirements of Mining Act RE 2019 and EMA 2004 by requiring EPP and EIA to form part of PML license applications • Enforcement of laws and regulations for mining and protection of the environment in all licensed areas; • Environmental monitoring and auditing of the various exploration and mining activities; • Mining projects EIS & EMP approvals (through a multi-sectoral committee under the NEMC);

Institution	Role
	<ul style="list-style-type: none"> Managing resettlements in Mining areas (through the Ministry of Lands and Housing Settlements); and Mining conflict resolutions.
President's Office – Local Government and Regional Administration	<p>Regional Level Advice on environmental implementation and enforcement of legislation to the project operations</p> <p>District Level</p> <ul style="list-style-type: none"> The District Commissioner as the Chairperson of the District Security Committee is responsible for ensuring security and also the resolution of grievances The District Environment Management Officer (DEMO) is responsible for environmental matters in the district. This includes issuing nonhazardous waste permits and inspection of facilities within the district. He is the main connection between the district and NEMC and VPO-Environment The District Social Officer is responsible to follow up on gender and youth matters The District Community Development Officers registers and follows up on establishment of cooperatives and development groups in the district <p>Ward and Village Levels The Village Executive Officer and Ward Executive Officers are responsible for receiving, organizing for resolution forums and escalating grievances to the district level</p>
Occupational Safety and Health Authority	<p>OSHA was set up in 2001 under the Ministry of Labor, Youth, Employment and Persons with Disability to administer occupational health and safety at workplaces in the country. This Ministry is the main actor with the oversight role of ensuring that decent work is practiced and maintained in Tanzania. It provides directives, and technical advice, enforces legislations, proposes amendments, allocates resources, oversees all activities carried out by OSHA, and ensures that OHS rules and regulations are adhered to and maintained at workplaces.</p>
Basin Water Boards	<p>They appoint members and chairpersons of catchment and sub-catchment committees which are responsible for the management of water sources. Responsible for monitoring pollution and subsequent prevention measure</p>
Government Chemist Laboratory Authority (GCLA)	<p>GCLA is under the Ministry of Health and it is mandated to ensure that all chemicals that are imported and used in the country are regulated. This includes the issuance of importation and transport permits. Mercury is one of such chemicals that are regulated.</p>
NGOs and Miners Associations	<p>The Government's drive to formalize prospecting and Primary Mining Licenses and to stimulate the formation of associations of small-scale miners has been effective in giving the small-scale sub-sector a stronger voice and further influence over policy, legislation, and implementation procedures. The influence of individual societies, associations, faith groups, and other organizations is recognized by</p>

Institution	Role
	the government and the mining sector, and some bodies, like the Lawyers Environmental Action Team and Policy Forum, have played key roles in advocating changes to recent draft legislations. Other groups (TAWOMA, AFWIMM, and WIMA) have lobbied for fairer treatment of women miners and processors.
Project Site	The Mine Manager and his assistants the HSE Officer and Fundi are overall responsible for the day-to-day welfare of employees. Mine Resident Officer (MRO) who oversees all operations on behalf of the Mining Commission is always on site and ensuring compliance with HSE requirements forms part of their portfolio

3.2.3 Administration at the ASGM Sites

Administration at ASGM sites is usually through a group or cooperative who may or may not be the PML holders but work under the PML holder under a profit-sharing agreement. As per Mining Act RE 2019 and subsidiary regulations, each mine site has an appointed Mine Manager, and hence the cooperatives have appointed such a person. Any person wishing to mine in the area would apply to the designated manager of the cooperative/group who will present it to the members for approval/disapproval. Once allowed to operate in their area, the person is provided a portion of land where they can operate (develop a mining shaft to extract ore and in some cases also construct a processing facility) and then a formal agreement is drawn where the person is to provide a portion of the ore mined or gold recovered to the cooperative as rent and in cases required to use the processing facilities onsite and leave the tailings behind as payment of tenure.

Daily productions of each shaft and processing facility are followed up on and recorded by the Cooperative Manager. The manager is assisted at a minimum by two personnel a Health, Safety, and Environment (HSE) Officer and Fundi. The HSE Officer is responsible for ensuring that each operator follows the minimum HSE requirements provided under the PML. The Fundi is responsible for ensuring that reinforcement of shafts and tunnels is done according to standards (as per experience) at each operational area and controls the number of employees operating within the area. Each operational area has a supervisor who looks after employees' welfare and collects operational information to provide to the shaft/process plant owner and the cooperative manager. Each PML cluster area has a designated Mines Resident Officer (MRO, an employee of the Mining Commission) onsite to follow up on production and safety compliance. All PML cooperative managers provide daily reports to the Mines Resident Officer

3.3 PROJECT LEGAL FRAMEWORK

The legal framework establishes the framework comprising Policies, laws, regulations, and guidelines/procedures that guide the entire project lifecycle from planning to decommissioning. It also defines the legal responsibilities and duties that project proponents must follow throughout the project lifecycle. This legal framework ensures that projects operate within established legal limits, considering factors like environmental, health, and safety, etc. Adhering to this framework is crucial for achieving project objectives while upholding compliance with relevant laws and regulations, thereby safeguarding the environment and community well-being.

3.3.1 Relevant Policies

The sections outline the policies to be considered when implementing the proposed project, these policies were also used to guide the project by assessing where and how project development could be suitable and ensuring projects progress without negatively impacting the environment and the well-being of communities.

3.3.1.1 The National Environmental Policy (NEP), 2021

The National Environmental Policy (NEP) aims to coordinate environmental management that enhances the well-being of current and future generations. This necessitates engagement from the government and other stakeholders, as outlined in sections 2 (2.2.3 b) and 3 (3.6), which emphasize environmentally sound management, including land and water, and the promotion of a safe and healthy environment. The NEP also recognizes mining as a primary source of pollution, necessitating sound, chemical and pollution management throughout the project life cycle. In alignment with the NEP, Umoja wa wenye mashamba Ilindi site mining operations continuously use mercury for gold production. In order to facilitate effective plant operation and safeguard environmental and community well-being, NEMC has secured financial support from the World Bank to oversee the construction of Gold Ore Processing and Washing Facilities. This initiative aims to promote environmental sustainability throughout the gold mining production process, particularly in Artisanal and Small-scale Gold Mining (ASGM) at Umoja wa wenye mashamba Ilindi Site. Additionally, NEMC is dedicated to ensuring that the operations of these facilities align with environmental protection standards. To achieve this, training sessions on facility handling are provided to those engaged in ASGM at Umoja wa wenye mashamba Ilindi Site, enhancing awareness and promoting responsible practices.

3.3.2 The National Mineral Policy, 2009

The mineral policy aims to enhance the mineral sector by integrating it with other economic sectors, boosting investments, maximizing benefits, improving the legal framework, and involving local communities in mining projects. Section 6 (6.1) of the policy outlines strategies for managing safety, occupational health, and the environment in mining activities, including enhancing environmental management systems and allocating funds for environmental rehabilitation and closure. To comply with the policy, NEMC is conducting an Environmental Impact Assessment for the construction of the Gold Ore Processing and Washing Facilities, to ensure proper environmental management is adhered to in all project phases and is aligned with the proposed mitigation measures, an Environmental and Social Management Plan (ESMP), and monitoring plans throughout the project lifecycle. Also, stakeholder consultation has been conducted, with their concerns and views detailed in chapter five of this report.

3.3.2.1 National Health Policy 2003

The main goal of the National Health Policy is to enhance the health and well-being of all individuals, especially those at risk, by promoting a responsive health system that takes into account environmental health and sanitation. Section 3 (3.5.2.5) of this policy emphasizes the significance of maintaining environmental cleanliness, monitoring water quality, and ensuring a safe environment for people. The proposed project will be designed as per local and international standards to guarantee that the Gold Ore Processing and Washing Facilities do not pose any harm to the environmental and employees. Additionally, during the mobilization construction and operation phase, employees will be provided with personal protective equipment (PPEs) and will be enforced to wear them. Occupational health training will also be conducted and provided to all employees.

3.3.2.2 The National Water Policy (2002)

The main objective of this water policy is to establish a framework for sustainable development and management of the nation's water resources, with effective legal and institutional mechanisms for implementation and recognizing the importance of water resources for various socioeconomic activities such as agriculture, industry, mining, hydropower, and tourism, the policy emphasizes the need to manage and plan the use of surface and groundwater sustainably. As outlined in Section 4 (4.4.1), the policy requires the assessment of water quality for the project and the identification of measures to mitigate any negative impacts on water quality and quantity, along with the implementation of a monitoring plan to ensure compliance. The responsible water board overseeing the environmental impact of Artisanal and Small-scale Gold Mining (ASGM) at the Umoja wa wenye mashamba Ilindi Site should conduct regular monitoring of runoff and discharges from sluicing pits. Additionally, they should promote the adoption of pollution prevention measures by monitoring water quality in the vicinity of these facilities.

3.3.2.3 The National Occupational Health and Safety Policy, 2009

This policy aims to improve working conditions and alleviate poverty by offering high-quality Occupational Health and Safety (OHS) services which involve maintaining safe and healthy workplaces, managing and preventing hazards, and adjusting work processes to boost productivity. In Section 2 (2.3.1), the OHS Policy aims to decrease work-related accidents and illnesses in Tanzania by fostering a culture of OHS hazard prevention among the Government, Employers, and Employees by preventing work-related incidents and diseases will bring about significant social and economic advantages. NEMC will ensure training is provided for employees and ensuring they all have appropriate personal protective equipment before commencing work, a designated HSE representative will be selected to conduct thorough inspections of all employees to ensure they put on their PPEs and maintaining other safety related matters.

3.3.2.4 The National Land Policy (1995) Second Edition 1997

The main aim of the National Land Policy is to establish and guarantee a secure land tenure system, efficient utilization of land resources, and sustainable management of land for social and economic advancement, all while preserving ecological harmony. In Section 2 (2.4), the policy promotes the productive use of land to foster swift social and economic progress while safeguarding land resources from degradation for sustainable development. The proposed construction of the Gold Ore Processing and Washing Facilities will be undertaken within the PML and not being utilized for other purposes.

3.3.3 The National Five-Year Development Plan (FYDP) 2021/22 to 2025/26

The National Five-Year Development Plan (FYDP) 2021/22 – 2025/26 focuses on building a competitive and industrialized Tanzanian economy aimed at human development. It prioritizes enhancing productive capacity, strengthening critical infrastructure, and promoting industrialization across sectors like agriculture, manufacturing, tourism, and mining. A core objective is sustainable and inclusive growth, underpinned by good governance, environmental sustainability, and active regional integration. The FYDP sets ambitious goals for improving the overall quality of life for Tanzanians through strategic economic and social interventions. The plan targets specific initiatives to unlock economic potential and boost living standards. Key among these are infrastructure investments in transport and energy, fostering value-added activities in both agriculture and manufacturing, and upgrading skills through education and technological advancement. The FYDP aims to create a business-friendly

environment that attracts both domestic and international investment while diversifying the economy away from primary commodities. It also addresses crucial social challenges, such as poverty, unemployment, and inequality, through targeted social programs and interventions.

The gold ore processing and washing facilities project closely aligns with the FYDP's industrialization and economic growth objectives. By enabling local processing of gold ore, the project supports the move toward value addition in the mining sector, reducing reliance on exporting raw materials. The project will generate employment, increase local revenues, and attract further investment, contributing to the FYDP's goals for sustainable and inclusive economic growth. It will ensure that the benefits are shared locally and that the mining sector contributes more directly to Tanzania's development. The project's commitment to environmental sustainability and skills development also matches the FYDP's priorities. Conducting a thorough Environmental Impact Assessment (EIA) and implementing a robust Environmental and Social Management Plan (ESMP) will ensure compliance with environmental regulations. Furthermore, providing training and employment opportunities for local communities will enhance their skills and promote technological innovation within the mining sector. The project will ensure alignment with environmental standards, contributing to the sustainable development goals outlined in the FYDP.

3.3.4 The National Gender Policy (2002)

The National Gender Policy (2002) of Tanzania aims to promote gender equality and empower women across various sectors of society. The policy recognizes the importance of addressing gender disparities in economic, social, and political spheres and seeks to eliminate all forms of discrimination and violence against women. The core objectives include increasing women's participation in decision-making processes, enhancing their access to education and healthcare, and ensuring economic empowerment through access to resources, services, and opportunities. The policy emphasizes the need for affirmative actions and legal reforms to support gender equality and create an enabling environment for both women and men to contribute to national development.

The National Gender Policy is relevant to the Gold Ore Processing and Washing Facilities Project as it seeks to promote the economic empowerment of women through access to resources and opportunities. By creating employment and income-generating opportunities for local communities, especially women, the project can contribute to the attainment of the policy's objectives. Moreover, the project's commitment to conducting an Environmental Impact Assessment (EIA) and implementing an Environmental and Social Management Plan (ESMP) will help ensure that the project does not support gender disparities.

3.3.5 The National Trade Policy 2003

The National Trade Policy of Tanzania (2003) aims to create a conducive trade and investment environment to boost economic growth. It prioritizes enhancing export competitiveness, facilitating trade through simplified procedures, promoting private sector development, integrating gender considerations, and strengthening trade-related institutions.

The Gold Ore Processing and Washing Facilities Project aligns with the policy by contributing to economic development through job creation and revenue generation. It supports local businesses, promotes gender inclusion, and helps Tanzania become a significant player in the global gold market while adhering to regulatory standards and trade agreements.

3.3.6 The women and gender policy 2003

The policy aims to promote gender equality and empower women by addressing social, economic, and political inequalities. It focuses on eliminating discrimination, ensuring equal access to resources, and integrating gender perspectives into all development sectors. The policy emphasizes women's participation in decision-making, access to economic opportunities, and protection from exploitation.

In relation to the Gold Ore Processing and Washing Facilities Project at the Umoja Wenye Mashamba Ilindi mining site, the policy is relevant in ensuring that women benefit equally from employment and business opportunities in the mining sector. It also highlights the need for gender-sensitive workplace policies, fair wages, and safety measures to protect women from gender-based violence and exploitation in mining operations. Implementing the policy can contribute to a more inclusive and socially responsible project.

3.4 LEGAL FRAMEWORK

This section gives a summary of the legislation that governs environmental management in the mining sector and other related issues that should be included in the Environmental Impact Assessment (EIA) of the construction of Gold Ore Processing and Washing Facilities at Umoja wa wenye mashamba Ilindi Site to ensure sustainable compliance.

3.5 LEGISLATION

Mining activities in Tanzania are governed by the Mining Act of 2010 as revised in 2019 which provides access to minerals to Artisanal and Small-Scale Miners by requiring them to operate in areas that are under Primary Mining Licenses. The act also has the Mining (Environmental Protection for Small Scale Miners) Regulations of 2010 which describes the minimum health, safety, and environmental protection requirements and standards for ASGM. The environmental management of ASGM is regulated by the Environment Management Act 2004 (EMA), through the Environment Impact Assessment and Audit Regulations of 2005 as amended in 2018, ASGM activities need to obtain an EIA certificate and implement an Environment and Social Management Plan. However, during the field visit it was observed that most of the ASGM operations still follow the Mining (Environmental Protection for Small Scale Miners) Regulations of 2010 even though there was awareness that they need to adopt the EMA 2004 requirements. Table 3-3 outlines the key legislation that ASGM needs to follow and their relevance to this project.

Table 3-2: Legislation that Governs the Project

Legislation	Description	Relevance to the Project
Mining Act RE 2019		
<p>Section 55. Grant and Validity of a Primary Mining License</p> <p>Mining (Mineral Rights) Regulations 2018 reg 7(g) Area of PML</p>	<p>Provides small-scale miners with the opportunity to acquire PMLs with access to not more than ten (10) hectares granted for seven years and can be mortgaged, renewed, or transferred to another holder subjects the PML holders to follow regulations pertaining to Health and Environment protection allows to stack or dump minerals or waste in line with applicable regulations</p>	<p>All the project areas had PMLs Has a designated HSE Officer and Fundi</p>
<p>Section 64. Abandonment</p>	<p>Provides procedure for abandoning land under a mineral right which includes application to the chief mining inspector 90 days before abandonment. If approved then abandonment conditions should be adhered to. The certificate does not remove liabilities incurred before certificate</p>	<p>Areas in which mining has ceased may be abandoned but environmental liabilities need to be cleared</p>
<p>Section 87. Royalties</p>	<p>Requirements to pay royalties at the gross Value of Minerals</p>	<p>The Cooperatives at the sites should ensure the gold recovered from the plant is subjected to royalties</p>
<p>Section 95. Restrictions on the right of entry by mineral right holder</p>	<p>Need consent from LGA responsible and lawful occupier to exercise mineral rights for land within 200m of residential 100m from crop farms</p>	<p>The proximity of the gold ores processing site at Mwime does not meet this criterion hence needs to have written consent from the LGA responsible</p>
<p>Section 96. Be reasonable when exercising mineral rights</p>	<p>Ensure activities are not injurious to land occupiers or other land users Rightful occupiers are not to hinder access or erect buildings without consent of the mineral right holder Compensate for land disturbance/property damage</p>	<p>There is a need to clear access roads to the sites. Landowners should provide access and the project should compensate for any damage</p>

Legislation	Description	Relevance to the Project
Section 97. Compensation, relocation, and resettlement	Fair and reasonable compensation in line with the Land and Village land acts at the current market value to be paid by mineral right holders cannot coexist with landowner without injuriously affecting them	The site selection process has eliminated this requirement as the PML and cooperatives have given the land freely. The project will use existing roads
Section 102. Provision of goods and services by Tanzanians	Mineral rights holders to have local content plans and follow up on the HSE performance of their suppliers	The Cooperatives at the sites should ensure compliance
Section 105. Corporate Social Responsibility	Mineral rights holders are to have a CSR plan that has been developed jointly with and approved by the LGA responsible for the host community and aligns with their priorities.	The cooperatives at the sites have engaged in community development activities that are priorities of the host communities and have agreement with the village government
Section 107. Compliance with Environmental Principles	<p>Mineral rights holders should comply with the environmental safeguards included in the Environment Management Act and other written laws</p> <p>Should contract a separate competent entity to manage wastes arising from operations who is permitted under the Environment Management Act 2004</p>	<p>The operations at the project sites demonstrated to follow some principles e.g. water recovery and circulation but still improvement is needed.</p> <p>The project should implement measures to limit emissions and discharges, separate operational impacted water and enhance mercury recovery. This report ensures compliance. The management of wastes proposed should align with the requirements</p>
Section 109. liability of the License holder for pollution damage	A license holder shall be responsible for pollution damage	The cooperatives operating the sites were aware that they were liable for environmental pollution by their activities, but negligence was observed especially in dewatering and stormwater management
Mining (Mineral Rights) Regulations 2018 reg 16 Information and Reporting	Each year prepare a report on the machinery available, employees, wages, minerals produced, deaths, and accidents and submit it to the Mine Commission	The project needs to assign these responsibilities to the GOP administration

Legislation	Description	Relevance to the Project
Mining (Designated Minerals Certification) Regulations 2019 Regulation 5. Classification and Certification of Mining Areas	Provides for inspection, classification, and certification of Mining Areas as part of the International Conference of the Great Lakes Region (ICGLR) Pact for designated minerals that include Gold. These classes include: (a) Red-flagged, where there is a presence of illegal mining; illegal processing and trading of minerals and active involvement of miners under eighteen years of age in mining activities; (b) (b) yellow-flagged, where mining or processing is legal, but there is a lack of environmental management plan or protection plan; (c) (c) green-flagged, where infractions stated under paragraphs (a) and (b) are not present.	The project is to ensure that the selected sites do not fall under the red category. Most of the sites visited fell under the yellow category and hence the need for this study
Mining (Safety, Occupational Health and Environmental Protection) Regulations 2010		
Regulation 20: Safety Precautions to be observed	Requires all persons working or supervising work at the mine to ensure the safety of areas and equipment and also ensure that people are not exposing themselves to risks	The cooperatives should enforce the use of PPE and following of procedures and that works are undertaken at the designated places
Regulation 70: Mercury retorts to be sealed	Requires retorts used for gold-mercury amalgamation to be tight sealed and seals to be tested and certified by recognized bureau of standards	During stakeholder consultation, it was revealed that retorts are not used and amalgam separation is done via open burning
Regulation 196: Reclamation Requirement Standards	Requires license holders to undertake environmental protection and reclamation activities throughout the operational life which is aligned to these standards	There was no proper ESMP and closure plan that was followed at the sites. Processing areas no longer used were not rehabilitated and tailings and retort ashes were just staked on the ground with no drainage. The project should include drainage, tailings/retort ashes, and wash water viable solutions in its plan

Legislation	Description	Relevance to the Project
Mining (Environmental Protection for Small Scale Miners) Regulations of 2010		
Regulation 3. Baseline environmental investigation and social study Regulation 4. Environmental Audit of Existing Workings Regulation 5. Review of EPP Regulation 6. Prohibition of pollution	Each PML should conduct a baseline environmental and social assessment or an Environmental Audit for existing facilities and submit an environmental protection plan (EPP). If the mining activities have significantly changed then review the EPP. It prohibits pollution and requires adherence to the Water Resources Act 2009 and Environmental Quality Standards as per the Standards Act 2009	These regulations align with the requirements of the EMA 2004 and provide for standards that the project areas are currently following
Regulation 10. Settling Ponds Regulation 11. No vegetation clearing Regulation 12. Use of Retort Regulation 13. Abandoned workings to be backfilled or fenced Regulation 14. Tailings disposal Regulation 15. Children not to be employed Regulation 16. Pit latrines to be constructed Regulation 17. Protective gears to be used	These provide for protection of water sources from sedimentation and conservation of riparian vegetation. Requires closed retort system to be used when heating Gold/Mercury Amalgam. Making safe abandoned pits. They prohibit engagement of persons less than 18 years and require that PPE be used to limit contact with hazardous substances	Cooperatives and miners in the project areas were aware of these requirements however as there was limited enforcement PPE was sparingly used as the
The Explosives Act of 1963 The Explosives Regulations 1964	This governs import, transportation, and use of explosives.	the blasting characteristics (materials used and patterns) will determine the size of the materials that will be mined and hence the need for manual sorting of rocks according to sizes and rock breaking which is mainly done by women.
Occupational Health and Safety Act of 2003 Part VI: Safety Special Provisions	This part requires risk assessments that cover people, property, and environment to be undertaken and management plans be implemented; employees not	The facilities managers were not aware of the requirement to undertake risk assessment. PPE was said to be provided however minimal uses and just

Legislation	Description	Relevance to the Project
	be exposed to harmful emissions; requires the provision of PPE to employees exposed to hazards; and provision of eye protection in rock-breaking activities	gumboots were observed. No measures were in place to manage emissions from retort activities. And no eye protection was provided to the women breaking the rocks. Measures need to be included in the project to comply
Employment and Labor Relations Act of 2004		
Part II: Fundamental Rights and Protection	This part prohibits child labor, forced labor, and discrimination and requires employers to promote equal opportunities	All the project sites stated that no child labor was present and it was not obvious however absenteeism in primary and secondary schools due to boys engaged to work at mine sites was reported. Small children were noticed at the mines while their mothers were sorting and breaking rocks. There were norms for division of work according to gender
Part III: Employment Standards	Gives minimum requirements for hours of work, rest, holidays, fair remuneration, and termination	As these sites operate not under regular working hours, the exemption of the mining sector and good practice guidance should be included in the Labor Management Plan and contractor documents
Environment Management Act of 2004		
Section 81. Obligation to undertake EIA EIA and Audit Regulations amended in 2018. Regulation 5. Application and Classification of Projects	Mining activities fall under category A and B1 projects of which EIA is mandatory	Currently, the PMLs do not have EIA or EA certificates to govern their operations. This study is being undertaken to ensure compliance as ASGM activities fall in category B1
EIA and Audit Regulations of 2005. Regulation 42. Developer to inform	Obligations to inform NEMC of changes in the project	The nature of operations at the PMLs where shaft operators and ores processing facilities are frequently onboarded and develop shafts or close

Legislation	Description	Relevance to the Project
the council of changes in the undertaking		and abandon shafts may be difficult to continuously comply.
EIA and Audit Regulations of 2005. Regulation 46. Environmental Audit	Initial Environmental audits are to be conducted on ongoing projects that commenced prior to coming into force these regulations	PML holders should undertake Initial Environmental Audits and have an ESMP that will be fit for their operations and cover all the operators on their land.
Industrial and Consumer Chemicals (management and control) Act 2003 Section 11(9) All chemicals appearing in the 6 th Schedule shall require registration	Mercury and its compounds are included in the 6 th Schedule as chemical that are hazardous to the environment	The project should ensure that the cooperatives operating the sites comply as they were not registered
Industrial and Consumer Chemicals (management and control) Regulations of 2020 Regulation 24. Requirements for chemical users and producers Regulation 27. Requirements for storage of chemicals	ASGM (described as a special group in first schedule item 2(1) using and storing chemicals need to be registered; Ensure the public is aware of the inherent nature of the chemicals handled at their sites; and, adhere to the code of practice and guidelines on the safe handling and use of chemicals	The project should ensure that the cooperatives operating the sites comply as they were not registered
Water Resources Management Act 2009		
Section 23: Powers and Functions of Basin Water Boards	Bodies responsible for issuing, revoking, and monitoring water use and discharge permits, and pollution prevention measures	The responsible water board should monitor runoff and discharges from sluicing pits at these sites and encourage the implementation of pollution prevention measures
The Land Act (1999)		
Section 11:	This section outlines the rights of land ownership, and the project's compliance with these rights when leasing or acquiring land for its operations is crucial	These acts are relevant to the project because they dictate the manner in which land rights can be acquired and managed, ensuring the project

Legislation	Description	Relevance to the Project
		complies with Tanzania's land laws and respects the rights of local communities
Section 15:	Regarding the compulsory acquisition of land for public purposes, the project must adhere to the procedures outlined in this section to ensure the rights of affected parties are respected.	
Village Land Act (1999)		
Section 12:	This section emphasizes the role and authority of the village council in granting or leasing land, which is critical for determining the land tenure security for the project.	

3.6 RELEVANT REGIONAL AND INTERNATIONAL CONVENTIONS

3.6.1 International Conference on the Great Lakes Regions (ICGLR) Model Law 2012

“The Prevention and Suppression of the Illegal Exploitation of Minerals in the Great Lakes Region Act”, known as “Model Law” was developed to domesticate the “Regional Initiative against the Illegal Exploitation of Natural Resources” (RINR) that was agreed upon by the countries forming the Great Lakes region launched in 2009 and then agreed as a Protocol on the Illegal Exploitation of Natural Resources in the Great Lakes Region in December 2010 as part of the Lusaka Declaration. The ICGLR includes Angola, Burundi, the Central African Republic, Democratic Republic of Congo, Kenya, Republic of Congo, Rwanda, Uganda, Sudan, Tanzania, and Zambia which was launched in 2009. The RINR outlines specific actions needed to translate the Great Lakes region’s rich mineral resources from a source of conflict into a catalyst for development. The Model Law has focused on the Conflict minerals (3T and Gold); OECD Due diligence; and Regional Certification aspects of the Protocol as already the member states had legal instruments governing responsible mining. Tanzania localized this protocol in 2019 through the Mining (Designated Minerals Certification) Regulations 2019. The project should make sure that measures to prevent child labor and traceability records are implemented by the cooperatives who will operate the facilities to align with the requirements of this protocol to enable the projects not to be classified as Red Areas.

4.6.2 World Bank Group Environmental Health and Safety Guidelines

The World Bank Group (WBG) Environmental, Health, and Safety (EHS) Guidelines (General EHS Guidelines, April 30, 2007) are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). The industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document. The applicable EHS guidelines include: -

1. General EHS Guidelines and
2. Industry Specific EHS Guidelines for Mining

4.6.3 General EHS Guidelines

The General EHS Guidelines (April 30, 2007) provides guidance to users on common EHS issues potentially applicable to all industry sectors. The general guidelines provide GIIP advice relating to the following elements to protect human health and the environment.

Requirements for the proposed project are not a single set of rules but a combination of general and industry-specific measures. Here are some of the key requirements:

3.6.4 World Bank Environmental and Social Standards (ESS) 2018

The Gold Ore Processing and Washing Facilities are required to include measures for environmental and social sustainability comprising of assessment for potential negative impacts. Certain activities during the construction and operation phase of the project may have environmental and social impacts. These can be resolved through adequate mitigation measures. The WB’s Environmental and Social Standards are designed to ensure that the proposed project is environmentally and socially sustainable. For approval of bank financing, it is essential to ensure that all WB standard policies are complied with.

3.6.2

Table 3-1: World Bank Environmental and Social Standards (ESS) Applicable to Project and Associated Instruments

S/N	Instrument for Project Implementation	Environmental and Social Standards (ESS)	Purpose/Objectives	Reason for its Application in the Project
1.	Environmental and Social Management Framework (ESMF)	ESS1: Assessment and Management of Environmental and Social Risks and Impacts	<p>Identification of adverse impacts and respective mitigation measures</p> <p>Enable screen and follow-up of remedies achieved through application of prevention, mitigation and compensation measures</p> <p>Enable allocation of responsibilities and resources to implement required mitigation measures</p>	The application of ESS1, focusing on environmental and social risk assessment and management, is crucial for the "Construction of Gold Ores Processing and Washing Facilities" project in Mwanza, Geita, and Mara regions under the EHPMP. It's vital to identify and mitigate potential environmental and health risks associated with gold mining and processing, ensuring responsible and sustainable practices while safeguarding local communities and the environment.
2		ESS2: Labor and Working Conditions	<p>Ensure the healthy and safe working environment during projects implementation.</p> <p>Ensure the provision of fair working conditions.</p>	The application of ESS2, which focuses on Labor and Working Conditions, is vital for the "Construction of Gold Ores Processing and Washing Facilities" project in Mwanza, Geita, and Mara regions under the Environmental Health and Pollution Management Project (EHPMP). This project involves labor-intensive activities, and ensuring proper working conditions, fair wages, occupational safety, and health standards is paramount. Adhering to ESS2 helps promote a safe, ethical, and inclusive work environment, fostering employee well-being, productivity, and compliance with international labor standards. Ultimately, it contributes to the overall success and sustainability of the

				project while upholding social responsibility and ethical practices within the mining industry.
3		ESS3: Resource Efficiency and Pollution Prevention	To promote the sustainable use of resources including energy, water and raw materials.	The application of ESS3, focusing on Resource Efficiency and Pollution Prevention and Management, is essential for the "Construction of Gold Ores Processing and Washing Facilities"

S/N	Instrument for Project Implementation	Environmental and Social Standards (ESS)	Purpose/Objectives	Reason for its Application in the Project
		and management	To avoid or minimize generation of hazardous and non-hazardous wastes.	project in Mwanza, Geita, and Mara regions under the Environmental Health and Pollution Management Project (EHPMP). Gold processing is resource-intensive and can generate significant pollution if not managed properly. Adhering to ESS3 ensures efficient resource utilization, minimization of waste, and effective pollution control measures. It aligns with sustainable practices by reducing the project's environmental footprint, optimizing resource consumption, and managing pollution, ultimately fostering environmentally responsible gold ore processing within the specified regions.
4		ESS4: Community Health and Safety	To manage potential risks to the community during construction and operation of school infrastructures.	The application of ESS4, focusing on Community Health and Safety, is fundamental for the "Construction of Gold Ores Processing and Washing Facilities" project in Mwanza, Geita, and Mara regions under the Environmental Health and Pollution Management Project (EHPMP). Gold processing operations inherently impact local communities. Prioritizing community health and safety through ESS4 ensures measures are in place to mitigate potential risks and hazards associated with the project. This includes not only the health and safety of workers but also the neighboring communities, considering the potential environmental and health impacts of mining activities. Implementing ESS4 fosters a safer and healthier environment for both project stakeholders and the communities residing in the vicinity, promoting responsible and sustainable gold ore processing within the outlined regions.

5		<p>ESS10: Stakeholder Engagement and Information Disclosure</p>	<p>To develop a systematic approach to stakeholder engagement to develop good relationships and gather their views on issues that could affect them.</p> <p>To provide stakeholders with a mechanism through which to raise grievances.</p>	<p>The proponent will provide stakeholders with timely, relevant, understandable and accessible information, and consult with them in a culturally appropriate manner, which is free of manipulation, interference, coercion, discrimination and intimidation. During this study stakeholders' engagement has been crucial part of the study in line with this standard.</p> <p>By doing so, the project aims to integrate diverse perspectives, address concerns, and actively involve stakeholders in decision-making processes. Ultimately, this approach enhances accountability, promotes social inclusivity, and enables the project to align with the community's needs and expectations, thereby, contributing to a sustainable and successful implementation of the gold ore processing and washing facilities.</p>
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4 CHAPTER FOUR: ENVIRONMENTAL BASELINE DATA

4.1 GENERAL OVERVIEW AND APPROACH

This chapter provides information on the relevant environmental baseline for the project site which with the implementation of the project may be either positively or negatively impacted and will form the basis of the environmental and social risks and impacts assessment. The collection of baseline data therefore focused on providing information to support the assessment of any potential impact of the Project. Information was therefore collected at the following levels

- National Level: Secondary information was collected at a national level to provide a high-level contextual overview of Tanzania.
- Regional Level: Secondary information was collected at the country level aimed at providing a contextual overview of the Shinyanga region.
- Project Site: Secondary and primary information was collected within the Project Site specifically within Mwime Village where the Project is located. This included a 500m radius (Area of Influence) from the Site.

In order to collect the above information, the following methodology was employed:

- Desktop Study: A desktop review of publicly available data such as socioeconomic profile and existing studies was carried out to investigate the natural environment that exists at the three levels outlined above.
- Site Investigations: Site visits were conducted. During the site visits, information pertaining to the natural environment, particularly related to existing flora, fauna, soils and hydrology within the Area of Influence, Project Footprint and Project Site data was collected.
- Stakeholder Engagement and consultation: Different stakeholder was consulted from the local level to regional level to collect views and concerns regarding the project.

Below section describes the existing physical and biological conditions of the Site and surrounding areas

4.2 PHYSICAL ENVIRONMENT

4.2.1 Climate

Kahama has a tropical savannah climate with one rainfall season. The wet season is warm, humid, and overcast and the dry season is hot, windy, and partly cloudy. Weather data from 2018 to 2022 recorded from Kahama and Shinyanga was provided by PIT and it is what is used to describe the climate.

4.2.2 Temperature

From the dataset provided, the average temperature at Kahama ranges from a minimum of 170 °C to a maximum of 320 °C. The hottest month is October, and the coldest month is July.

4.2.3 Rainfall

Kahama falls into a region with one high rainfall maxima. The rainy season starts in October all the way to May and the dry season from June to September with almost no precipitation at all.

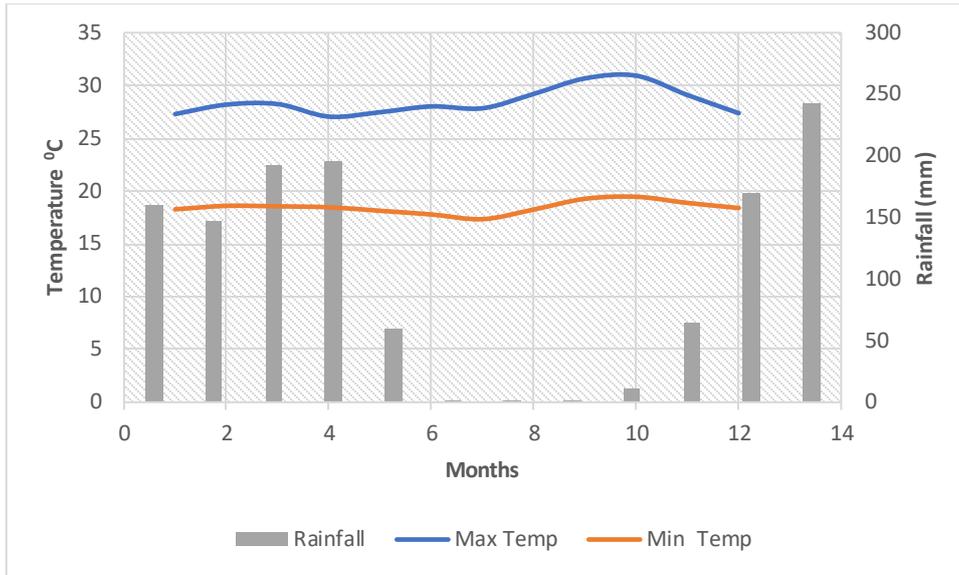


Figure 4-1: Rainfall and temperature pattern

4.2.4 Evaporation

Kahama records the highest evaporation during the dry season with maximum evaporation of 263mm in September, the lowest evaporation recorded in January ranging at 128mm

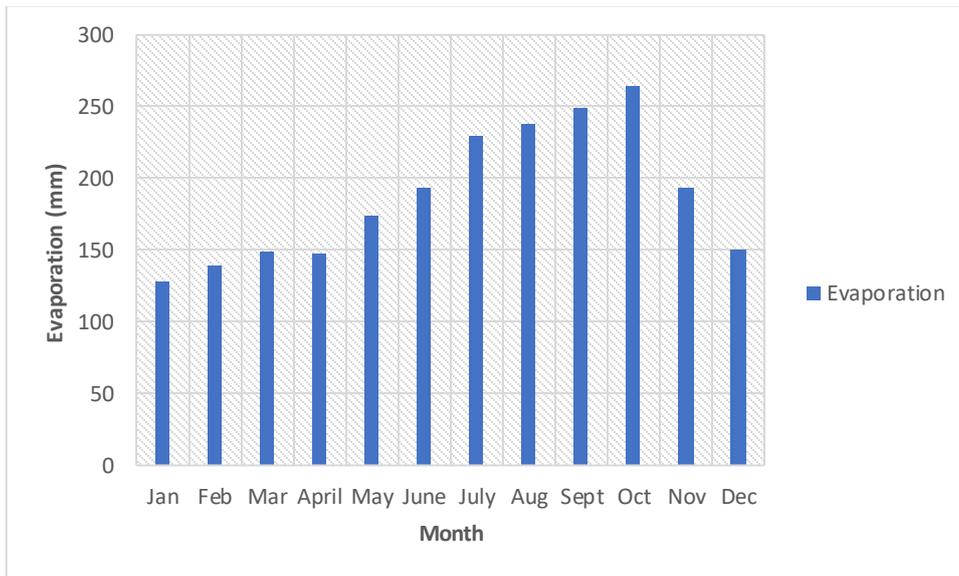


Figure 4-2: Evaporation pattern

4.2.5 Windspeed and Direction

As per below Windrose for Kahama, it shows that the majority of wind recorded for 1800hrs of that time the wind was blowing from South East to Northwest with a maximum speed of 20-30km/h. Almost 60 hours of the time recorded the wind was blowing in the same direction for a speed of 5-10km/h.

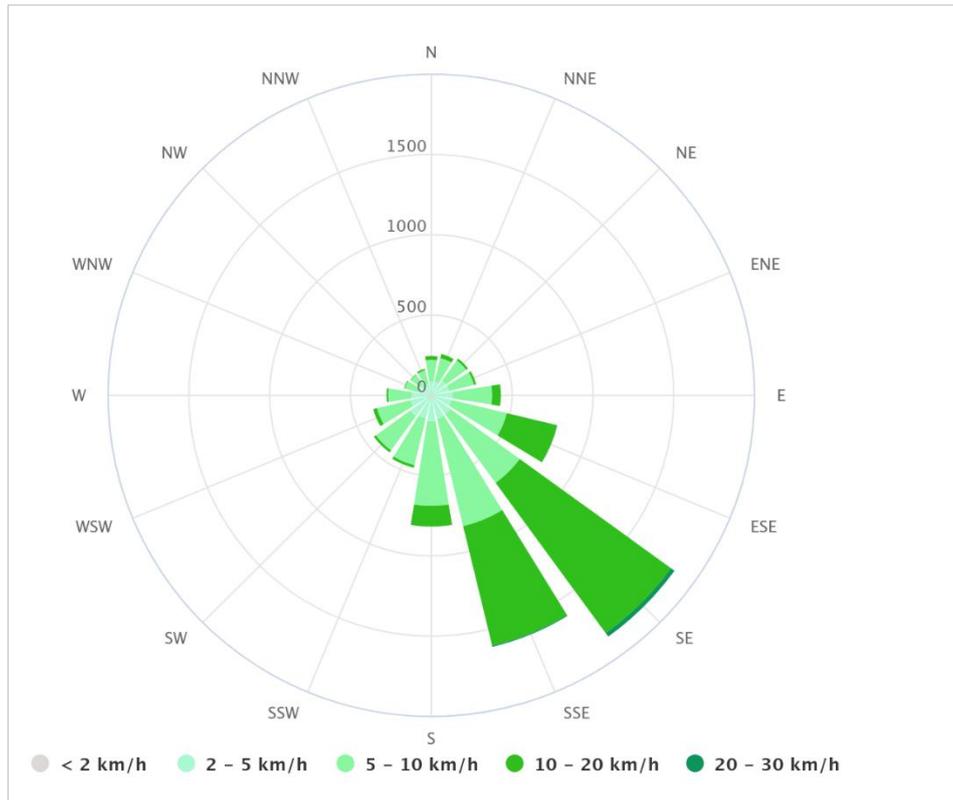


Figure 4-3: Windrose

4.2.6 Topography

Kahama district which is a northern western plateau of Tanzania. It is mainly situated 1250m above sea level with flat and gentle slopes which impact on drainage that usually ends in lowlands with limited distinct water channels.

4.2.7 Soil and Geology

Surface soil samples were taken by the PIT at two points in Mwime (Mwime S24 and Mwime) and tested for Mercury, Lead, Copper, and Cadmium. The level of mercury at all points was below the detection limit of 5 mg/L. However, the contaminant limit for Mercury is 2 mg/kg which is lower than the method detection limit making it difficult to comment on the current soil quality. Levels of Cadmium concentration were also below the detection limit.

4.2.8 Seismicity

Eastern and Southern Africa cover a region prone to a significant seismic hazard due to the presence of the East African Rift system. The Seismicity Hazard Map developed by GEM Foundation and the METEOR Project Consortium included in Figure 4-6 shows that Kahama area is in an area with low seismic potential and the potential ground accelerations are less than 0.05g.

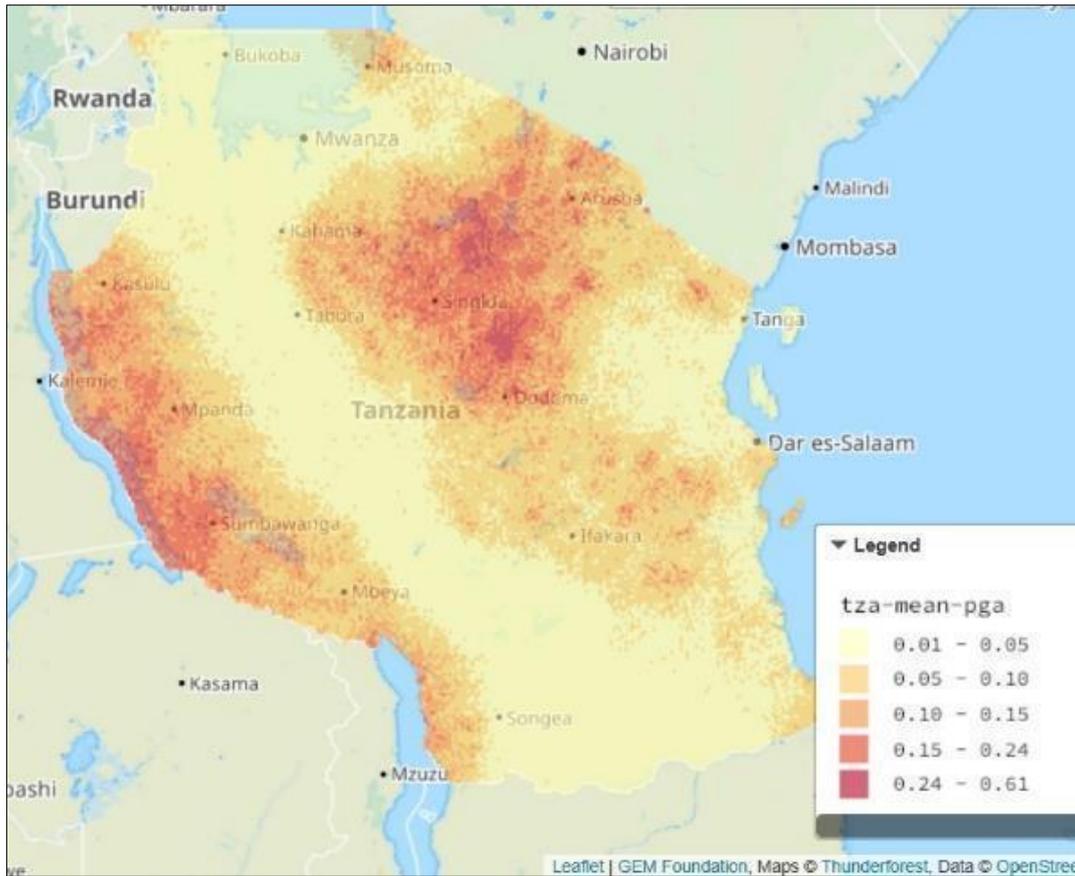


Figure 4-4: Tanzania Seismicity Hazard Map

Source: [METEOR Explorer - Tanzania Seismic Hazard Map \(meteor-project.org\)](http://meteor-project.org)

4.2.9 Noise Levels

The noise level recorded by the PIT has indicated that the noise level recorded at Mwime was at 70.5 dBA which is above the standard as per Environment Management (Standard for control of Noise Pollutions ,2015)

4.3 BIOLOGICAL ENVIRONMENT

4.3.1 Introduction

The biological environment encompasses all living components of an ecosystem, including all organisms and their interactions within a particular habitat or area. According to the IFC performance standards of 2012, a habitat is a terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment divided into natural, modified, and critical. Various life forms such as plants, animals, fungi, bacteria, and other microorganisms interact with each other and with their physical surroundings to shape the ecosystem through processes like predation, competition, symbiosis, and decomposition. The biological environment is paramount for maintaining ecological balance and supporting life on the Earth.

To cover the aspects of the biological environment in the project's area of influence, a biodiversity assessment was conducted. The project considered Biodiversity as defined by CBD 2012 and IFC performance standards 6 of 2012 as "the variability among living organisms from all sources including, inter-alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between

species, and of ecosystems.” Hence, the fauna and flora aspects of the project area are depicted below.

4.3.2 Determination of the ecological status of organisms

The ecological status of the observed species was analyzed based on criteria found in the International Union of Conservation of Nature (IUCN) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES is a multilateral treaty to protect specimens indicated in Article II of the Convention and IUCN red list. The IUCN Red List is a critical indicator of the health of the world's biodiversity. It is a powerful tool to inform and catalyze action for biodiversity conservation and policy change. It provides information about range, population size, habitat and ecology, use and trade, threats, and conservation actions that will help inform necessary conservation decisions. It divides species into nine categories: Not Evaluated, Data Deficient, Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, Extinct in the Wild, and Extinct as detailed below.

- A taxon is Data Deficient (DD) when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology is well known, but appropriate data on abundance and/or distribution are lacking.
- A taxon is Least Concern (LC) when it has been evaluated against the Red List criteria and does not qualify for Critically Endangered, Endangered, Vulnerable, or Near Threatened.
- A taxon is Near Threatened (NT) when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered, or Vulnerable now. Still, it is close to qualifying for or is likely to qualify for a threatened category in the near future.
- A taxon is Vulnerable (VU) when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
- A taxon is Endangered (EN) when the best available evidence indicates that it meets any of the criteria A to E for Endangered. Therefore, it is considered to be facing a very high risk of extinction in the wild.
- A taxon is Critically Endangered (CR) when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered. Therefore, it is considered to be facing an extremely high risk of extinction in the wild.
- A taxon is Extinct in the Wild (EW) when it is known only to survive in cultivation, in captivity, or as a naturalized population (or populations) well outside the past range.
- A taxon is Extinct (EX) when there is no reasonable doubt that the last individual has died.

4.3.3 Determination of Critical Habitats

Critical habitats are Specific areas within the geographical area occupied by the species at the time of listing that contain physical or biological features essential to the conservation of species and that may require special management considerations or protection and the specific area beyond the geographic range of distribution occupied by the species if the authority determines that the area is essential for conservation. Critical habitat designation should be made based on the best scientific data available.

Identification of Critical habitats at the project site was done following the Environmental Management Act, of 2004 and the Mining Act of 2010. Not only that but also, life history criteria were observed i.e. habitats favoring a given species to enable them to reproduce and perpetuate their offspring.

4.3.4 Methodology

The assessment of flora and fauna in the proposed project area was conducted in November 2023. The biodiversity baseline of the project site was established through an onsite survey, interviews with locals, Focus Group Discussion, Opportunistic Sampling, and review of documents relevant to the project and locality as described in the sections below

4.3.4.1 Literature review

The review process involved examining various reports and documents related to the project. These included the Site Selection Report, Environmental and Social Management Framework (ESMF) for EHPMP, Annex III: List of Consulted Stakeholders, Annex IV: Details of Each Visited Site Report, and regulations and guidelines such as the Water Resources Management Act (No.11), 2009, among others. Additionally, web-based resources and online technical databases like ScienceDirect, IPIECA, JSTOR, Wiley Online Library, and Google Scholar were utilized.

Furthermore, two significant international documents—the IUCN Red List of Threatened Plants and Animals and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)—were reviewed to assess the ecological status of the biodiversity observed at the site.

Key areas of review included:

- i. **Relevant Legislation and Conservation Guidelines**
 - o IUCN Red List of Threatened Plants and Animals
 - o Convention on International Trade in Endangered Species (CITES)
 - o International Finance Corporation 2012, PS 6
 - o The World Bank Environmental and Social Framework, ESS6
- ii. **Site-Specific Documents**
 - o Site Selection Report
 - o Environmental and Social Management Framework (ESMF) for EHPMP
 - o Annex III: List of Consulted Stakeholders
 - o Annex IV: Details of Each Visited Site Report
- iii. **Related Studies**
 - o Previous biodiversity studies conducted in the project sites and region by various institutions and organizations, including research centers, universities, NGOs, and international organizations
 - o Environmental baseline studies

4.3.4.2 Stakeholders' engagement and consultations

Stakeholders' engagement and consultations were facilitated by the use of interviews and focus group discussion techniques. The techniques were administered to locals, village leaders, and small-scale miners to gather information on the uses and management of flora, the existence & sighting of wild animals, and the seasonality of the sightings. All the information

gathered was recorded in standard form for analysis and incorporation of output inputs in this report.

4.3.4.3 Observation

Observation methods employed in the assessment of flora and fauna in the project site included an onsite survey, stakeholders' consultation and engagement, Focus Group Discussion, and Opportunistic Sampling.

4.3.5 Survey findings

4.3.5.1 Fauna Survey

The survey undertaken to gather information on fauna found in the project area and its surroundings indicated limited fauna species since the degree of land disturbance is very high. The Umoja wa Wenye Mashamba Ilindi site is surrounded by mixed land uses including mining, residential, recreation, livestock keeping, and trading activities. The specific project area was formerly used for a Guest House as remnants of the floor and toilets were observed, and gold processing with remnants of a sluicing plant. No fauna species were observed in the project area.

Figures 4-8 were observed in various areas adjacent to the site. Due to the area being highly disturbed and occupied, no wild animal species were observed during the site visit or reported during the stakeholder's engagement

4.3.5.2 Flora Survey

The survey revealed limited native flora species due to high land disturbance. No native plant species were observed at the Ilindi Mwime site due to it being surrounded by several human activities. Apart from mining activities, the site was surrounded by residential, farming, business, and livestock keeping. The dominant vegetation type included *Senna siamea*, and *Mangifera indica* as shown in Figure 4-7. However, as ASGM activities are highly dependent on using timber for wall reinforcement, they collect fresh timbers from Tabora and Kagera *Brachystegia sp* and *Eucalyptus sp* respectively.



Figure 4-5: *Senna siamea* observed during the site visit, the condition of the project site in Mwime village

Source: City Engineering Co. Ltd – Site Visit, November 2023

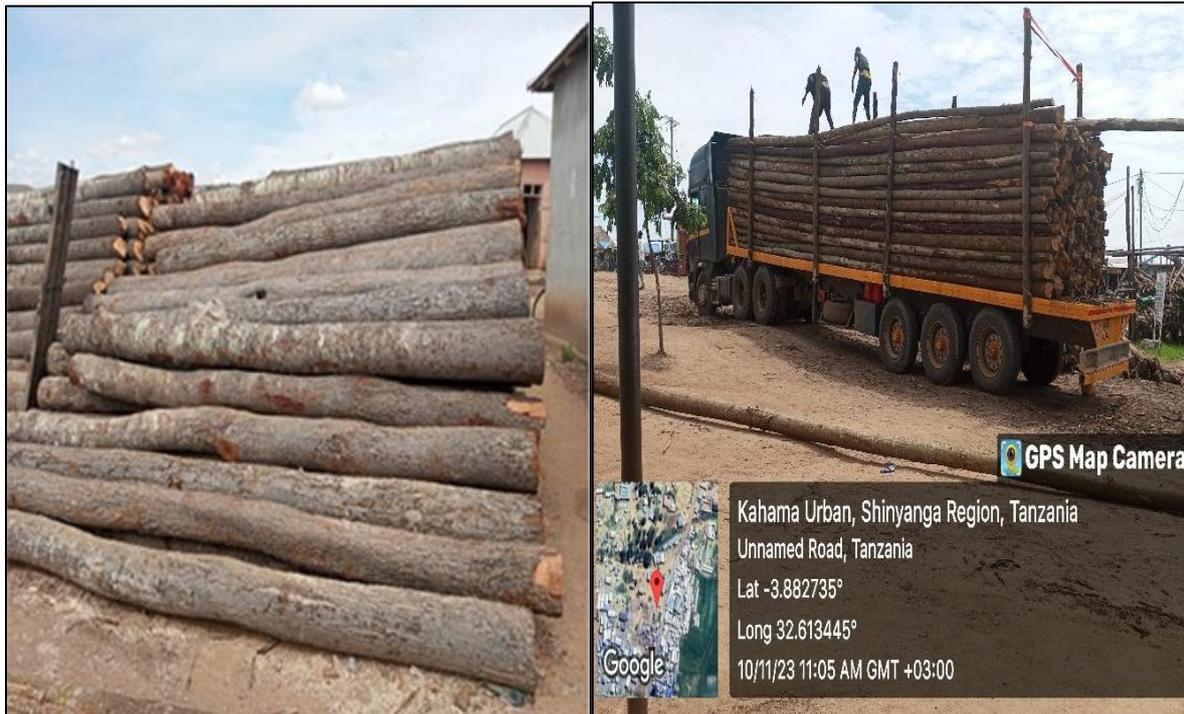


Figure 4-6: Timbers in Mwime mining site; the right picture is *Eucalyptus sp* and the left picture is *Brachystegia sp* collected from Kagera and Kigoma-Kasulu respectively.

Source: City Engineering Co. Ltd – Site Visit, November 2023

4.3.6 Alien and Invasive Alien Species

The common alien species observed were *Senna siamea*, and *Mangifera indica* (Figure 4-7), being used by locals as food crops, provision of shade, fruits, and local medicine. According to the Convention on Biological Diversity (CBD, 2005), alien plant species can become invasive plant species by displaying remarkable effects of replacing native species, resulting in the degradation of habitat. No invasive alien species were observed at the project site.

4.3.7 Species of Ecological Concern

Among the plants and animals that were observed in and around the project area, there exists no endemic, rare, or endangered species in the project area, nor any species that fall under the IUCN red-listed species. Critical Habitats for flora and fauna species in the project site

The survey revealed that there are no protected areas or critical habitat for both flora and fauna within the project area as it is already disturbed. Thus, the project won't pose any disturbance to the flora and fauna in the area.

4.3.8 Hydrology and Surface Water Resources

Regional Hydrology

Kahama's regional hydrology is defined by its semi-arid climate, seasonal rainfall, and reliance on groundwater resources. Rainfall averages between 600 and 900 millimeters annually, falling mainly from November to April, with long dry periods that create water scarcity. Surface water is limited, as most rivers and streams in the area are seasonal, flowing only during the rainy months. Flood hazard from rivers is generally low, though localized urban flooding can occur in Kahama town due to poor drainage systems. Groundwater serves as the primary and most reliable source of water for communities, agriculture, and mining operations, but over-

extraction and contamination risks are growing concerns. Mining activities, particularly gold mining, place significant pressure on water resources through high consumption and potential pollution from tailings and artisanal practices. Hydrologically, Kahama lies within the southern fringe of the Lake Victoria basin, though its contribution to the lake is relatively small compared to northern tributaries. Land use changes from agriculture and mining have reduced vegetation cover, increasing runoff variability and sedimentation in seasonal streams. Overall, Kahama's hydrology reflects a delicate balance between limited natural water availability, heavy reliance on groundwater, and the pressures of mining and urban development.

Mwime Area Drainage

Hydrologically, Mwime lies within the southern catchment of the Lake Victoria basin, though its contribution to the lake is relatively minor compared to northern tributaries. Mining activities have altered land cover, increasing runoff variability, erosion, and sedimentation in seasonal streams. Additionally, artisanal mining practices pose risks of contamination, particularly from mercury use, which can affect both groundwater and surface water quality. Urban expansion around Mwime further compounds hydrological stress, as poor drainage infrastructure can lead to localized flooding during heavy rains despite the overall low flood hazard in the region. Mwime's hydrology reflects a fragile balance between limited natural water resources, heavy reliance on groundwater, and the environmental pressures of mining and settlement growth. Groundwater extracted from the underground mines is pumped into the drainage channel that traverses the Mwime mining area, creating a man-made stream and resulting in stagnant surface water downstream, as indicated in Figure 4-7.

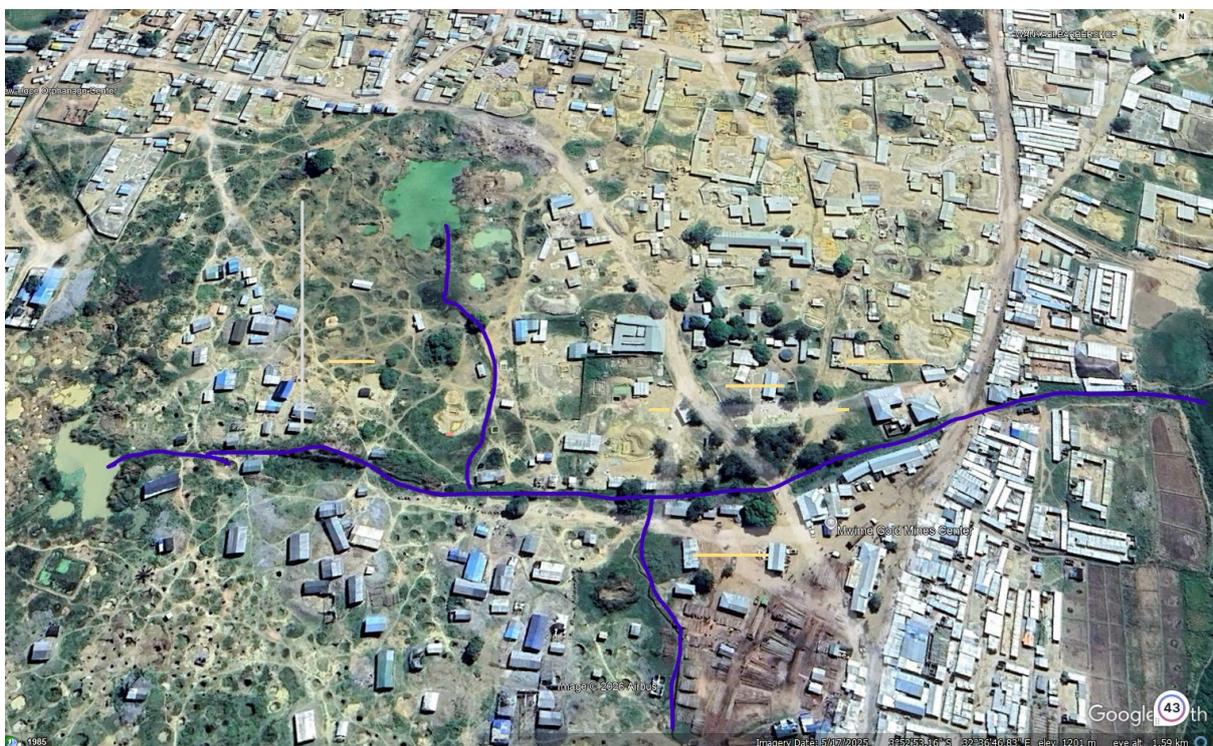


Figure 4-7: Drainage Pattern of Mwime Project Area

Source (City Engineering Company Ltd)

Notable surface water sources identified in the vicinity of the area include small and large streams, predominantly seasonal, and small ponds formed during wet conditions observed during the site visit.

Water Quality

Water quality baseline conditions were established through in-situ measurements and laboratory analysis of selected heavy metals at representative locations within and around the project area. Sampling was conducted at Mwime drainage W1 (Coordinates: -3.882350, 32.612710), representing water that has been abstracted from an active mining pit/shaft and flowing in a drainage, and Mwime W2A (Coordinates: -3.882245, 32.610846°) and W2B (Coordinates: -3.881131, 32.611922: which are ponded water body downstream of the drainage and represent a potential downstream receptor of runoff from the mining area.

Field measurements included pH, turbidity, Total Dissolved Solids (TDS), and temperature, providing an indication of the general physicochemical characteristics of the water bodies. The results on the drainage surface water indicate elevated levels of Total Dissolved Solids (1400 mg/l) and turbidity (621 NTU) compared to the permissible limits of 1200 mg/l and 30 NTU, respectively, as specified in TZS 860:2019. These elevated values are consistent with increased sediment load and dissolved materials associated with disturbed surfaces, erosion processes, and runoff within the mining environment.

Laboratory analysis focused on key heavy metals including mercury (Hg), arsenic (As), cadmium (Cd), lead (Pb), copper (Cu), and zinc (Zn). The results revealed that lead (Pb) Cadmium and Mercury exceeded the permissible limit, slightly above the TZS 860:2019 limit of 0.01 mg/l, while all other analyzed metals were within prescribed limits. The elevated lead levels are associated primarily with mobilization from disturbed soils and mineralized rock due to mining activities, reflecting the influence of mining-related disturbances on water quality

Table 4.1 Water Quality Results for Mwime

S/N	Parameter	Units	W1 (drainage waster)	W2A (Pond Water)	W2B (Pond Water)	TZS 860:2019 Limits
1	pH	-	6.21	7.04	7.31	6.5 – 8.5
2	Copper (Cu)	mg/l	<0.01	<0.01	<0.01	3.0
3	Lead (Pb)	mg/l	<0.01	<0.01	<0.01	0.01
4	Zinc (Zn)	mg/l	<0.01	<0.01	<0.01	5.0
5	Cadmium (Cd)	mg/l	0.015	<0.01	<0.01	0.05
6	Chromium (Cr)	mg/l	<0.01	<0.01	<0.01	0.05
7	Nickel (Ni)	mg/l	0.03	<0.01	<0.01	NM
8	Mercury (Hg)	mg/l	0.018	<0.01	<0.01	0.01

AIR QUALITY

Measurement and analysis of air quality, noise, and meteorological conditions within the mining license area were carried out at established sampling stations while targeting the general environment, site workers and public health. These include dust (ambient particulate matter in term of PM10 and PM2.5), ambient pollutant gases (Volatile organic compound (TVOC), Formaldehyde and benzene (HCHO and C6H6), Carbon dioxide (CO2), Carbon monoxide (CO), Hydrogen Sulphide (H2S), Sulphur dioxide (SO2), Noise levels, Temperature and relative humidity.

All measured parameters were then compared with the available standards stipulated in the Tanzania Environmental Management Regulations and TBS, as well as International Standard and Guidelines, specifically, WHO.

4.4.1 Sampling Locations

Air quality and Noise measurement locations were selected based on the climatic status of the area and the different activities' and across to the mining license area where the dust and gases might be dispersed to. Moreover, noise measurements were taken within the mining license area and the points surrounding the mining license area. Two sampling stations were established for noise levels, ambient dust (PM10 & PM2.5) and gas emissions measurement were taken in each station sampling locations.

Monitoring Point 1 (Coordinates: -3.882588, 32.612658) was established near active mining and mineral processing areas to capture emissions from potential sources such as excavation, ore crushing, and diesel-powered equipment.

Monitoring Point 2 (Coordinates: -3.883378, 32.611765) were positioned to assess air quality in adjacent zones, including areas downwind of processing activities and near residential or communal spaces where miners and local communities may be exposed.

The monitored parameters included Carbon Monoxide (CO), Nitrogen Dioxide (NO₂), Ozone (O₃), Volatile Organic Compounds (VOC), Sulphur Dioxide (SO₂), and particulate matter (PM2.5 and PM10). These pollutants are of particular concern in small-scale mining contexts due to the use of diesel generators, artisanal equipment, and potential biomass burning for site clearance or domestic use.

Preliminary findings indicate generally low ambient pollutant concentrations, though particulate levels may show localized elevation near active crushing or haulage routes. The data confirm that current air quality remains within acceptable limits relative to the Tanzania Standard (TZS 845:2007) and World Bank EHS Guidelines, while providing a critical reference for monitoring any deterioration as mining activities scale up or intensify. The table below indicated the air quality analysis results

Table 4-2: Air Quality Monitoring Results at the Proposed Site

Location	CO (ppm)	NO₂ (ppm)	O₃ (ppm)	VOC (ppm)	SO₂ (ppm)	PM2.5 (ppm)	PM10 (ppm)
Monitoring Point 1	2.55	0.01	0.02	3.8	0.01	0.032	0.01
Monitoring Point 2	1.3	0.01	0.02	0.12	0.01	0.01	0.01
Tanzania Standard [TZS 845:2007]	20	0.1	0.1	10	0.05	0.05-0.08	0.05-0.116
World Bank EHSs for air quality	10	0.2	0.1 (8hr)	NM	0.125	0.075	0.15

4.4 SOCIO-ECONOMIC BASELINE

This chapter describes the existing socio-economic status of the Umoja wa Wenye Mashamba Ilindi area that includes wards and villages that are likely to experience direct and indirect benefits/impacts associated with the proposed Project.

4.4.1 Geographic Location and Administration

Shinyanga Region is one of the administrative regions in Tanzania, located in the northwestern part of the country. The region has several councils named Kishapu District Council, Shinyanga Municipal Council, Shinyanga District Council, Ushetu District Council, Msalala District Council, and Kahama Municipal Council.

Ilindi-Mwime is contained in Zongomera ward which is under Kahama Municipal Council. Kahama Municipal Council (MC) was officially published on 15th October 2010 through Government Notice No. 393; and began to execute its functions on 17th June 2011 as per the certificate but full operationalization began in July 2012. It is located between latitude 30 15" and 40 30" South of the Equator and Longitudes 310 30" and 330 00" East of Greenwich.

Kahama MC is found along the Shinyanga-Isaka-Rwanda trunk road that connects it to neighboring countries of DRC Congo, Uganda, Burundi, and Rwanda. It is about 1,050 Km from Dar es Salaam, 267 Km from Mwanza, and 109 Km from Shinyanga Municipality the headquarters of Shinyanga Region.

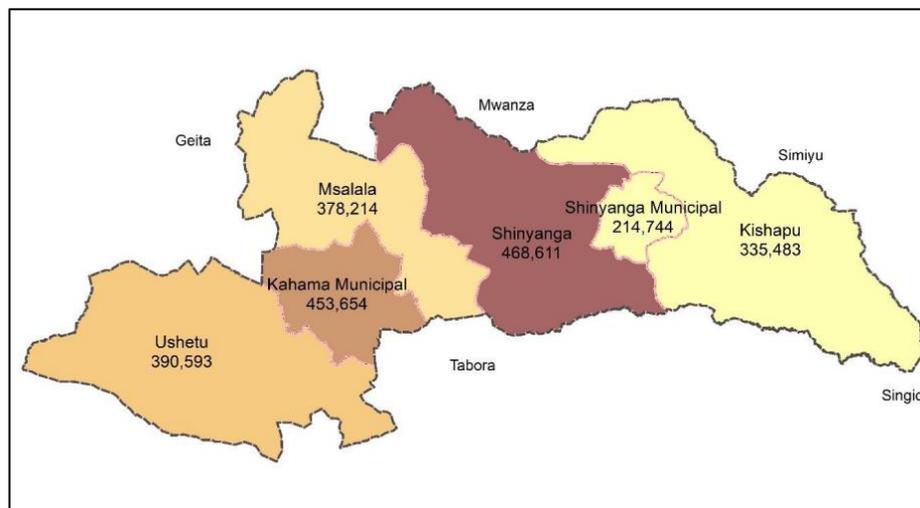


Figure 4-7: Kahama Urban Districts

Source: NBS, 2023

Kahama Municipal Council is bordered by the Nzega District of Tabora region to its south; Shinyanga District to the east; and Msalala District Council to its north. To the west and south, there is Ushetu District and Mbogwe District of Geita Region.

4.4.2 Population and Age Distribution

The 2022 Population and Housing Census reported that Kahama MC had a total of 453,654 people with 234,297 females and 219,357 males living in 104,686 households. The average household and sex ratios were 4.3 and 94 respectively.

³ [Administrative units Population Distribution Report Tanzania Mainland volume1b.pdf](https://nbs.go.tz/Administrative%20units%20Population%20Distribution%20Report%20Tanzania%20Mainland%20volume1b.pdf) (nbs.go.tz)

The 2012 census results showed that Kahama MC had growth rate is 8.7% per annum. The age distribution for Kahama Municipal Council shows that the young population under 15 years was 49.2 percent. For the working population of the age group between 15 to 64 years the proportion was 48.7%. Kahama MC by 2019 is estimated to have 49,436 numbers of households at an average family size of 5 persons and a life expectancy an average of 45 years which is very low compared to the national average of 67.3⁴ years. Kahama Municipal has a population density of 442 persons per kilometer square. The population of Kahama is influenced by the immigration of people from different parts of the country since it is a main junction with linking roads to Rwanda, DRC, Burundi, and Uganda in the western part and the Northern part links Geita Municipality, Msalala District. While, in the East, it links with the Nzega district in Tabora Municipality and the availability of service infrastructures, social and community facilities as well as the concentration of urban economic activities.

Zongomera ward has a total population of people 32,984 with 15,506 being female and 17,478 being male. The household and sex ratio are 4.7 and 113 respectively. The population density of the ward is 331.7 per square kilometer⁵.

The high proportion of the young population (under 15 years) and a significant working population (15-64 years), suggests a potential labor pool for the project but also highlights the need for community support programs and a focus on family well-being. The low life expectancy indicates the importance of health and safety measures. The relevance extends to providing employment opportunities that can enhance the quality of life and healthcare accessibility. The project should consider the dependency ratio and ensure that employment opportunities are accessible to both genders to improve overall household income.

4.4.3 Social Services

4.4.3.1 Water Supply

The main source of water for Kahama is water from Lake Victoria supplied by KASHWASA and distributed by KUWASA. with a Total length of Distribution network of approximately 240 km with 200km Upvc and 14km of steel pipes. As of 2020, approximately 66.1% of the residents were connected to the water supply network. Other sources include shallow wells and Boreholes fitted with submersible pumps. Groundwater supplies in some areas are favorable for boreholes and shallow wells which are for domestic use but in other areas, groundwater contains some dissolved minerals which makes it unsuitable for human consumption e.g. Mwanzwangi in Mondo ward.

At Mwime, KUWASA water supply covers approximately 30% of the area. Primarily, water distribution is concentrated in the neighboring village of Zongomera. There are two wells in the areas of Seeke and Ilindi which Mwime residents depend on. There are still challenges related to water accessibility with only Zongomera dispensary having access to KUWASA water.

4.4.3.2 Health Facilities

Kahama Town Council has 43 total Health Facilities including 2 hospitals, 5 health centers and 34 dispensaries, and 2 clinics. The available health services centers are under the ownership of government, FBO, private, and parastatals. 629 Community Health Workers (CHWs), and 57 Traditional Medical Practitioners (TMPs).

⁴ [United Republic of Tanzania \(who.int\)](http://who.int)

⁵ [Zongomera \(Urban Ward, Tanzania\) - Population Statistics, Charts, Map and Location \(citypopulation.de\)](http://citypopulation.de)

In the Zongomera Ward, there are three health facilities—Ilindi, Seeke, and Zongomera dispensaries. These dispensaries have been providing services in the ward such as outpatient services, treatment, and maternal and child health., although they face challenges, particularly in terms of equipment and resources

4.4.3.3 Education and Literacy

In Kahama Town Council Number of Primary Schools and Enrollment Kahama Town Council, the number of schools increased slightly to 602 in 2018, 620 in 2019, and 640 in 2020 and increased again to 646 in 2021. By the year 2021, Kahama Municipal Council had 115 pre-primary schools out of which 83 were Government Primary Schools while 32 were in Private Primary Schools. The Municipality had a target to enroll 61,265 primary pupils in the year 2021 out of which 30,903 were girls and 30,362 were boys, up to June 2021 a total of 65,100 pupils were enrolled. Girls were 32,776 and boys were 32,324 which is 106% of the target.

The number of secondary schools in the Kahama Municipal Council increased from 119 in 2017 to 170 in 2021, Number of public secondary schools increased slightly from 95 schools to 138 schools in 2021, while the number of private secondary schools increased from 24 in 2017 to 32 in 2021.

In Mwime, there are seven primary schools: Wigehe Primary School, Zongomera Primary School, Seeke Primary School, Guido Primary School, Ilindi Primary School, Kabera Gold Primary School, and Kadwini Primary School. Additionally, there are three secondary schools: Seeke Secondary School, Kabera Secondary School, and Isinuka Secondary School. The engaged ward leaders reported that most of the residents are literate.

4.4.3.4 Energy

Kahama Municipal Council has various sources of energy for domestic and commercial purposes. These include national grid electricity, solar electricity, firewood, and charcoal. The main source of energy used for cooking is firewood which accounts for 94.3 percent of total households in the Municipality followed by charcoal 4.9 percent and other sources 0.8 percent. Kahama Municipal Council connected to the national power grid in the transmission point is located at the Ibadakuli industrial area in Shinyanga Municipality.

To protect forests and be environmentally sustainable, alternative energies are required other than charcoal and firewood. Electric energy is more important in the development of the Municipality, especially for the industrial sector including mining.

4.4.3.5 Telecommunication

Telecommunication services in the Municipality are provided by Tanzania Telecommunication Company Limited (TTCL) and five (5) cellular phone service providers namely TIGO, Airtel, VODACOM, Halotel, and ZANTEL. Other telecommunication providers include 3 radio stations (Radio Faraja FM, Jambo FM, and Kahama FM), internet operators 5 branches of post offices, and 7 sub-post offices. Internet services are also available. Kahama Municipal Council is connected to the Optic-Fiber Cable (OFC). To date, a terrestrial link of cable to further inland to masses of users in the rural areas has not started. Once this service is introduced in the rural areas it will not only ease telecommunication services and internet use but will reduce the cost of communication Kahama Municipal Council enjoys Internet, telephone services (both cellular phone and landline telephone services), radios, and postal services.

In Mwime cellular network coverage in villages includes Vodacom, Tigo, Airtel, and Halotel. Information is also accessible through TV and radio. While many residents lack TVs in their homes only for those people who live in the centers there are also radio stations such as (Radio

Faraja FM, Jambo FM, and Kahama FM). This provides an impression of the reliability and availability of telecommunication services within and around the project area.

4.4.3.6 Infrastructure and Transport System

Kahama district is distinguished by a well-established transportation network, featuring all-weather tarmac regional roads connecting it to Mwanza and other gravel roads managed by TANROADS. Roads within the district fall under the management of TARURA, exhibiting variations in condition and accessibility.

However, the majority of feeder road infrastructures in Mwime Wards are characterized by rough surfaces, rendering them impassable during the rainy seasons. This limitation hinders the community's access to essential social services beyond their villages. Therefore as the project implementation carries on, this should be taken into consideration as the infrastructure and transport systems are inevitable for project development.

4.4.3.7 Environmental Conservation and Management

To increase focus on environmental conservation, the Environment Department at LGAs has been split into two, Natural Resources and Environment Conservation, and Solid Waste Management and Cleaning. The Natural Resources and Environmental Conservation Department focuses on conservation efforts mainly tree planting and is planning to expand to other areas specifically covering lakes and fisheries. In the case of Mwime, they purchased Mitundu trees from Tabora and Kagera, utilizing them to ensure stability during the mining process.

4.4.3.8 Waste Management and Sanitation

There are domestic waste collection services in Kahama town being operated by a contractor engaged by the Municipal Council. Due to the presence of mines and other commercial activities recyclables collection and processing is a thriving business in Kahama. At the project site in Ilindi – Mwime there are no waste collection services and people depend on waste pits within their backyards. However, for recyclable wastes street vendors come and collect it, and in cases where it is metals, they buy it. Recyclable wastes are said to end up in plastics manufacturers within Kahama whereas iron is transported to Mwanza to make iron bars.

For liquid waste mainly excreta onsite systems are used and once full they are emptied by licensed sewage removal companies. However, some people still use the bush for sanitary convenience which is not hygienic, continuous education is needed.

4.4.3.9 Housing and Ownership

The majority of houses in Mwime are in good condition, built with blocks, and topped with iron sheet roofing. In contrast, other residences in the area are constructed from soil, and roofing with grass. Many guest houses have full-suit iron sheet walls, roofing doors, and windows. Upon inquiry, the team was informed that these are common temporal housing which are constructed on land which is in most cases rented and this temporary structure was erected to provide accommodation for the migrant miners. As these are gold rush areas, it is anticipated that eventually when the gold deposits are depleted these communities will leave and go to the next famous gold rush area. The iron sheets can easily be dismantled and taken to the next site.

Land (surface rights) ownership is usually from inheritance but also due to demand for mining and other related support e.g. temporal housing for both people and shops direct purchases from residents are made.

4.4.3.10 Financial Services

Kahama Municipal has a number of financial institutions including CRDB, NMB, TCB, Azania, and TPB banks primarily situated in the municipal headquarters and major centers. However, in Mwime Villages, there are no financial institutions. Instead, mobile money services such as Tigo-Pesa, Airtel Money, M-Pesa, T-Pesa, and Halopesa play a significant role in financial transactions. It's noteworthy that there is currently no financial institution providing loans to small-scale miners in the area, as they may not meet the necessary criteria for such services.

4.4.4 Gender Issues, Social Relations, and Welfare of Children

Tanzania has made significant efforts and investments in advancing and empowering women to achieve gender balance and address gender-based violence (GBV) and violence against children (VAC). In the project area, gender-based violence mentioned included spouse/lovers' conflicts and in few cases rape. It was revealed that gold rush areas are characterized by sex workers who service many clients which is one source of violence. Furthermore, it was common for migrants to start families and bear children and once the gold is depleted men would leave abandoning families to work in other gold rushes. In response, women in such situations often turn to small-scale mining as a means of supporting their families. There are even cases where both parents leave children behind creating child headed families that force the children especially boys to engage early in the mine.

Kahama municipality has had incidents of child abuse reported through the Department of Social Welfare. The department also receives a number of cases from areas inhabited by small-scale miners including Mwime. These cases involve issues such as child abandonment and others where children engage in small-scale commercial activities to support their families. On average, the department handles around 300 cases per year. The department usually searches for the families of the children and places them in their care but in some instances, they are unsuccessful and the department arranges for housing in centers which for Mwime is Peace Orphanage Center, which cares for about 170 children.

4.4.5 Ethnicity and Cultural Heritage

Most of the residents at Mwime are migrants who have flocked into the area from different regions with the country due to the gold rush. Most are from the Sukuma - Nyamwezi tribe but also most of the Tanzanian tribes are here including Subi, Haya, Nyambo, Kurya and Chagga. No areas of cultural significance were mentioned during the engagement with stakeholders.

4.4.6 Economic Activities

4.4.6.1 Agricultural Sector

Crop cultivation is among the main economic activity of most residents of Zongomera ward. Major crops which are cultivated include rice, maize, cotton, cassava, chickpeas, and vegetables for both food and cash crop.

4.4.6.2 Livestock Keeping

The main types of livestock kept in Zongomera ward are Cattle, Donkeys, goats, and chickens. The numbers of livestock vary significantly between households. Larger livestock keepers have about 260 heads of cattle while some of the rest of the households in the settlements have about 10 heads of cattle. Chickens are common livestock in almost every household and are

kept through a free-range system. Livestock keeping is challenged by frequent disease outbreaks.

4.4.6.3 Small Business

Small-scale businesses are prevalent throughout the villages in Zongomera ward. These businesses encompass a variety of types, such as guest houses, retail shops, hair salons, and motorcycle and bicycle repair centers. However, the level of business engagement varies, within Mwime village exhibiting a higher degree of business activity compared to others within the ward.

4.4.7 Mining

A significant portion of the population in the Zongomeraward is directly or indirectly engaged in mining activities, primarily through large mines like SMCL or PML fields. Women play an active role in these activities, particularly in tasks such as crushing and panning. Mining serves as a major source of income for many households within the ward, contributing significantly to their livelihoods. Additionally, artisanal and small-scale mining (ASM) plays a crucial role in providing employment opportunities and supporting local economies within Zongomera ward.

5 CHAPTER FIVE: PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

5.1 INTRODUCTION

Public consultation and project information disclosure is a process carried out throughout the lifespan of a project. It fosters the establishment of strong, positive, and responsive relationships crucial for effectively managing a project's environmental and social risks. Stakeholder engagement at an early stage of project development is particularly effective, as it becomes an essential component of initial project decisions, and is incorporated into the assessment, management, and monitoring of environmental and social risks and impacts of the project.

According to WB ESS 10 state that; successful stakeholder engagement can enhance the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and execution.

Therefore, this section outlines the primary stakeholders involved in the project and how their concerns were factored into the project based on WB ESS 10. The broad objective of the stakeholder engagement and involvement process is to provide authorities and interested and affected parties with the opportunity to raise issues, concerns, and opportunities regarding the proposed Project and to address key stakeholders' concerns during the preparation of the Environmental and Social Management Plan (ESMP) for the Project. Furthermore, a plan for future actions will be devised through the creation of a Stakeholder Engagement Plan (SEP) for the EIS report.

5.2 OBJECTIVES OF STAKEHOLDER CONSULTATION

The stakeholder's consultation and engagement process aimed to achieve the following specific objectives as part of the ESIA process as per the requirement of WB ESS 10.

- To identify stakeholders and create a structured approach to engaging stakeholders, to ensure positive relationships with those affected by the project.
- Provide project-related information and materials to affected and interested parties in a timely, understandable, and accessible manner.
- Enhance project acceptance by clarifying project objectives and scope at an early stage and managing stakeholders' expectations
- Assess and mitigate project environmental and social impacts and risks to enhance project benefits
- To provide effective and inclusive means of communication with project-affected parties throughout the projects.
- Provide accessible means for project-affected parties to raise issues and grievances, and respond to them promptly and fairly

5.3 LEGISLATION REQUIREMENT

The stakeholder engagement and consultation processes have been undertaken in compliance with both Tanzanian legislative requirements, and World Bank Environmental and Social Standards. Section 89 of the EMA No. 20 of 2004 emphasizes its importance by guiding public participation and involvement in the EIA process and states its importance in the EIA. Regulation 17 of the EIA and Audit Regulations 2005 provides further directives and procedures for public participation in the EIA process.

Additionally, WB ESS 10 states that successful stakeholder engagement can enhance the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and execution.

5.4 STAKEHOLDERS CONSULTATION PROCESS

The consultation process is designed to establish an effective platform for productive interaction with the potentially affected parties, disadvantaged groups, and others with an interest in the implementation outcome of the Project. The purpose of the stakeholder engagement plan is to provide meaningful stakeholder engagement throughout the project cycle. The consultation aimed to solicit views, concerns, comments, and inputs from a wide range of stakeholders and project-affected parties regarding project implementation.

5.4.1 Stakeholder Engagement Plan

The consultant developed a Stakeholder Engagement Plan (SEP) to ensure effective engagement with stakeholders at every stage of the project. The consultation aims to gather opinions, concerns, comments, and input from a diverse range of stakeholders. This involved mapping and identification of Interested and Affected Parties, determining the types of information to share with stakeholders, developing effective communication channels and methods to facilitate interaction, and documenting stakeholder feedback, concerns, comments, and suggestions regarding the project

5.4.2 Stakeholder Identification and Analysis

Identification of stakeholders considered those people and institutions that have an interest in the design, implementation, and sustainability of the Project. This includes those positively and negatively affected by the Project. An approach for systematically identifying stakeholder groups was guided by the following:

- Dependency- groups or individuals on whom the Project proponent will depend in one way or another to operate, e.g. the cooperatives managing these sites
- Responsibility groups or individuals to whom the Project proponent has, or in the future may have, legal, commercial, operational, or ethical/moral responsibilities, e.g. the women crushing the rocks.
- Tension groups or individuals who will need immediate attention from the proponent about social or environmental issues associated with the Project, individuals who may oppose the project, e.g. NGOs;
- Influence groups and individuals who can have an impact on the Project through strategic planning or operational decision-making, e.g. LGAs, regulators of various aspects; and
- Diverse perspectives- groups and individuals whose different views can lead to a new understanding of the situation and the identification of opportunities for action that may not otherwise occur.

The stakeholder analysis was used to group stakeholders according to their influence and support of the Project. Lake Tanganyika Drainage Basin 11-1 below provides the list of stakeholders for the construction of ores Gold washing facilities that were identified in the stakeholder engagement process.

Table 5-1: List of Project Stakeholders and their roles

Stakeholders Group	Stakeholders	Relevance to the Project
Regulators/Government Agencies/Institutions	Government Chemist Laboratory Agency (GCLA), Mwanza, Lake Tanganyika Basin Water Office, Fire and Rescue Services	The Authority deals with permits related to chemical handling, management, and usage; water resources management and pollution prevention; emergency services
Regional Administration	Shinyanga Regional Management Team Regional Commissioner Regional Administrative Secretary - RAS Regional Medical Officer-RMO Regional Mine Officer -RMO (mines) Regional Fire Officer-RFO Regional Police Commander -RPC TFS	In charge of regional community health and welfare, investment development, environment management, and security.
District Administration	Kahama Municipal DED -District Executive Director District Management Team District Commissioner District Administrative Secretary Heads of Department -DCDO, DEMO, Social welfare, Planning, DMO	Responsible for people's welfare in the district and responsible for District development. They oversee the general community's welfare (in terms of People's rights, environment, security, welfare, etc.).
Ward Administration	Zongomera Ward (Kahama district) Ward Councilor Ward Development Committee Ward Executive Officers Ward Development committee	Responsible for Ward administration, community development, social welfare, environment, and land management.
Village Administration	Mwime villages Village Councils (VC) Village Environment Committees	Responsible for people's welfare in the Village and responsible for Village development. They oversee the general community's welfare (in terms of People's rights, environment, security, welfare, etc.).
Institutions	The local existing community institutions such as schools, police churches, mosques, hospitals, CBOs, and NGOs	Responsible for the provision of social services (health, education, safety, security, worshiping, and education but could also take part in observing the environment.
Community	Community members at Mwime for Shinyanga, religious leaders, traditional leaders, Influential people	These are communities in proximity to the Project area and are responsible for providing necessary inputs during Project planning and will

Stakeholders Group	Stakeholders	Relevance to the Project
		be potentially impacted by the mining activities
Individuals/ groups	PML and Surface Rights Owners, Groups Managing the PMLs	Community members located in the Project area may directly be impacted by the Project, in terms of relinquishing their surface rights for the project, and have the potential to be either economically/physically displacement.

5.4.3 Methodology of Consultation

The consultation was conducted according to the methodologies outlined below, ensuring stakeholders had the chance to voice their opinions on project risks, impacts, and mitigation measures. Furthermore, ongoing engagement with stakeholders will be maintained throughout the project's lifecycle, based on building up effective communication channels.

5.4.3.1 Notification of Stakeholders

To align with the requirements of the ESCP stakeholders should be notified as early as possible so they can understand the agenda that is going to be discussed and can make it to the meeting venue. The consultation was initiated by sending advance information through the phone call to make appointments with all the stakeholders including the Regional Administrative offices of the Shinyanga Region and Kahama municipal council District, as well as to ward and village leaders at least a week before the engagement. The phone call not only detailed the program but also requested the aforementioned government leaders to inform their respective committees and community members/villagers about the program and ensure their attendance at the consultation meetings with the consultants. The meeting venue was agreed upon by the target groups and the team followed the stakeholders to their places of work e.g. mining area, cooperatives offices, village and ward offices, schools, etc.

The consultation process was facilitated by the sociologist and the meetings took place from 6th November to 10th November 2023.

5.4.3.2 One-to-one meetings

A meeting took place between the consultant and key officials such as the government Chemist Laboratory Agency (GCLA), Lake Tanganyika Drainage Basin, Fire and Rescue Services and Shinyanga Regional Management Team, Shinyanga Region and kahama Districts as follows

- **Regional Level**

Meetings were held with the assistant of the Regional Commissioner (RC), RAS, RMO-Mines, and RMO, RPC at their respective offices on November 7th, 2023 to present information on the study process and to obtain the Regional administrative leader's opinions about the project. The RC was also informed about the meetings to be conducted at the district and project local levels.



Figure 5-1: Consultative meeting with RPC -Shinyanga, 7th Nov 2023

Source: City Engineering Co. Ltd Field Study

- **District Level**

The second meeting took place on November 8, 2023, with the Kahama Municipal Council officers and was attended by the District Executive Director (DED) and Heads of Departments. The meeting aimed to apprise the authority of the proposed project and gather data to establish socio-economic baseline conditions. The discussion included an overview of the project and the study process for the project and obtaining their views on the project. Another meeting was held at the District Commissioner's (DC) office on the same day with a similar agenda.

- **Government Agencies**

Meetings were held with the representatives from the Government Agencies between the 6th, 7th, and 13th Nov 2023, the government agencies involved in the consultation process included the Government Chemist Laboratory Agency (GCLA), TFS, and Lake Tanganyika BWB. These agencies were consulted to solicit views and significant concerns on policy and regulatory responsibilities of the agencies concerning the Project. Comments from agencies are key to ensuring that Project activities conform to the legislative requirements and procedures.

- **Ward Level**

Focus Group Discussions (FGDs) with the Ward Councilor, Ward Executive Officer, and Ward Development Committee (WDC) about the ESIA study were conducted on 10th Nov 2023 at Zongomera ward in Ilindi village office. Another FGD was conducted with Village Executive Officers (VEOs), Village Chairpersons, Village Council, Influential, Religious leaders, and traditional leaders on the same dates. The primary objectives of these meetings were to provide information about the proposed project, explain the study, and gather data on socio-economic baseline information in the local study area, encompassing aspects such as health, education, police, and livelihood activities and collecting views of the project.



**A consultative meeting with MMO-Kahama
8th Nov 2023**



**A consultative meeting with TFS-Shinyanga
field study 7th Nov 2023**



**A consultative meeting with RMO-Kahama
7th Nov 2023**



FGDs at Mwime village Office 11th Nov 2023

Figure 5-2: Stakeholder Consultation Meetings with Various Project Stakeholders

Source: CECL Field Study Nov 2023

5.4.3.3 Stakeholder's comments and concerns

The consultation process carried out in this study has allowed the team to distinguish the potential community concerns linked with the gold ores washing facilities project. Stakeholders' issues and concerns were documented, encompassing written submissions as well as verbal expressions during focus group discussions and individual meetings. The Table 5-2 below summarizes stakeholder views and perceptions about the likely positive and possible adverse effects of the proposed project

Table 5-2: Record of the Stakeholders' Concerns and Responses

STAKEHOLDER	ISSUE/CONCERN	COMMENT/RECOMMENDATION
GCLA-Mwanza Chemist Mr, Boazi Muzari Date 06/11/2023	It would be beneficial for NEMC to consider expanding the project's coverage. The initiative should target a larger number of small miners, as, at present, mercury has become similar to an illegal product due to its harmful effects on miners and communities. In the past, there was a well-known mercury distributor in Geita who received proper training on the safe transportation and sale of mercury. However, the situation has now changed, posing greater risks as miners started to hide where they purchase mercury	Continuous education will be provided to ASGM on management of mercury and general safety issues
	The demonstration center should comply with all the requirements	Centers are designed with all essential components
Regional Administrative Secretary -Shinyanga Prof, Siza Tumbo Date: 07/11/2023	NEMC should develop local expertise to ensure the project's sustainability after completion.	NA
Regional Commission Office - Shinyanga Mr. Fabian Kamoga Ag RC Date: 07/11/2023	NEMC should begin implementing this project as it will provide significant support to small-scale miners by understanding and implementing essential safety measures	The project will be implemented once all procedures needed have been followed and completed
	Local-level stakeholders, including ward and village governments, should actively participate in understanding any issues at the project site, and their involvement will be crucial in providing ideas.	This is also considered in the study
Regional Medical Officer (RMO) Shinyanga Dr, Yuda Ndagugile - RMO Neema Simba-RHO Mussa Makungu-RIDSR, EHO Date: 07/11/2023	It will support the small miners in understanding the best safety mechanism for handling mercury NEMC should create awareness among the community leaders so that they can provide full support during the implementation of the project	Awareness will continue to be offered
	NEMC should plan and prepare the Monitoring and evaluation plan to ensure the effective implementation of the project Small-scale miners contribute significantly to the development of the region and support numerous livelihoods, especially in this region hence efforts to find a safe way of handling mercury will be a great and positive project for them.	The project will be monitored for its efficiency

STAKEHOLDER	ISSUE/CONCERN	COMMENT/RECOMMENDATION
	<p>NEMC should ensure they conduct continuous monitoring and evaluation of the project after they construct to make sure small miners understand the applicability of the project and its advantage</p>	
	<p>The NEMC must collaborate with other institutions in conducting research in small miner's areas to determine the cause of mortality related to mercury exposure</p>	NA
<p>Regional Commander Police-RPC ACP S.Magomi Date: 07/11/2023</p>	<p>NEMC should start implementing the project since there are so many incidences of ASGM dying in the shaft this government project will support the ASGM in using protective gears and other PPE</p>	<p>The project will be implemented after completion of all necessary procedures</p>
<p>Regional Fire Officer SR Martin Nyambala (RFO) Date: 7th Nov 2023</p>	<p>The proposed project will help the ASGM to understand the proper use and handling of mercury for the health and environment considering that mercury is a very dangerous chemical NEMC should consider sharing the structure layout with the Fire officer for advice before they start the construction NEMC should consider providing education to the small-scale miners and the new technology equipment which will detect the consumption of mercury to the small-scale miners NEMC should work very closely with the Fire department in the respective areas to minimize risks that will likely occur</p>	<p>All fire hazard management measure will be implemented</p>
	<p>NEMCs should work closely with the District Cultural officer to maintain and preserve the indigenous culture of the community members in mining sites</p>	
<p>TFS-Shinyanga Franaeli Sumari Date: 7th Nov 2023</p>	<p>NEMC need to collaborate with other institutions to see how they can advise ASGM to use other alternatives instead of using trees in the shaft</p>	<p>NEMC will maintain good relation with other stakeholders</p>
<p>Kahama Municipal District Executive Director-DED Mr, Anderson Msumba Date: 8/11/2023</p>	<p>Small miners are surrounded by a low standard of living, so the risk is even higher. Many of them live in these areas and engage in vegetable farming. Often, water flows from the mines, and it contains mercury. Therefore, when this project begins, it will be of great assistance to them</p>	<p>Noted</p>
	<p>The perspective might be slightly different because they believe in traditional healing methods, but with additional education provided by NEMC, they will understand the project</p>	<p>Proper education will be provided during implementation of the project</p>

STAKEHOLDER	ISSUE/CONCERN	COMMENT/RECOMMENDATION
<p>Kahama Municipal Social Welfare Officer Swahiba Mcemchem Date: 8/11/2023</p>	<p>It is a good idea for NEMC to propose to the Regional and district management how to address the challenge of VAC in the mining areas There have been numerous incidents of Violence against children, with many being abandoned or engaged in small commercial activities around the mining areas.</p>	<p>Will be addressed as per Mitigation Measures chapter</p>
<p>Ward Executive Officer Zongomera ward Mr, Mroso E. P Chairperson Seeke Village Ms, Grace J. Nkuba Ward Education Officer Mr, Paschari M. Mabubu Influential leaders Suzana John Chairperson Zongomera Juma Matabu Religion leaders Mr, Paschar Mabubu -RC Date 10/11/2023</p>	<p>In this area, specifically in Mwime, there has been a significant challenge with the investor D4N Company Ltd, who invested here and caused an explosion with explosives and rocks, resulting in cracks in the houses of the residents. This conflict is at the district level, so NEMC (National Environmental Management Council) needs to investigate the permits of this investor before starting a new project, as the residents still seek clarification on the resolution of the challenges they faced NEMC (National Environmental Management Council) should have a system in place for visiting areas in small-scale miners. Ideally, they should establish offices in nearby locations so that when challenges arise, such as the case with investor D4N, they can address them promptly. This is crucial as they are also issuers of licenses There is a need for NEMC to self-evaluate, especially in the issuance of mining licenses. For instance, this investor D4N is located close to residential areas, which is why people have suffered, and there is no established procedure for compensation for the damages</p>	<p>The intended project will follow all the procedure to safeguard environment and the community</p>
<p>Inspector of Police -Mwime Mr, Athuman M.Kisangu Date: 10/11/2023</p>	<p>The project will be very beneficial. Often, small-scale miners completely disregard proper procedures for handling mercury, which is hazardous to both health and the environment. Once this project is implemented, it will greatly assist Umoja wa wenye mashamba lindi the small-scale miners, not only benefiting them but also the local community</p>	
<p>Umoja wa wenye Mashamba lindi -Small miners Manager Mr. Martin Bundala Date: 10/11/2023 Secretary Mr, Juma C. Manga Members Mr, Maziko Kalegi Mr, Dogo Mleziwa Mr, Shaban Maziku</p>	<p>As miners in whose area the project will be implemented, we are pleased and request NEMC to strive to bring this project early. Many of our miners do not pay attention to important health issues, and this project will greatly assist us. Through this, other miners in the surrounding areas will also learn There are many things that we, as miners, will learn that will greatly help us monitor and care for our health. However, NEMC should establish a proper procedure once the construction of those gold ores and washing facilities is completed, especially in the project management aspect, to avoid challenges in the future</p>	<p>The project intends to improve the operation of small-scale miners and safeguard environment</p>

5.5 GRIEVANCE REDRESS MECHANISM

5.5.1 Grievance

Grievance refers to any dissatisfaction that has the potential to adversely affect organizational relations and productivity. It encompasses concerns or complaints raised by individuals within or outside an organization, highlighting issues that may impact their well-being, rights, or the functioning of the entity.

5.5.2 Grievance Redress Mechanism

The Grievance Redress Mechanism (GRM) is a set of arrangements designed to empower local communities, employees, and other stakeholders to express grievances related to the project and seek redress for perceived negative impacts. In the context of project management, especially in endeavors with potential social or environmental implications, the GRM plays a pivotal role. It fosters effective communication, facilitates conflict resolution, and establishes accountability among project stakeholders.

5.5.3 Relevance to the Project

In Kahama MC, the grievance resolution process involves lodging complaints with the village and ward executives if not resolved then proceed to the District Commissioner level. As there is a police station, other matters are reported there and, in some cases, mediation and arbitration is done under the supervision of the police or the matter is escalated to court.

In Mwime, they faced a conflict between the village, and an investor called D4N Company Limited who triggered explosions causing damage to some village houses. The matter was escalated to the ward leaders, and from there, it proceeded to the Regional Mining Office, highlighting that a more structured approach to conflict resolution is needed.

Grievance Redress Mechanism

At project level a Grievance Redress Mechanism (GRM) will be established to allow community members, workers, and other stakeholders to raise complaints or concerns related to the project. Complaints could be submitted verbally or in writing through local leaders, GRM committee, project representatives, phone calls, or suggestion boxes.

All grievances will be recorded, investigated, and resolved within defined timelines. Sensitive cases, including GBV and SEA/SH, will be handled confidentially and referred to appropriate service providers.

6 CHAPTER SIX: ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS

6.1 INTRODUCTION

This section provides the identification and assessment of potential environmental and social impacts for the proposed project activities in all phases of the project life cycle i.e. mobilization, construction, operational phase as well as decommission phase. The Environmental and Social (E&S) screening processes outlined in sections 3.2 and 3.3 of the project's ESCP successfully mitigated most project risks through careful site selection. However, a few key potential environmental and social concerns remain following this thorough screening. These include

- Hazardous waste management (including disposal) at pilot sites.
- Dust and particulate materials, causing nuisances to surrounding families and businesses, especially to sensitive receptors (children, elders) during construction.
- Undesirable noise levels due to the machinery and equipment, especially in areas with health centers, homes for the elderly, and schools.
- Occupational health and safety of workers; and
- Terms and conditions of employment of workers.

These observations were made at the operational processing facilities across all sites, as the model plant is expected to have similar impacts. The primary anticipated impacts include emissions to air, land, and water, as well as effects on the health and safety of those involved in mining and processing, and other land users.

6.2 IDENTIFIED NEGATIVE IMPACTS

The Impacts Identified during the life cycle of the project are presented in Tables 6-2, 6-3, and 6-4. Since similar activities are undertaken within the vicinity of the project sites the risk level determination is based on the prevailing environmental conditions, and hence for most the impacts are low. Below is a description of some of the potential impacts identified.

6.2.1 Generation of Undesirable Levels of Noise

As described in section 2.2, the site is bounded by mining and processing sites, a Guest House, and a trading center. The operation of the crusher and generators powering the crushers and dewatering pumps significantly contribute to the levels of noise. As observed when noise measurements were undertaken at Mwime, the baseline noise levels were already above the limit for areas with mixed residential, commercial, and production activities which was recorded at 70.5 dBA. Furthermore, the proposed site is adjacent to all these activities hence it will be added to the noise levels. However, as this is a gold rush area, these levels are not considered a nuisance to the residents, and they are pleased that activities are ongoing providing them with a source of livelihood and income. The impact due to noise from the operation of the plant is high as the probability is almost certain, magnitude is high and the consequences of hearing impairment are permanent.

6.2.2 Employee Health, Safety and Welfare

There are several HSE risks associated with the project employees

- i. **Site risks** – potential for injuries due to falling into the abandoned mine pits, sluicing drainage, and abandoned toilet pits;
- ii. **Inherent risks associated with construction activities** of potential for injuries due to working at height, manual handling; contact with sharp, heavy, and moving objects;

slip and trip due to uneven ground and various items placed onsite, dust and noxious gas emissions; increased levels of noise; using shared sanitary facilities; sexual interactions amongst workers and the community.

- iii. **Inherent risks associated with ore processing** include noise, dust, contact with hazardous extraction chemicals (mercury, cyanide, lime)
- iv. **Welfare risks** include unfair employment conditions including payment below minimum wage, excessive working hours, discrimination, and harassment

6.2.3 Community Health and Safety Risks

Increased potential for accidents due to increased traffic for transit of goods and project personnel; or community members, especially children accessing the construction site and the gold ore processing facility during operation

Increased levels of noise, dust, and chemical emissions/discharge may impact community health.

Project employees interact with community members and transmit STIs and upon project closure abandon families increasing the number of vulnerable groups (single/women and child-headed families)

6.2.4 Impacts on Water Resources

Increased water demand for use in construction, by construction workers and operation of the proposed gold ores processing facility.

Both domestic and operational wastewater have the potential to contaminate water sources from inadequate control of stormwater at the site and discharge of wastewater

6.2.5 Generation of Hazardous Waste

Construction wastes will contain cement, paint, and specific materials that contain hazards.

The use of extraction chemicals e.g. Mercury, Cyanide, and Lime will generate chemically contaminated waste from packaging/containers, tailings, and wastewater.

6.3 IDENTIFIED POSITIVE IMPACTS

6.3.1 Reduction in Mercury Pollution

The project promotes the use of alternative gold recovery technologies, significantly reducing mercury emissions in mining areas. This will prevent mercury contamination of water bodies, soil, and the atmosphere, thereby protecting both human health and biodiversity. The shift to cleaner technologies will also minimize the bioaccumulation of mercury in fish and other aquatic life, reducing health risks for communities that rely on these resources for food.

6.3.2 Improved Air and Water Quality

By eliminating or significantly reducing mercury use, the project will lead to cleaner air and water in ASGM regions. Mercury vapor inhalation is a major health hazard, and its reduction will decrease cases of respiratory diseases among miners and nearby communities. Additionally, cleaner water sources will provide safer drinking water, reducing the prevalence of waterborne diseases and ensuring the sustainability of aquatic ecosystems.

6.3.3 Soil and Land Restoration

Unregulated ASGM activities lead to severe land degradation, but the project encourages sustainable mining practices that minimize environmental destruction. Through controlled

processing centers, waste disposal will be managed more effectively, allowing the land to regenerate and potentially be used for agriculture or reforestation. This will also help restore local biodiversity and reduce the long-term ecological footprint of mining activities.

6.3.4 Sustainable Mining Practices

The introduction of modern mineral processing centers will set a precedent for environmentally responsible mining. Miners will be trained on best environmental practices (BEPs), such as efficient ore processing and waste management techniques. By demonstrating the benefits of cleaner technology, the project encourages widespread adoption of sustainable mining methods, reducing environmental harm and improving long-term productivity in the ASGM sector.

6.3.5 Improved Waste Management

The construction of well-managed mineral processing centers will provide miners with access to designated waste disposal facilities, reducing the random dumping of hazardous waste. This will prevent the release of toxic mining residues into the environment, protecting soil and water resources. Proper waste management also reduces the spread of disease and environmental contamination, benefiting both miners and surrounding communities.

6.3.6 Improved Health and Safety for Miners

By equipping mineral processing centers with personal protective equipment (PPEs) and safer gold extraction methods, the project will significantly reduce occupational health risks. Miners will no longer be directly exposed to mercury vapor and other harmful chemicals, lowering cases of mercury poisoning, lung disease, and neurological disorders. This will lead to a healthier workforce and improve the overall well-being of those involved in ASGM.

6.3.7 Community Health Benefits

Mercury pollution affects not only miners but also surrounding communities, particularly women and children who are more vulnerable to mercury toxicity. By reducing mercury use, the project will help lower the incidence of birth defects, cognitive impairments, and chronic illnesses linked to mercury exposure. Additionally, improved environmental conditions will lead to a general decline in respiratory and waterborne diseases in mining areas.

6.3.8 Economic Empowerment for ASGM Miners

The introduction of alternative gold recovery technologies will enhance gold extraction efficiency, increasing miners' income without compromising their health or the environment. Training on modern mining techniques will allow miners to improve their productivity while reducing operational costs. This shift towards sustainable practices will enable miners to maintain long-term livelihoods and contribute positively to the local economy.

6.3.9 Job Creation and Local Economic Growth

The establishment of mineral processing centers will create employment opportunities in construction, operation, and maintenance. Skilled and unskilled workers will benefit from increased job availability, boosting local economies. Additionally, supporting industries such as equipment supply, safety gear distribution, and transportation services will experience growth, creating further economic benefits for communities around mining sites.

6.3.10 Capacity Building and Skills Development

The project will provide training programs for miners, regulators, and local authorities, improving their knowledge of sustainable mining practices. By equipping stakeholders with

the necessary skills to implement and oversee mercury-free mining, the project will strengthen institutional capacity and governance in the ASGM sector. This will ensure long-term compliance with environmental regulations and encourage further innovation in the mining industry.

6.3.11 Strengthened Institutional and Regulatory Frameworks

The involvement of government agencies like NEMC and the Mining Commission in project implementation will enhance regulatory oversight of ASGM activities. By developing policies that support cleaner mining technologies, the project will help enforce existing environmental laws and promote responsible mining practices. This will create a more structured and legally compliant ASGM sector, benefiting both miners and the environment.

6.3.12 Improved Gender and Social Inclusion

Women are often disproportionately affected by mercury exposure due to their involvement in gold processing and household responsibilities. The project's focus on safer mining practices will provide women with improved working conditions and better health outcomes. Additionally, by ensuring equal access to training and resources, the project will empower women and marginalized groups to participate in the mining sector on more equitable terms.

6.3.13 Community Awareness and Environmental Education

Educational programs and awareness campaigns will inform local communities about the dangers of mercury use and the benefits of alternative technologies. Increased awareness will encourage communities to adopt safer practices and support regulatory measures aimed at reducing environmental and health risks. This cultural shift towards responsible mining will foster long-term sustainability and protect future generations from the harmful effects of mercury pollution.

6.4 IMPACT ASSESSMENT CRITERIA

The criteria adopted mimicked the recommendations of ESCP Annex II: World Bank ESF Risk Categories which defined a level of risk according to a combination of duration, extent, probability of occurrence, and magnitude. To determine the different levels the consultant adopted a methodology that was utilized before that aligns with the Australian and New Zealand impact assessment criteria as included in Table 6-1.

Table 6-1: Risk Assessment Criteria

Criteria	Category	Description
Nature	Positive	Beneficial environmental change
	Negative	Adverse environmental change
The extent of impact: spatial limit of the impact	International	Beyond Tanzania's borders
	National	Tanzania
	Regional	Beyond the regional boundaries or watershed
	Local	Within the district within Ward/village borders, or at off-site locations (material sources, waste disposal sites, etc.)
	Site-specific	Onsite or within the 100m
Magnitude of impact	High	Natural functions and processes/existing conditions are severely altered. Sensitive/protected species or habitats are severely affected

Criteria	Category	Description
	Medium	Natural functions and processes/existing conditions are notably altered. Sensitive/protected species or habitats affected
	Low	Natural functions and processes/existing conditions are slightly altered. Sensitive/protected species or habitats not affected
	Very low	Natural functions and processes/existing conditions are negligibly altered
	Zero	Natural functions and processes remain unaltered
Duration of impact	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases. For instance, one month.
	Medium-term	The impact will last up to the end of the phases, whereafter it will be negated. For instance, for several months.
	Long term	The impacts last a couple of years or will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
	Residual/ Enduring term	The impact lasts several years to and past the life of operations. Will last past the post-closure phase of the project (after cessation of the activity) but will be mitigated by direct human action or by natural processes thereafter.
	Permanent	Permanent impact. The impact will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.
Probability: impact occurrence likelihood	Improbable	The possibility of the impact occurring is very unlikely
	Probable	There is a good possibility (<50% chance) that the impact will occur
	Highly probable	It is most likely (50-90% chance) that the impact will occur
	Definite	The impact will occur regardless of any preventive measures (>90% chance of occurring)

Table 6-2: Construction Phase Impacts Identified and Their Corresponding Risk Level

Phase/Activity	Potential Impact	Probability	Magnitude	Duration	Extent	Risk Level
Construction Phase						
Demolition of existing foundation and facilities	Generation of dust nuisance to the neighbors at the adjacent guest house and shops/bars	Definite	Low	Medium term	Site specific	Low
	Generation of undesirable noise levels	Definite	Very low	Medium term	Site specific	Low
	Generation of demolition waste	Definite	Low	Short term	Local	Low
	Generation of sediments that may wash into waterways	Probable	Low	Medium term	Site specific	Low
	Occupational safety and health risks due to sharp and heavy objects in the demolition	Probable	Low	Medium term	Site specific	Low
	Risk of falling into the mine and toilet pits onsite	Probable	Low	Medium term	Site specific	Low
	Potential for accidents due to use of heavy equipment	Probable	Low	Medium term	Site specific	Low
	Potential for impact incidents due to use of hand and jack hammers	Probable	Low	Medium term	Site specific	Low
Construction of sluices, VAT leaching tanks, drainage and amalgamation pool	Generation of dust from cement works	Probable	Low	Medium term	Site specific	Low
	Potential for accidents due to falling in foundation and sluice drainage/sediment trap excavations and from working at height	Probable	Low	Medium term	Site specific	Low
	Potential for accidents due to falling objects	Probable	Low	Medium term	Site specific	Low
	Health and safety risks due to manual heavy lifting	Probable	Low	Medium term	Site specific	Low

Phase/Activity	Potential Impact	Probability	Magnitude	Duration	Extent	Risk Level
	Generation of construction wastes (cement bags/mixed cement/concrete)	Probable	Low	Medium term	Site specific	Low
		Probable	Low	Medium term	Site specific	Low
Rehabilitation of degraded land, landscaping and tree planting	Improved health and safety due to backfilling of mining pits and excavations and levelling the ground	Probable	Low	Medium term	Site specific	Low
	Exposure of loose soil that may wash into waterways and cause siltation	Probable	Low	Medium term	Site specific	Low
	Change in drainage patterns	Probable	Low	Medium term	Site specific	Low
	Improved biodiversity due to encouraging and planting vegetation	Probable	Low	Medium term	Site specific	Low
	Improved aesthetics	Probable	Low	Medium term	Site specific	Low
Transit of supplies and project personnel to and from site	Increased traffic that increases potential for accidents in the community especially for children	Probable	Low	Medium term	Site specific	Low
		Probable	Low	Medium term	Site specific	Low
Provision of food to employees	Generation of food waste	Probable	Low	Medium term	Site specific	Low
Provision of drinking water	Potential for communicable diseases due to use of unsafe water supply	Probable	Low	Medium term	Site specific	Low
	Increased water demand	Probable	Low	Medium term	Site specific	Low
Employee hygiene	Potential for spread of communicable diseases due to use of unsanitary washrooms	Probable	Low	Medium term	Site specific	Low
Sourcing of Labor	Immigration of construction workers	Probable	Low	Medium term	Site specific	Low

Phase/Activity	Potential Impact	Probability	Magnitude	Duration	Extent	Risk Level
	Unfair employment terms to local people	Probable	Low	Medium term	Site specific	Low
	Unfair employment terms to Women	Probable	Low	Medium term	Site specific	Low
	Potential for child Labor	Probable	Low	Medium term	Site specific	Low
Demobilization of construction workers	Increase number of single women and child headed families due to abandoning families	Probable	Low	Medium term	Site specific	Low

Table 6-3 Operations Phase Impacts Identified and Their Corresponding Risk Level

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
Operation Phase						
Drying of ore	Health and safety risks due to manual heavy lifting	Probable	Low	Medium term	Site specific	Low
	Generation of sediments that may wash into waterways	Probable	Low	Medium term	Site specific	Low
Crushing of ore using hand hammers	Generation of undesirable level of noise	Definite	Medium	Long term	Local	Moderate
	Generation of dust exposure to workers	Probable	Low	Medium term	Site specific	Low
	Increased potential for finger injuries due to use of hand hammers	Probable	Medium	Medium term	Site specific	Low

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
	Exposure of children to mine hazards due to being at the mine site with mothers for care	Probable	Medium	Long term	Local	Moderate
Grinding/milling using crushers	Generation of undesirable level of noise	Probable	Low	Medium term	Site specific	Low
	Generation of dust	Probable	Low	Medium term	Site specific	Low
	Generation of metal waste (steel balls and work crushers)	Probable	Low	Medium term	Site specific	Low
Supplying power to the crushers	Generation of noise from the onsite generators	Probable	Low	Medium term	Site specific	Low
	Emission of noxious gases from generators	Probable	Low	Medium term	Site specific	Low
	Increased potential for hydrocarbon spills polluting land and water	Probable	Low	Medium term	Site specific	Low
	Potential for fire from power generators	Probable	Low	Medium term	Site specific	Low
Sluicing	Potential for inhalation of dust during handling of milled ore	Probable	Low	Medium term	Site specific	Low

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
	Increased water demand for sluicing	Probable	Low	Medium term	Site specific	Low
	Generation of sediment-loaded wastewater	Probable	Low	Medium term	Site specific	Low
	Generation of tailings	Probable	Low	Medium term	Site specific	Low
Amalgamation	Exposure of employee's elemental mercury by contact	Probable	Medium	Long term	Local	Moderate
	Generation of wastewater that contains mercury in the amalgam pool	Probable	Medium	Long term	Local	Moderate
	Generation of mercury-laden tailings	Probable	Medium	Long term	Local	Moderate
	Generation of gold that contains mercury as an impurity	Probable	Medium	Long term	Local	Moderate
	Promoting continued mercury production and trade	Probable	Medium	Long term	Local	Moderate
Removal of mercury and impurities in gold amalgam via heating	Increased demand for charcoal and firewood	Probable	Low	Medium term	Site specific	Low

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
	The release of mercury in air causes pollution	Highly Probable	Medium	Long term	Regional	High
	Exposure of employees to mercury aerosols	Highly Probable	Medium	Long term	Regional	High
	Generation of ashes that may contain mercury	Probable	Low	Medium term	Site specific	Low
	Generation of mercury contaminated waste from utilizing retort	Probable	Low	Medium term	Site specific	Low
VAT Leaching of tailings	Exposure of employees to hazardous chemicals (Cyanide and Lime)	Probable	Low	Medium term	Site specific	Low
	Generation of mercury and other leaching byproducts laden tailings	Probable	Low	Medium term	Site specific	Low
	Increased water demand	Probable	Low	Medium term	Site specific	Low
	Exposure of employees to drowning in the VAT tanks	Probable	Low	Medium term	Site specific	Low
	Generation of chemical wastes from packaging	Probable	Low	Medium term	Site specific	Low

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
	Requirement of Skilled Labor	Probable	Low	Medium term	Site specific	Low
Provision of food to employees	Generation of food waste	Probable	Low	Medium term	Site specific	Low
	Consuming contaminated food (Mercury/dust) as most eat at their worksite	Probable	Low	Medium term	Site specific	Low
Provision of drinking water	Potential for communicable diseases due to use of unsafe water supply	Probable	Low	Medium term	Site specific	Low
	Increased water demand	Probable	Low	Medium term	Site specific	Low
Employee hygiene	Potential for spread of communicable diseases due to use of unsanitary washrooms	Probable	Low	Medium term	Site specific	Low
Provision of Labor	Unfair employment terms to local people	Probable	Low	Medium-term	Site-specific	Low
	Unfair Employment Terms to Women	Probable	Low	Medium-term	Site-specific	Low

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
Hazardous Waste Management (expired chemicals, chemical containers, and mismanagement of sewage)	Exposure of employees to hazardous chemicals (Cyanide and Lime)	Probable	Low	Medium-term	Site-specific	Low
	Fecal-related disease outbreaks (typhoid, cholera, Dysentery,	Probable	Low	Medium-term	Site-specific	Low

Table 6-4 Decommission Phase Impacts Identified and Their Corresponding Risk Level

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
Decommission Phase						
Dismantling of mine and plant infrastructures and 'leveling	<ul style="list-style-type: none"> Deterioration in ambient air quality due to dust and particulate matter (PM10 and PM2.5) Increased noise and vibrations that may lead to nuances and damages of properties Deterioration of water quality affecting the use of ground water and surface water as a natural resource Exposure of employees to hazardous chemicals (Cyanide and Lime) which can lead to serious health effects such as neurological and behavioral disorders, kidney damage, respiratory problems, and even death 	Probable	Low	Medium-term	Site - Specific	Low
Generation and management of wastes		Probable	Low	Medium-term	Site - Specific	Low
VAT closure activities		Highly Probable	Medium	Long term	Regional	High

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
Transportation of materials out of site	Accident and Injuries	Probable	Low	Medium- term	Site - Specific	Low
Site leveling and revegetation	Introduction of invasive species	Probable	Low	Medium- term	Site - Specific	Low

6.5 ALTERNATIVES ANALYSIS

The aim of this project is to promote phasing out of mercury as the main extraction mechanism used by ASGM. The focus will be on promoting alternative technologies for gold extraction without the use of harmful chemicals. However, as a viable technology that is accessible and can be easily adopted by ASGM is still being researched the project proposes improved handling and recovery to reduce exposure to ASGM and the environment.

6.5.1 No project Alternative

If nothing is done, the ASGM will continue to handle liquid mercury with bare hands; discharge the amalgamation pool overflow into the environment; open burning of the mercury amalgam without respiratory protection; and disposing ashes that may contain mercury on bare land. All these activities cause mercury pollution. Furthermore, the limited use of PPE will prolong the exposure to respirable particulate matter, potential for injuries due to manual handling of rocks, tools and cargo that cause health and safety impacts largely to the employees but also to the children found onsite as their mothers had no one to care for them at home.

As this option supports continued health, safety and environmental issues it is not a viable option.

6.5.2 VAT leaching Directly after Milling

The ASGM interviewed reported that VAT leaching was a preferred option as it has higher gold recovery rates and would shorten the processes needed to obtain gold. However, due to the costs of constructing a VAT leach plant, permitting requirements, and operational costs this was a solution that was out of reach as it required large volumes of ore to become economically viable which would take time to accumulate with the ASGM mining methods and they need fast cash to help them maintain the Labor and daily operational requirements for the mine. Furthermore, VAT leaching plants are not located onsite and will require stockpiles to be transported to the plant offsite and another set of workers which had the necessary skills to safely and efficiently operate leaching plant. Mercury is easily available within proximity to the site and not costly e.g. said to cost TSh 50,000/- per bob (measured in a cap of soda or beer) and one would need about 2 to 3 whereas accessing a VAT plant is at a minimum TSh. 5 million.

Impacts associated with this option include high investment and operation costs, use of hazardous chemicals (cyanide and lime), generation of chemical wastes from packaging and remnant tailings, and skilled Labor force. However, it will eliminate the need for mercury and the associated amalgamation process and burning. This option was found to be viable downstream of the mercury amalgamation process which will be needed to generate the necessary cash for ASGM to access the VAT leaching plants. However, reprocessing of mercury-contaminated tailings results in mercury/cyanide compounds that are more easily dispersed in waters and make mercury more bio-available. The ASGM at all sites admitted that they were reprocessing tailings from the amalgamation pool.

6.5.3 Direct Smelting

In this process, A small mass of high-grade concentrate is first produced (by milling, sluicing and/or concentrating), then it is melted to separate the gold from other minerals. If working with sluice carpet concentrate, additional concentration beyond the stage at which mercury is applied is required before direct smelting can be applied. Direct smelting is an alternative processing pathway that does not use mercury. However, it is important to understand that it

is not a direct replacement for mercury because it is not applied at the same stage of processing. Mercury is commonly applied to large masses of concentrate - for example, 20 kg coming from the carpets of a sluice - whereas direct smelting is performed on small masses of high-grade concentrate usually no larger than 100g⁶. The challenge in this method is in the production of high-grade concentration (More than 25%), which may be achieved by using several sluices or various methods of gravity concentration e.g. panning or mechanical separators, e.g. shaking table. As no mercury is used, this method is more environmentally friendly, however as it requires multiple efforts to produce the high-grade concentrate and by the common methods available of sluicing and panning is tedious, may cause gold losses in additional concentration steps, and is time and energy consuming. These factors make it less appealing to the ASGM and hence it was not considered further.

6.5.4 Use of retorts

Heating to vaporize off mercury from the gold mercury amalgam obtained from panning (reported to contain 40 – 60% Mercury⁷) is another way workers and their families are exposed to mercury which subsequently reaches the environment. In order to remove this pathway use of retorts have been prescribed in the Mining (Environmental Protection for Small Scale Miners) Regulations of 2010 in separating gold from the amalgam. Retorts heat amalgam in one part and cool and condense the mercury vapor back into a liquid in another part of the device which can then be re-used after activation. Care should be taken when handling retorts as they are contaminated with mercury and one should wait until they have completely cooled not to cause secondary mercury vapors to release. Retorts are not commonly used in Artisanal and Small-Scale Gold Mining (ASGM) due to several reasons. One of the main reasons is that retorts require a certain level of technical expertise to operate and maintain, which may not be available to many ASGM miners. Additionally, retorts can be expensive to purchase and may not be affordable for many ASGM miners⁸. The impacts associated with the use of retorts is that themselves and the associated sand/water is that they can provide a source of secondary pollution when disposed.

However, the benefits of capturing mercury which can be reused (resource recovery) is favorable than the risks of secondary pollution which can only occur when the retort and associated components are not properly handled. This project proposes the use of retorts in the separation of gold/mercury amalgam.

6.5.5 Well & Boreholes (Groundwater)

Drilling boreholes or wells provides a reliable and independent water supply for mining operations, reducing competition for surface water sources. This method is particularly useful in areas where rainfall is inconsistent, ensuring a stable source of water for processing activities. However, excessive groundwater extraction can lead to depletion and potential conflicts with local communities. The project should conduct hydrogeological surveys before implementation to assess groundwater availability and sustainability, ensuring responsible water management practices are in place.

⁶ [AGC Practical-Guide-on-Reducing-Mercury-in-ASGM_en.pdf \(artisanalgold.org\)](#)

⁷ [\(PDF\) Situational Analysis of Gold Processing Practices at Artisanal and Small-Scale Gold Mining in Tanzania \(researchgate.net\)](#)

⁸ [Guide.pdf \(unep.org\)](#)

The combination of rain harvesting and groundwater will provide alternative approaches that provide practical solutions to enhance the project's sustainability.

6.5.6 Alternative Power Sources

Solar energy offers a clean, renewable power source for mining operations, especially in remote areas with limited access to electricity grids. By installing solar panels to power mineral processing centers, miners can reduce reliance on fossil fuels, lower operational costs, and minimize carbon emissions. While solar panels require significant upfront investment, they provide long-term savings and energy independence. Battery storage solutions can also be integrated to ensure a continuous power supply, addressing the challenge of intermittent energy production. The project can consider pilot installations of solar power in demonstration centers to assess the feasibility of wider adoption.

However, Ilindi village is connected to the national grid through the Rural Electrification Agency Project (REA) which the residents mainly use for lighting and was also observed at the project site being used to operate the crushers. This will be the main source as a 3-phase electricity connection is already onsite. These will be supported by generators of adequate capacity which will be used as backup in events of power outage and low voltage.

Renewable energy sources, such as solar power, present a feasible alternative for mining operations, particularly in remote areas with limited access to electricity grids. By harnessing solar energy to power mineral processing facilities, miners can significantly reduce their reliance on fossil fuels, decrease operational expenses, and lower their carbon footprint. Although the initial investment in solar infrastructure is substantial, it yields long-term cost savings and energy independence. Furthermore, the integration of battery storage solutions can mitigate the challenge of irregular energy production, ensuring a stable power supply.

However, in the case of Ilindi village, the existing connection to the national grid via the Rural Electrification Agency Project (REA) provides a reliable source of electricity. The villagers primarily utilize this electricity for lighting purposes, and it is also being used to operate the crushers at the project site. Given that a 3-phase electricity connection is already available onsite, this will serve as the primary power source. To ensure uninterrupted operations, generators with sufficient capacity will be employed as backup systems in the event of power outages or low voltage, providing a reliable and efficient energy solution.

7 CHAPTER SEVEN: IMPACT MITIGATION AND ENHANCEMENT MEASURES

Most of the impacts identified can be mitigated to a large extent by measures that have been previously developed, tested, and approved and in some cases incorporated in legislation and best practice guidelines. They require changes in behavior and willingness to adapt to new ways of operating.

7.1 MITIGATION MEASURES FOR IMPACTS DURING CONSTRUCTION

Several impacts were identified for the construction period the majority of which are pertaining to the health and safety of both project employees and the community. Corresponding mitigation measures proposed during the construction period are included in Table 7-1.

Table 7-1 Mitigation Measures for the Construction Phase Identified Impacts

Phase/Activity	Potential Impact	Proposed Mitigation
Demolition of existing foundation and facilities	Generation of dust nuisance to the neighbours at the adjacent guest house and shops/bars	<ul style="list-style-type: none"> ● Conduct activities during daytime hours ● Wet down areas prior to starting demolition activities ● Consider an alternative site
	Generation of undesirable noise levels the neighbours at the adjacent guest house and shops/bars	<ul style="list-style-type: none"> ● Conduct activities during daytime hours ● Consider an alternative site
	Generation of demolition waste	Reuse demolition debris as core in foundations and floors
	Generation of sediments that may wash into waterways	Construct drainage around the site and sediment trap prior to discharge
	Occupational safety and health risks due to sharp and heavy objects in the demolition	<ul style="list-style-type: none"> ● Ensure construction workers receive training prior to commencing work ● Provide PPE and enforce usage ● Engage HSE Officer as part of construction crew ● Ensure Job Safety Hazard analysis is conducted prior to commencing work and required mitigation measures are in place
	Risk of falling into the mine and toilet pits onsite	<ul style="list-style-type: none"> ● Identify and demarcate pits ● Use mechanical equipment to level the site prior to employees accessing it
	Potential for accidents due to use of heavy equipment	<ul style="list-style-type: none"> ● Ensure traffic management rules are in place and communicated ● Always use a spotter when heavy equipment is operating ● Ensure operators are trained and certified according to the national driving requirements and in addition the project specific drivers training
	Potential for impact incidents due to use of hand and jack hammers	<ul style="list-style-type: none"> ● Ensure operators are trained and certified according to the national driving requirements and in addition the project specific drivers training ● Ensure Job Safety Hazard analysis is conducted prior to commencing work and required mitigation measures are in place
Construction of sluices, VAT leaching	Generation of dust from cement works	<ul style="list-style-type: none"> ● Ensure construction workers receive training prior to commencing work ● Provide PPE and enforce usage ● Engage HSE Officer as part of construction crew

Phase/Activity	Potential Impact	Proposed Mitigation
tanks, drainage and amalgamation pool	Potential for accidents due to falling in foundation and sluice drainage/sediment trap excavations and from working at height	<ul style="list-style-type: none"> ● Promote good cement handling and limit wasteful practices ● Demarcate all areas with falling hazards ● Provide scaffolding for people working at height ● PPE and enforce usage ● Ensure Job Safety Hazard analysis is conducted prior to commencing work and required mitigation measures are in place
	Potential for accidents due to falling objects	<ul style="list-style-type: none"> ● Ensure safety signs are placed at strategic areas to provide warning ● Provide PPE and enforce usage ● Provide tool holding equipment for people working at height
	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> ● Provide manual handling and lifting training. ● Use mechanical lifting and transporting equipment/ devices e.g. pulley,
	Generation of construction wastes (cement bags/mixed cement/concrete	<ul style="list-style-type: none"> ● Institute a waste management program that promotes waste segregation ● Have a recyclable waste storage facility that is secure ● Identify permitted contractors/person who can collect and recycle the waste ● Avoid wasteful practices ● Use hardened cement and concrete debris as core
	Rehabilitation of degraded land, landscaping and tree planting	Improved health and safety due to backfilling of mining pits and excavations and levelling the ground
Exposure of loose soil that may wash into waterways and cause siltation		<ul style="list-style-type: none"> ● Landscape to ensure non scouring/erosion promoting slopes ● The landscaping should ensure minima areas are left bare ● Include sedimentation basins in drainage
Change in drainage patterns		<ul style="list-style-type: none"> ● Landscape according to the natural topography ensuring free draining ● Include water crossings for areas with defined drainage channels
Improved biodiversity due to encouraging and planting vegetation		<ul style="list-style-type: none"> ● Landscape the area to promote aesthetic appeal ● Plant trees and vegetation that is common to the floristic region

Phase/Activity	Potential Impact	Proposed Mitigation
		<ul style="list-style-type: none"> ● Use drought resistance and low maintenance vegetation that can thrive without need for care
	Improved aesthetics	<ul style="list-style-type: none"> ● Landscape the area to promote aesthetic appeal ● Plant trees and vegetation that is common to the floristic region ● Use drought resistance and low maintenance vegetation that can thrive without need for care
Transit of supplies and project personnel to and from the site	Increased traffic increases potential for accidents in the community especially for children	<ul style="list-style-type: none"> ● Ensure traffic management rules are in place and communicated to employees ● Provide awareness to the community members ● Ensure operators are trained and certified according to the national driving requirements and in addition the project specific driver training ● Liaise with TARURA and install safety signs on community roads
Use of heavy equipment	Potential for hydrocarbon spills	<ul style="list-style-type: none"> ● Contractor will be required to use appropriate fueling equipment with spill prevention measures when refueling onsite ● Use of plastic drums and mats under heavy
Provision of food to employees	Generation of food waste	<ul style="list-style-type: none"> ● Engage local food vendors who will prepare food offsite and bring food in reusable utensils and containers ● Properly segregate food waste to ensure no harmful objects are contained and identify recycling opportunities ● Consider having a composting unit ● Ensure the eating area is kept clean and the dust bin sealed to discourage vermin infestation
Provision of drinking water	Potential for communicable diseases due to the use of unsafe water supply	Ensure access to adequate amounts of potable water
	Generation of light plastic waste (water bottles)	<ul style="list-style-type: none"> ● Ensure recyclable plastics collection point is available ● Engage plastic waste collectors who are operating in Kahama town and identify economical means to promote recyclable waste collection
	Increased water demand in community water supply	Consider the provision of bottled water or bulk water supply

Phase/Activity	Potential Impact	Proposed Mitigation
Employee hygiene	Potential for the spread of communicable diseases due to the use of unsanitary washrooms	<ul style="list-style-type: none"> ● Provide adequate facilities for sanitary convenience e.g. mobile toilets and mobile septic tanks ● Engage cleaners to ensure that they are kept in hygienic conditions ● Frequently empty full sewage tanks utilizing permitted contractors ●
Sourcing of Labor	Immigration of construction workers	<ul style="list-style-type: none"> ● Adopt principles included in the Labor Management Plan where unskilled workers will be locally hired through the village authority ● No migrant Labor will be employed by the project ● Specialized work will be undertaken by contractors who will be responsible for managing their employees
	Unfair employment terms to local people	<ul style="list-style-type: none"> ● Include adherence to Labor requirements in contracts for engaged contractors ● Ensure that employees are provided with contracts as per Employment and Labor Relations Act 2004 ● Ensure Labor rights and responsibilities specific training is provided to both contractors and employees, the district authority responsible for Labor ● Ensure the project and contractor have a grievance mechanism and that employees are aware of it
	Unfair Employment Terms to Women	<ul style="list-style-type: none"> ● Include adherence to Labor requirements in contracts for engaged contractors
	Potential for Child Labor	<ul style="list-style-type: none"> ● Include adherence to Labor requirements in contracts for engaged contractors and ensure that children under 18 year are not hired.
Demobilization of construction workers	Increase number of single women and child-headed families due to abandoning families	<ul style="list-style-type: none"> ● Provide awareness to project employees and the community pertaining to interactions ● Ensure the project and contractor have a grievance mechanism and that employees are aware of it ● Engage local NGOs who work on these matters to assist

7.2 MITIGATION MEASURES FOR IMPACTS DURING OPERATIONS

The main impacts associated with the operations phase are related to the use of chemicals specifically Mercury. Reductions in mercury use are more likely to be accepted by miners and become permanent if they increase or at least maintain income. These may be achieved by:

- Conserving or eliminating the need for mercury and other reagents, saving costs
- Saving time by more efficient processing
- Recovering more gold by improving extraction techniques, which might include using better technology or using existing technology better
- Getting a better price for gold by following standards that get a better market price (incentives)⁹

Furthermore, changes in the way people work e.g. utilizing mechanical rather than Labor means e.g. rock breaking and utilizing PPE can be adopted if they can understand the benefits and lower their risk tolerance levels. Others need a supporting environment, e.g. availability of caregivers for children at home or another designated area such that their mothers can comfortably leave them and come to work limiting small children's exposure to a hazardous environment at mine. The mitigation measures should also be inclusive not leaving behind a group of people without livelihoods e.g. adoption of mechanical rock crushing will leave the women engaging in this activity (Wapiga Ukwara) jobless and they are no longer able to support their families.

⁹ [AGC Practical-Guide-on-Reducing-Mercury-in-ASGM_en.pdf \(artisanalgold.org\)](#)

Table 7-2: Mitigation Measures for Operation Impacts

Activity	Potential Impact	Proposed Mitigation
Drying of ore	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> ● Provide manual handling and lifting training. ● Use mechanical lifting and transporting equipment/ devices e.g. pulley.
	Generation of sediments that may wash into waterways	Construct drainage around the site and sediment trap prior to discharge
Crushing of ore using hand hammers	Generation of undesirable level of noise the neighbours at the adjacent guest house and shops/bars	<ul style="list-style-type: none"> ● Conduct activities during daytime hours ● Consider an alternative site which is not very close to residential dwellings ● Provide hearing protection to employees
	Generation of dust exposure to workers	<ul style="list-style-type: none"> ● Ensure workers receive training prior to commencing work ● Provide PPE and enforce usage ● Engage HSE Officer as part of construction crew ● Install mechanical crusher plants ● Apply water as dust suppressant in mechanical crushers
	Increased potential for finger injuries due to use of hand hammers	<ul style="list-style-type: none"> ● Provide PPE and enforce usage ● Ensure job hazards analysis is conducted and mitigation measures are in place ● Install mechanical crusher plants
	Exposure of children to mine hazards due to being at the mine site with mothers for care	Liaise with NGOs and community on support system for child care while mother is working
Grinding/milling using crushers	Generation of undesirable level of noise	<ul style="list-style-type: none"> ● Conduct activities during daytime hours ● Consider an alternative site which is not very close to residential dwellings ● Provide hearing protection to employees
	Generation of dust	<ul style="list-style-type: none"> ● Conduct activities during daytime hours ● Consider an alternative site which is not very close to residential dwellings ● Provide respiratory protection to employees

Activity	Potential Impact	Proposed Mitigation
	Potential for injuries due to being exposed to moving parts of the crusher	<ul style="list-style-type: none"> ● Provide mechanical guards ● Isolate the crushers to limit access of
	Generation of metal waste (steel balls and work crushers)	Engage recyclable waste contractors
Supplying of power to the crushers	Generation of noise from the onsite generators	<ul style="list-style-type: none"> ● Improve the availability of national grid power ● Conduct activities during daytime hours ● Consider an alternative site which is not very close to residential dwellings ● Provide hearing protection to employees
	Emission of noxious gases from generators	<ul style="list-style-type: none"> ● Improve the availability of national grid power ● Service generators as per manufacturer's recommendations
	Increased potential for hydrocarbon spills polluting land and water	<ul style="list-style-type: none"> ● Generators should be placed in enclosures with their covers in place ● Service generators as per manufacturer's recommendations
	Potential for fire from power generators	<ul style="list-style-type: none"> ● Service generators as per manufacturer's recommendations ● Install fire extinguishers within proximity of generators
Sluicing	Potential for inhalation of dust during handling of milled ore	Provision of PPE to workers
	Increased water demand for sluicing	<ul style="list-style-type: none"> ● Continue practice of removing sediments and reusing excess water
	Generation of sediment loaded wastewater	<ul style="list-style-type: none"> ● Install sediment traps at discharge sites
	Increasing potential for sedimentation in water resources due to improper storage of generated tailings	<ul style="list-style-type: none"> ● Improve facilities for tailings storage to have cut off drainage that isolates the tailings from runoff
	Potential for slip and fall and drowning from the sluicing plant drainage and sediment traps	<ul style="list-style-type: none"> ● Provide covers for the drainage system ● Barricade the drainage to limit exposure
Amalgamation	Exposure of employees' elemental mercury by contact	<ul style="list-style-type: none"> ● Provide hand and respiratory PPE
	Generation of wastewater that contains mercury in the amalgam pool	<ul style="list-style-type: none"> ● Provide training on how to improve the planning process to increase mercury recovery ● Reuse water in the amalgamation pool in the panning

Activity	Potential Impact	Proposed Mitigation
	Generation of mercury-laden tailings	<ul style="list-style-type: none"> ● Improve facilities for tailings storage to have cut off drainage that isolates the tailings from runoff
	Generation of gold that contains mercury as impurity	<ul style="list-style-type: none"> ● Use retort in removal of excess mercury from amalgam to promote recapture and reuse
	Promoting continued mercury production and trade	<ul style="list-style-type: none"> ● Investigate on increasing efficiency, availability and cost effectiveness of non-mercury processes ● Investigate mechanisms that can provide subsidies to VAT chemicals so they can be more affordable to ASGM ● Encourage banks to provide finance ASGM eliminating the need for quick cash to finance mining operations and VAT extraction that leads to requiring fast cost-effective leaching using mercury
Removal of mercury and impurities in gold amalgam via heating	Increased demand for charcoal and firewood	<ul style="list-style-type: none"> ● Use alternative energy sources e.g. LPG and acetylene blow torch
	Release of mercury in air causing pollution	<ul style="list-style-type: none"> ● In cooperation with ASGM investigate on how to promote the use of retorts and/or fume hoods. ● Enforce regulations mandating the use of retort
	Exposure of employees to mercury aerosols	<ul style="list-style-type: none"> ● In cooperation with ASGM investigate how to promote the use of retorts and/or fume hoods. ● Enforce regulations mandating the use of retort
	Generation of ashes that may contain mercury	Improve facilities for ashes storage to have cut off drainage that isolates the ashes from runoff
	Generation of mercury contaminated waste from utilizing retort	ASGM should have facilities for storage of mercury contaminated waste. E.g. use steel drums used to supply metal balls for the mills
VAT Leaching of tailings	Exposure of employees to hazardous chemicals (Cyanide and Lime)	<ul style="list-style-type: none"> ● Ensure workers receive training prior to commencing work ● Provide PPE and enforce usage ● Have a chemical handler trained and certified by GCLA
	Generation of mercury and other leaching by products laden tailings	Remove mercury from tailings obtained from amalgamation pool prior to VAT leaching
	Increased water demand	Improve water recovery and management to reduce the need for fresh water

Activity	Potential Impact	Proposed Mitigation
	Exposure of employees to drowning in the VAT tanks	Provide barricade and warning signs at leach tanks
	Generation of chemical wastes from packaging	MC/NEMC/GCLA to provide affordable access to chemical waste dealers to ASGM
	Requirement of skilled Labor	GCLA in collaboration with MC provides training to ASGM Require ASGM to have formally trained employees in their structure
Provision of food to employees	Generation of food waste	<ul style="list-style-type: none"> Discourage food consumption at the site Provide employees with lunch breaks so they can go and eat elsewhere
	Consuming contaminated food (Mercury/dust) as most eat at their worksite	<ul style="list-style-type: none"> Discourage food consumption at the site Provide employees with lunch breaks so they can go and eat elsewhere
Provision of drinking water	Potential for communicable diseases due to the use of unsafe water supply	Ensure access to adequate amounts of potable water
	Generation of light plastic waste (water bottles)	<ul style="list-style-type: none"> Ensure recyclable plastics collection point is available Engage plastic waste collectors who are operating in Kahama town and identify economical means to promote recyclable waste collection
	Increased water demand in community water supply	Consider the provision of bottled water or bulk water supply
Employee hygiene	Potential for the spread of communicable diseases due to the use of unsanitary washrooms	<ul style="list-style-type: none"> Provide adequate facilities for sanitary convenience Engage cleaners to ensure that they are kept in hygienic conditions Frequently empty full sewage tanks utilizing permitted contractors
Sourcing of Labor	Immigration of construction workers	<ul style="list-style-type: none"> Operational staff to be provided by the cooperative managing the PML
	Unfair employment terms to local people	<ul style="list-style-type: none"> Include adherence to Labor requirements in agreement with the cooperative Ensure that employees are provided with contracts as per Employment and Labor Relations Act 2004

Activity	Potential Impact	Proposed Mitigation
		<ul style="list-style-type: none"> • Ensure Labor rights and responsibilities specific training is provided to both cooperative managers and employees the district authority responsible for Labor • Ensure the project and contractor have a grievance mechanism and that employees are aware of it
	Unfair Employment Terms to Women	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors
	Potential for child Labor	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors

7.3 MITIGATION MEASURES DURING DECOMMISSION PHASE

The table below presents the mitigation measures for the impacts identified during decommission phase

Table 7-3: Mitigation Measures

Activity	Potential Impact	Mitigation Measure
Dismantling of mine and plant infrastructures and 'leveling	<ul style="list-style-type: none"> • Deterioration in ambient air quality due to dust and particulate matter (PM10 and PM2.5) 	<ul style="list-style-type: none"> • Provision of enough PPEs to all workers onsite and mandate their use • All dismantling activities should be limited in a daytime <p>Assign qualified supervisors or safety officers to ensure that all safety protocols are being followed</p>

Activity	Potential Impact	Mitigation Measure
<p>Generation and management of wastes</p> <p>VAT closure activities</p>	<ul style="list-style-type: none"> Increased noise and vibrations that may lead to nuances and damages of properties Deterioration of water quality affecting the use of ground water and surface water as a natural resource <p>Exposure of employees to hazardous chemicals (Cyanide and Lime) which can lead to serious health effects such as neurological and behavioral disorders, kidney damage, respiratory problems, and even death</p>	<ul style="list-style-type: none"> Timely collection and removal of waste by a certified contractor Good separation of waste Proper disposal of hazardous waste through NEMC certified contractor Mark hazardous zones or restricted areas Assign qualified supervisors or safety officers to oversee the operation and ensure that all safety protocols are being followed Storing chemicals in appropriate containers, ensuring they are properly labelled, tightly sealed, and stored in designated areas away from water sources Implementing measures to prevent spills, such as using secondary containment systems like spillers or pallets to capture and contain leaks or spills Keeping spill response kits readily available and ensuring they contain appropriate materials for containing and cleaning up hazardous chemicals <p>Developing and implementing proper drainage management systems to minimize the interaction of water from mine facilities and the receiving environment, particularly water sources</p>
<p>Transportation of materials out of site</p>	<p>Accidents and injuries</p>	<ul style="list-style-type: none"> Provision of PPEs and enforcing their use during working hours Mandate the use of appropriate Personal Protective Equipment, such as helmets, safety goggles, gloves, and high-visibility clothing, for all personnel operating or working in close proximity to heavy machinery Provide trained First Aiders and First Aid kits at potential areas Only qualified personnel should be employed <p>Engaging trained and certified drivers to ensure speed control & road safety</p>

Activity	Potential Impact	Mitigation Measure
Site leveling and revegetation	Introduction of invasive species	Wherever possible, use native plant species in re-vegetation and restoration programs to reduce the risk of introducing invasive vegetation species

8 CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan (ESMP) outlines measures to manage social and environmental impacts and risks identified during the project's lifecycle. It specifies mitigation actions, demonstrates organizational capacity and resources to implement them, ensures compliance with laws, and aims to minimize negative impacts while enhancing benefits. The responsibility for the implementation of the ESMP is for the project implementor (PIT) NEMC in collaboration with the Mine Commission. Table 8-1 below presents the Environmental and Social Management Plan for the proposed project. Cost is estimated per year.

Table 8-1: Environmental and Social Management Plan

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
Construction Phase					
Construction of sluices, VAT leaching tanks, drainage and amalgamation pool	Generation of dust from cement works	<ul style="list-style-type: none"> • Ensure construction workers receive training prior to commencing work • Provide PPE and enforce usage • Engage HSE Officer as part of the construction crew • Promote good cement handling and limit wasteful practices 	NEMC & HSE Manager	Standards included in the Environment Management (Air Quality Standards) Regulation, 2007	10,000,000
	Potential for accidents due to falling in the foundation and sluice drainage/sediment trap excavations and from working at height	<ul style="list-style-type: none"> • Demarcate all areas with falling hazards • Provide scaffolding for people working at height • PPE and enforce usage • Ensure Job Safety Hazard analysis is conducted before commencing work and required mitigation measures are in place 		Zero incidents	Already included
	Potential for accidents due to falling objects	<ul style="list-style-type: none"> • Ensure safety signs are placed in strategic areas to provide warning • Provide PPE and enforce usage • Provide tool-holding equipment for people working at height 		Zero incident	Already Included
	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> • Provide manual handling and lifting training. • Use mechanical lifting and transporting equipment/ devices e.g. pulley, 			
	Generation of construction wastes (cement bags/mixed cement/concrete)	<ul style="list-style-type: none"> • Institute a waste management program that promotes waste segregation • Have a recyclable waste storage facility that is secure • Identify permitted contractors/persons who can collect and recycle the waste • Avoid wasteful practices 		Minimal waste generation	NA

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
		<ul style="list-style-type: none"> • Use hardened cement and concrete debris as core 			
Rehabilitation of degraded land, landscaping, and tree planting	Improved health and safety due to backfilling of mining pits and excavations and levelling of the ground	<ul style="list-style-type: none"> • Landscape the area to promote aesthetic appeal • Plant trees and vegetation that is common to the floristic region • Use drought resistance and low-maintenance vegetation 	HSE Manager	Improved ecology of the area	20,000,000
	Exposure to loose soil that may wash into waterways and cause siltation	<ul style="list-style-type: none"> • Landscape to ensure non scouring/erosion-promoting slopes • The landscaping should ensure minimal areas are left bare • Include sedimentation basins in the drainage 		Minimum soil disturbance within the project footprint	
	Change in drainage patterns	<ul style="list-style-type: none"> • Landscape according to the natural topography ensuring free draining • Include water crossings for areas with defined drainage channels. 		Restored drainage channels according to topographical	
	Improved biodiversity due to encouraging and planting vegetation	<ul style="list-style-type: none"> • Landscape the area to promote aesthetic appeal • Plant trees and vegetation that is common to the floristic region • Use drought resistance and low-maintenance vegetation that can thrive without the need for care 		Restored the ecology of the area	

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	Improved aesthetics	<ul style="list-style-type: none"> • Landscape the area to promote aesthetic appeal • Plant trees and vegetation that is common to the floristic region • Use drought resistance and low-maintenance vegetation that can thrive without the need for care 		Restored the ecology of the area	
Transit of supplies and project personnel to and from the site	Increased traffic increases potential for accidents in the community especially for children	<ul style="list-style-type: none"> • Ensure traffic management rules are in place and communicated to employees • Provide awareness to the community members • Ensure operators are trained and certified according to the national driving requirements and in addition the project specific drivers training • Liaise with TARURA and install safety signs on community roads 	HSE Manager	Zero Accident	3,000,000
Use of heavy equipment	Potential for hydrocarbon spills	<ul style="list-style-type: none"> • Contractor will be required to use appropriate fueling equipment with spill prevention measures when refueling onsite • Spill kits should be available and contaminated soil should be taken away immediately to soil remediation unit for treatment and final disposal as per the approved management plan • Use of plastic drums and mats under heavy 	& HSE Manager	Zero Spills	3,00,000
Provision of food to employees	Generation of food waste	<ul style="list-style-type: none"> • Engage local food vendors who will prepare food offsite and bring food in reusable utensils and containers • Properly segregate food waste to ensure no harmful objects are contained and identify recycling opportunities 	Plant Manager and HSE Manager	Improved hygiene	3,000,000

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
		<ul style="list-style-type: none"> Consider having a composting unit Ensure the eating area is kept clean and the dust bin sealed to discourage vermin infestation 			
Provision of drinking water	Potential for communicable diseases due to the use of unsafe water supply	Ensure access to adequate amounts of potable water		Sufficient supply of clean water	
	Generation of light plastic waste (water bottles)	<ul style="list-style-type: none"> Ensure recyclable plastics collection point is available Engage plastic waste collectors who are operating in Kahama town and identify economical means to promote recyclable waste collection 		Timely collection of waste to disposal site	
	Increased water demand in community water supply	Consider the provision of bottled water or bulk water supply		Available clean water	
Employee hygiene	Potential for the spread of communicable diseases due to the use of unsanitary washrooms	<ul style="list-style-type: none"> Provide adequate facilities for sanitary convenience e.g. mobile toilets and mobile septic tanks Engage cleaners to ensure that they are kept in hygienic conditions Frequently empty full sewage tanks utilizing permitted contractors 	& HSE Manager	Zero discharge of domestic waste	10,00,000
Sourcing of Labor	Immigration of construction workers	<ul style="list-style-type: none"> Adopt principles included in Labor Management Plan where unskilled workers will be local hired through the village authority No migrant Labor will be employed by the project Specialized work will be undertaken by contractors who will be responsible for managing their employees 	Plant Manager	Local people employed	NA

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	Unfair employment terms to local people	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors • Ensure that employees are provided with contracts as per Employment and Labor relations Act 2004 • Ensure Labor rights and responsibilities specific training is provided to both contractor and employee the district authority responsible for Labor • Ensure the project and contractor has a grievance mechanism and that employees are aware of it 	Plant Manager	<ul style="list-style-type: none"> • Signed contracts • Grievance mechanism procedure 	Included in project investment cost for employees
	Unfair employment terms to Women	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors 		Reasonable contracts as per industry needs	
	Potential for child Labor	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors. Children under 18 years will not be hired. 		No Child under the age of 14 to be employed	
Demobilization of construction workers	Increase number of single women and child headed families due to abandoning families	<ul style="list-style-type: none"> • Provide awareness to project employees and community pertaining to interactions • Ensure the project and contractor has a grievance mechanism and that employees are aware of it • Engage local NGOs who work on these matters to assist 	NEMC, Plant Manager and HSE Manager	Resolved grievances	
Operation Phase					
Drying of ore	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> • Provide manual handling and lifting training. • Use mechanical lifting and transporting equipment/ devices e.g. pulley, 	Plant Manager	Zero incident	Included in the cost below

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	Generation of sediments that may wash into waterways	Construct drainage around the site and sediment traps prior to discharge	and HSE Manager	Less or no sediments loosely available	Included in investment cost
Crushing of ore using hand hammers	Generation of undesirable level of noise the neighbours at the adjacent guest house and shops/bars	<ul style="list-style-type: none"> Conduct activities during daytime hours Provide hearing protection to employees 		The Environmental Management (Standards for The Control of Noise and Vibration Pollution) Regulations, 2011	30,000,000
	Generation of dust exposure to workers	<ul style="list-style-type: none"> Ensure workers receive training prior to commencing work Provide PPE and enforce usage Engage HSE Officer as part of construction crew Introducing mechanical crusher plants Apply water as dust suppressant in mechanical crushers 		Zero incident	
	Increased potential for finger injuries due to the use of hand hammers	<ul style="list-style-type: none"> Provide PPE and enforce usage Ensure job hazards analysis is conducted and mitigation measures are in place Install mechanical crusher plants 		No Child employment	
	Exposure of children to mine hazards due to being at the mine site with mothers for care	Liaise with NGOs and community on the support system for childcare while the mother is working		Zero incident	
Grinding/milling using crushers	Generation of undesirable levels of noise	<ul style="list-style-type: none"> Conduct activities during daytime hours Provide hearing protection to employees 		Standards included in the Environment Management (Air Quality Standards) Regulation, 2007	
	Generation of dust	<ul style="list-style-type: none"> Conduct activities during daytime hours Provide respiratory protection to employees 			

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	Potential for injuries due to being exposed to moving parts of the crusher	<ul style="list-style-type: none"> • Provide mechanical guards • Isolate the crushers to limit access of 		Zero incident	
	Generation of metal waste (steel balls and work crushers)	Engage recyclable waste contractors		Minimal waste	
Supplying of power to the crushers	Generation of noise from the onsite generators	<ul style="list-style-type: none"> • Improve the availability of national grid power • Conduct activities during daytime hours • Provide hearing protection to employees 		Reliable source of power	
	Emission of noxious gases from generators	<ul style="list-style-type: none"> • Improve the availability of national grid power • Service generators as per manufacturer's recommendations 		Standards included in the Environment Management (Air Quality Standards) Regulation, 2007	
	Increased potential for hydrocarbon spills polluting land and water	<ul style="list-style-type: none"> • Generators should be placed in enclosures with their covers in place • Service generators as per manufacturer's recommendations • Provide spill kits 		No Spills	
	Potential for fire from power generators	<ul style="list-style-type: none"> • Service generators as per manufacturer's recommendations • Install fire extinguishers within proximity of generators 		Zero source of fire hazard close to the generator	
Sluicing	Potential for inhalation of dust during handling of milled ore	Provision of PPE to workers	Standards included in the Environment Management (Air Quality		

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
				Standards) Regulation,2007	
	Increased water demand for sluicing	Continue practice of removing sediments and reusing excess water		Re-use of water	
	Generation of sediment loaded waste water	Install sediment traps at discharge sites		Best Industrial Practice	
	Increasing potential for sedimentation in water resources due to improper storage of generated tailings	Improve facilities for tailings storage to have cut off drainage that isolates the tailings from runoff			
	Potential for slip and fall and drowning from the sluicing plant drainage and sediment traps	<ul style="list-style-type: none"> • Provide covers for the drainage system • Barricade the drainage to limit exposure 		Zero incident	
Amalgamation	Exposure of employee's elemental mercury by contact can lead to serious health effects such as neurological and behavioral disorders, kidney damage, respiratory problems, and even death	<ul style="list-style-type: none"> • Provide hand and respiratory PPE • Ensure enough ventilation 		Zero incident	
	Generation of wastewater that contains mercury in the amalgam pool which could potentially contaminate sources of water in not disposed according	<ul style="list-style-type: none"> • Provide training on how to improve panning process to increase mercury recovery • Reuse water in the amalgamation pool in the panning 		Zero discharge to environment	
	Generation of mercury laden tailings	Improve facilities for tailings storage to have cut off drainage that isolates the tailings from runoff		Zero Discharge	Included in project

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	Generation of gold that contains mercury as impurity	Use retort in the removal of excess mercury from amalgam to promote recapture and reuse	HSE Manager and Plant Manager	Zero discharge to environment	Investment cost
	Promoting continued mercury production and trade	<ul style="list-style-type: none"> Investigate on increasing efficiency, availability and cost effectiveness of non-mercury processes Investigate mechanisms that can provide subsidy to VAT chemicals so they can be more affordable to ASGM Encourage banks to provide finance ASGM eliminating the need for quick cash to finance mining operations and VAT extraction that leads to requiring fast cost-effective leaching using mercury 	NEMC	NA	Included in Investment cost
Removal of mercury and impurities in gold amalgam via heating	Increased demand for charcoal and firewood	Use alternative energy sources e.g. LPG and acetylene blow torch	NEMC	Clean energy	
	Release of mercury in air causing pollution	<ul style="list-style-type: none"> In cooperation with ASGM investigate how to promote the use of retorts and/or fume hoods. Enforce regulations mandating the use of retort 	NEMC and HSE Manager	Standards included in the Environment Management (Air Quality Standards) Regulation, 2007	
	Exposure of employees to mercury aerosols can lead to serious health effects such as neurological and behavioral disorders, kidney damage, respiratory problems, and even death	<ul style="list-style-type: none"> In cooperation with ASGM investigated how to promote the use of retorts and/or fume hoods. Enforce regulations mandating the use of retort 			
	Generation of ashes that may contain mercury	Improve facilities for ashes storage to have cut-off drainage that isolates the ashes from runoff			
Generation of mercury-contaminated waste from utilizing retort	ASGM should have facilities for the storage of mercury-contaminated waste. E.g. steel drums used to supply metal balls for the mills				

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
VAT Leaching of tailings	Exposure of employees to hazardous chemicals (Cyanide and Lime) can lead to serious health effects such as neurological and behavioural disorders, kidney damage, respiratory problems, and even death	<ul style="list-style-type: none"> • Ensure workers receive training prior to commencing work • Provide PPE and enforce usage • Have a chemical handler trained and certified by GCLA 	HSE Manager	Zero incident	Already included
	Generation of mercury and other leaching by products laden tailings	Remove mercury from tailings obtained from amalgamation pool prior to VAT leaching		Zero discharge to the environment	NA
	Increased water demand	Improve water recovery and management to reduce the need for fresh water			NA
	Exposure of employees to drowning in the VAT tanks	Provide barricade and warning signs at leach tanks		Zero Incident	Already Included
	Generation of chemical wastes from packaging	MC/NEMC/GCLA to provide affordable access to chemical waste dealers to ASGM		No discharge to environment	Included in investment cost
	Requirement of skilled Labor	<ul style="list-style-type: none"> • GCLA in collaboration with MC to provide training to ASGM • Require ASGM have formally trained employees in their structure 		Trained employees	Already Included
Provision of food to employees	Generation of food waste	<ul style="list-style-type: none"> • Discourage food consumption at site • Provide employees with lunch breaks so they can go and eat elsewhere 	HSE Manager	No food consumption at site	NA
	Consuming contaminated food (Mercury/dust) as most eat at their worksite	<ul style="list-style-type: none"> • Discourage food consumption at site • Provide employees with lunch breaks so they can go and eat elsewhere 	HSE and Plant Manager		

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
Provision of drinking water	Potential for communicable diseases due to use of unsafe water supply	Ensure access to adequate amounts of potable water	HSE Manager and Plant Manager	Sufficient supply of clean water	NA
	Generation of light plastics waste (water bottles)	<ul style="list-style-type: none"> • Ensure recyclable plastics collection point is available • Engage plastic waste collectors who are operating in Kahama town and identify economical means to promote recyclable waste collection 		Recycling of plastic waste	5,000,000
	Increased water demand in community water supply	Consider provision of bottled water or bulk water supply			
Employee hygiene	Potential for spread of communicable diseases due to use of unsanitary washrooms	<ul style="list-style-type: none"> • Provide adequate facilities for sanitary convenience • Engage cleaner to ensure that they are kept in hygienic conditions • Frequently empty full sewage tanks utilizing permitted contractors 		Adequately and clean sanitary facilities	Included in investment cost
Sourcing of Labor	Immigration of construction workers	Operational staff to be provided by the cooperative managing the PML	Plant Manager	NA	NA
	Unfair employment terms to local people	<ul style="list-style-type: none"> • Include adherence to Labor requirements in agreement with the cooperative • Ensure that employees are provided with contracts as per Employment and Labor relations act 2004 • Ensure Labor rights and responsibilities specific training is provided to both cooperatives managers and employees the district authority responsible for Labor 	Plant Manager	<ul style="list-style-type: none"> • Employment and Labor relations act 2004 • Contract availability • Presence of grievance mechanism 	NA

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
		<ul style="list-style-type: none"> Ensure the project and contractor has a grievance mechanism and that employees are aware of it 			
	Unfair employment terms to Women	Include adherence to Labor requirements in contracts for engaged contractors		Contract signed for each employee	NA
	Potential for child Labor	Include adherence to Labor requirements in contracts for engaged contractors			
Drying of ore	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> Provide manual handling and lifting training. Use mechanical lifting and transporting equipment/ devices e.g. pulley, 	HSE Manager	Zero incident	Already Included
	Generation of sediments that may wash into waterways	Construct drainage around the site and sediment traps prior to discharge	Plant Manager	NA	Already included
Crushing of ore using hand hammers	Generation of undesirable level of noise the neighbours at the adjacent guest house and shops/bars	<ul style="list-style-type: none"> Conduct activities during daytime hours Provide hearing protection to employees 	HSE Manager	Zero Incident	
Decommission/ Closure Phase					
Dismantling of mine and plant infrastructures and 'leveling	<ul style="list-style-type: none"> Deterioration in ambient air quality due to dust and particulate matter (PM10 and PM2.5) Increased noise and vibrations that may lead to nuances and damages of properties 	<ul style="list-style-type: none"> Provision of enough PPEs to all workers onsite and mandate their use All dismantling activities should be limited in the daytime Assign qualified supervisors or safety officers to ensure that all safety protocols are being followed 	NEMC and HSE Manager	<ul style="list-style-type: none"> No incident Environmental Management (Air Quality Standards,2007) and WB EHSs 	5,000,000
Generation and management of wastes	<ul style="list-style-type: none"> Deterioration of water quality affecting the use of ground water and surface water as a natural resource 	<ul style="list-style-type: none"> Timely collection and removal of waste by a certified contractor Good separation of waste Proper disposal of hazardous waste through NEMC certified contractor Mark hazardous zones or restricted areas 	NEMC and HSE Manager	Zero Discharge	10,000,000
VAT closure activities					

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	<ul style="list-style-type: none"> Exposure of employees to hazardous chemicals (Cyanide and Lime) which can lead to serious health effects such as neurological and behavioural disorders, kidney damage, respiratory problems, and even death 	<ul style="list-style-type: none"> Assign qualified supervisors or safety officers to oversee the operation and ensure that all safety protocols are being followed Storing chemicals in appropriate containers, ensuring they are properly labelled, tightly sealed, and stored in designated areas away from water sources Implementing measures to prevent spills, such as using secondary containment systems like spill berms or pallets to capture and contain leaks or spills Keeping spill response kits readily available and ensuring they contain appropriate materials for containing and cleaning up hazardous chemicals Developing and implementing proper drainage management systems to minimize the interaction of water from mine facilities and the receiving environment, particularly water sources 			
Transportation of materials out of site	Accidents and injuries	<ul style="list-style-type: none"> Provision of PPEs and enforcing their use during working hours Mandate the use of appropriate Personal Protective Equipment, such as helmets, safety goggles, gloves, and high-visibility clothing, for all personnel operating or working in close proximity to heavy machinery Provide trained First Aiders and first Aid kit at potential areas Only qualified personnel should be employed 	NEMC and HSE Manager	Zero incident	Already included

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
		<ul style="list-style-type: none"> Engaging trained and certified drivers to ensure speed control & road safety 			
Site leveling and revegetation	Introduction of invasive species	Wherever possible, use native plant species in re-vegetation and restoration programs to reduce the risk of introducing invasive vegetation species	NEMC and HSE Manager	No Invasive Alien Plant species, and the regrowth of indigenous species recorded	NA

9 CHAPTER NINE: ENVIRONMENTAL AND SOCIAL MONITORING PLAN

Environmental monitoring aims to assess the effectiveness of mitigation and management measures implemented in the Environmental and Social Management Plan (ESMP). When deviations from set standards or expected trends occur, monitoring results provide an opportunity to adjust mitigation strategies promptly. The monitoring program also identifies any adverse changes in the surrounding environment due to project operations. Responsibility for environmental and occupational health and safety monitoring lies with the HSE Manager, who coordinates with other departments to address the impact generated from project activities to ensure adherence to the monitoring plan.

Umoja wa wenye mashamba Ilindi and Partners Site management will prepare monitoring procedures for each environmental setting as per local and international acceptable standards. This will ensure that the Monitoring plan for the given mitigation measures is accurately and properly done. The procedure will detail the attributes to be monitored, frequency, and institutional responsibility.

9.1 ASPECTS OF ENVIRONMENTAL MONITORING SYSTEM

To meet the objectives of the ESIA study which are to minimize the adverse impacts of the project as low as practicable with the current best practice, local and international conditions, and in a cost-effective manner, the monitoring program will include the below aspects of the physical, biological and social environment:

- Water Resources: Water quantity and quality,
- Operations Aspects: Health and safety data, different types of wastes generated, treated, recycled, and disposed of, incidents and potential incidences of environmental risks e.g. worker's injuries, noise impact, unpermitted land disturbance.
- Noise and Vibration
- Dust emission

The monitoring program will be associated with on-site sampling collection by an HSE expert of which samples will be sent to an accredited laboratory for analysis. Parameters will be analyzed according to environmental quality standards as developed under the Environmental Management Act of 2004 and results will be compared against the standards as well as baseline information.

The current cost of managing and implementing the site's Environmental Monitoring Plan is determined within the annual budget. Utilizing monitoring procedures established at the project site the estimated annual cost for managing and implementing the site's environmental monitoring is **TZS 10,500,000** Table 9-1 below outlines the monitoring plan for the proposed project.

Table 9-1: Environmental Monitoring Plan

Potential Impacts	Parameter for Monitoring	Frequency	Monitoring Area	Measurement Unit	Target level/ Standard	Estimated Cost per sampling frequency (TZS)
Personal injuries	Record of injuries/accidents/near misses and work-related diseases	Continuous	On-site	OSHA specific units	Zero accident/ incident or injury	1,000,000
Fire explosion	All potential fire sources including electrical appliances and connections such as switches, panel boxes, the Electronic Data Verification System, and other equipment.	As per the Fire and Rescue Service Act	On-site	Service tag	No fire and awareness to all employees and visitors	2,000,000
Increased noise Level	Noise levels	Continuous	Noisy areas/equipment	dBA	85dBA	500,000
Increased level of vibration	Vibration levels	Continuous	Onsite	mm/s PPV	5 mm/s PPV	500,000
Air pollution from emissions and fumes	Emissions of particulate matter, sulfur oxide, nitrogen oxides, fumes, dust, carbon oxides, and any other parameters emitted from the washing facilities and mining operations.	Continuous	Generator, galvanizing, and in emission areas	mg/Nm ³	Permissible Weight Concentrations of Emission Limits from the Atmosphere to a Receptor and respective test methods	1,500,000
Alteration of Water Quality	General Parameters – pH, EC, TDS, TSS Temp, Fluoride, Alkalinity, Phosphate, Nitrate, Nitrite, Cl, SO ₄ , Ca, Mg, K, Na, Ion Balance	After every three months in normal condition	Effluent from the washing facilities	As stated in the Regulations	Permissible limits for Municipal and Industrial effluents	5,000,000

Potential Impacts	Parameter for Monitoring	Frequency	Monitoring Area	Measurement Unit	Target level/ Standard	Estimated Cost per sampling frequency (TZS)
	<u>Total Metals</u> – Fe, Cr. Dissolved Metals – As, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Sb, Zn.)					
TOTAL ESTIMATED ANNUAL BUDGET 10,500,000						

10 CHAPTER TEN: EMERGENCY PREPAREDNESS AND RESPONSE PLAN (EPRP)

10.1 INTRODUCTION

Artisanal Small-Scale Gold Mining (ASGM) operations are often exposed to various hazards and emergencies due to the nature of their activities and working environments. This Emergency Preparedness and Response Plan (EPRP) is designed to provide clear and practical guidelines to effectively manage and respond to emergencies, ensuring the safety and well-being of all miners and associated communities.

10.2 SCOPE OF THE PLAN

This EPRP applies to all personnel involved in ASGM activities at Umoja wa Wenye Mashamba Ilindi and covers the following emergency scenarios:

- Fire Outbreaks
- Pit Wall Collapse/Landslides
- Mercury Exposure and Poisoning
- Machinery and Equipment Accidents
- Medical Emergencies

The plan outlines the procedures, roles, responsibilities, and resources necessary to prevent, prepare for, respond to, and recover from these emergencies.

10.3 OBJECTIVES

The main objectives of this EPRP are to:

- Protect Human Life:** Ensure the safety and health of all miners and nearby communities.
- Minimize Environmental Impact:** Prevent and reduce environmental damage during emergencies.
- Reduce Property Damage:** Protect equipment and infrastructure from severe damage.
- Ensure Efficient Emergency Response:** Provide clear procedures for prompt and effective responses to emergencies.
- Promote Preparedness:** Enhance awareness and readiness through training and regular drills.

10.4 EMERGENCY RESPONSE ORGANIZATION

10.4.1 Emergency Response Team (ERT)

Given the scale of ASGM operations, the Emergency Response Team comprises designated individuals with specific roles during an emergency.

Table 10-1: Team Structure and Roles

Position	Name	Contact Information	Responsibilities
Emergency Coordinator	[Name]	[Phone Number]	Overall coordination during emergencies; decision-making; liaising with external agencies.
Safety Officer	[Name]	[Phone Number]	Monitoring safety measures; conducting training and drills; assessing hazards.
First Aid Responder	[Name(s)]	[Phone Number]	Providing immediate medical assistance; maintaining first aid supplies.

Fire Safety Officer	[Name]	[Phone Number]	Managing fire prevention measures; operating firefighting equipment.
Communication Officer	[Name]	[Phone Number]	Disseminating information during emergencies; maintaining communication equipment.
Evacuation Leader	[Name]	[Phone Number]	Leading and coordinating evacuation procedures; ensuring all personnel are accounted for.

Note: All team members should be adequately trained for their roles and responsibilities.

10.5 EMERGENCY SCENARIOS AND RESPONSE PROCEDURES

10.5.1 Fire Outbreaks

Potential Causes

- Faulty electrical equipment.
- Improper storage of flammable materials.
- Open flames or unattended fires.
- Smoking in prohibited areas.

Prevention Measures

- Regular inspection and maintenance of electrical equipment.
- Safe storage of flammable substances away from ignition sources.
- Establishing designated smoking areas away from flammable materials.
- Training miners on fire safety and prevention practices.

Response Procedure

Immediate Actions:

- i. **Raise the Alarm:** The person who discovers the fire should shout "FIRE" loudly and notify others immediately.
- ii. **Notify Emergency Coordinator:** Inform the Emergency Coordinator or Safety Officer about the fire location and severity.
- iii. **Evacuate the Area:**
 - Proceed calmly to the nearest safe exit following designated evacuation routes.
 - Do not attempt to collect personal belongings.
 - Assist others in evacuating, especially those needing help.
- iv. **Attempt to Extinguish (If Safe):**
 - If the fire is small and manageable, trained personnel may attempt to extinguish it using available firefighting equipment.
 - Do not take unnecessary risks; prioritize personal safety.
- v. **Assemble at Designated Safe Zone:**
 - Gather at the predetermined assembly point [Specify Location].
 - The Evacuation Leader conducts a headcount to ensure everyone is accounted for.
- vi. **Contact External Support:**
 - If the fire is beyond control, the Communication Officer contacts local fire services through their phone number

vii. Do Not Re-Enter:

- No one should return to the affected area until declared safe by the Emergency Coordinator or relevant authorities.

10.5.2 Equipment and Resources

- **Fire Extinguishers:** Regularly serviced and easily accessible throughout the mining site.
- **Fire Blankets:** Available in areas with higher fire risks.
- **Sand Buckets:** Positioned near potential ignition sources.
- **Emergency Exits:** Clearly marked and unobstructed at all times.
- **Assembly Point Signage:** Visible signs indicating safe gathering areas.

10.6 PIT WALL COLLAPSE/LANDSLIDES

10.6.1 Potential Causes

- Unstable geological formations.
- Excessive excavation undermining structural integrity.
- Heavy rainfall weakening pit walls.
- Vibrations from machinery or nearby activities.

10.6.2 Prevention Measures

- Conduct regular assessments of pit wall stability.
- Implement proper excavation techniques maintaining safe angles and supports.
- Monitor weather conditions and cease operations during heavy rains.
- Limit vibrations by controlling machinery use near sensitive areas.

10.6.3 Response Procedure

Immediate Actions:

- i. **Raise the Alarm:** Upon noticing signs of collapse (e.g., cracking sounds, falling debris), shout warnings and alert others immediately.
- ii. **Evacuate the Area:**
 - Move away from the collapse zone swiftly and calmly.
 - Follow predetermined safe pathways away from potential secondary collapses.
- iii. **Notify Emergency Coordinator:** Provide details about the incident's location, extent, and any known injuries.
- iv. **Conduct Headcount:** Assemble at a safe distance [Specify Location] and perform a headcount to identify any missing persons.
- v. **Rescue Operations:**
 - If safe, trained personnel may attempt to rescue trapped individuals using appropriate equipment.
 - Avoid further risks; await professional rescue services if the situation is dangerous.
- vi. **Contact External Support:** Communication Officer contacts local emergency services and requests immediate assistance.
- vii. **Provide First Aid:** First Aid Responder attends to injured individuals until professional medical help arrives.

10.6.4 Equipment and Resources

- **Safety Helmets and Protective Gear:** Worn at all times during operations.
- **Warning Signs and Barriers:** Indicating hazardous zones and unstable areas.

- **Emergency Excavation Tools:** Shovels, ropes, and other tools for rescue efforts.
- **Communication Devices:** Radios or mobile phones for quick communication during emergencies.

10.7 MERCURY EXPOSURE AND POISONING

10.7.1 Potential Causes

- Improper handling and use of mercury during gold extraction.
- Lack of protective equipment when processing with mercury.
- Spillage or contamination of water and soil with mercury.

10.7.2 Prevention Measures

- **Training:** Educate miners on safe mercury handling and alternative gold extraction methods.
- **Protective Equipment:** Provide and enforce the use of gloves, masks, and protective clothing.
- **Proper Ventilation:** Ensure processing areas are well-ventilated to prevent inhalation of fumes.
- **Spill Management:** Establish procedures for safely containing and cleaning mercury spills.
- **Storage:** Store mercury securely in sealed containers away from living and eating areas.

10.8 RESPONSE PROCEDURE

Immediate Actions:

- **Identify Exposure:** Recognize symptoms such as tremors, headaches, respiratory issues, or skin irritation.
- **Remove from Exposure:**
 - Move the affected person to fresh air immediately.
 - Remove any contaminated clothing carefully.
- **Provide First Aid:**
 - Wash affected skin areas with soap and water.
 - If inhaled, ensure the person rests and breathes fresh air.
 - Do not induce vomiting if ingested; provide water to drink if conscious.
- **Seek Medical Attention:**
 - Contact local healthcare facilities or poison control centers for immediate assistance.
 - Transport the affected person to the nearest medical center if symptoms are severe.
- **Contain and Clean Spills:**
 - Evacuate and ventilate the area.
 - Use appropriate mercury spill kits to collect and contain the mercury safely.
 - Avoid using vacuum cleaners or brooms which can spread mercury particles.
- **Report Incident:**
 - Document the exposure incident and response actions taken.
 - Review and improve safety measures to prevent future occurrences.

10.8.1 Equipment and Resources

- **Mercury Spill Kits:** Including sulfur powder, gloves, masks, and collection containers.

- **Personal Protective Equipment (PPE):** Gloves, masks, protective eyewear, and clothing.
- **First Aid Kits:** Stocked with supplies suitable for treating chemical exposures.
- **Emergency Contact Information:** Readily available numbers for medical facilities and poison control centers.

10.9 MACHINERY AND EQUIPMENT ACCIDENTS

10.9.1 Potential Causes

- Lack of proper training on equipment use.
- Operating faulty or poorly maintained machinery.
- Ignoring safety protocols during operation.
- Fatigue or negligence during work.

10.9.2 Prevention Measures

- **Training:** Ensure all operators receive training on machinery use and safety.
- **Maintenance:** Conduct regular checks and maintenance of all equipment.
- **Safety Protocols:** Develop and enforce standard operating procedures for machinery use.
- **Protective Gear:** Mandate the use of appropriate PPE such as helmets, gloves, and safety boots.
- **Work Scheduling:** Implement reasonable work hours to prevent fatigue-related accidents.

10.9.3 Response Procedure

Immediate Actions:

- i. **Stop Operations:** Immediately turn off and secure the machinery involved in the accident.
- ii. **Assess the Situation:**
 - Check for injuries and the condition of the injured person(s).
 - Identify any ongoing hazards (e.g., leaks, electrical risks).
- iii. **Provide First Aid:**
 - Administer appropriate first aid based on the injury.
 - Do not move the injured person if spinal injuries are suspected unless necessary for safety.
- iv. **Contact Medical Services:**
 - Call local emergency medical services for assistance.
 - Provide clear information about the nature and severity of injuries.
- v. **Secure the Area:**
 - Keep non-essential personnel away from the accident scene.
 - Preserve the scene for any necessary investigations.
- vi. **Report the Incident:**
 - Document the details of the accident including time, location, causes, and actions taken.
 - Review and update safety measures to prevent future incidents.

10.9.4 Equipment and Resources

- **First Aid Kits:** Accessible and well-stocked for treating various injuries.
- **Emergency Shut-off Mechanisms:** Clearly marked and functional on all machinery.
- **Communication Devices:** For immediate contact with emergency services.

- **Accident Report Forms:** Simplified forms to document incident details promptly.

10.10 MEDICAL EMERGENCIES

10.10.1 Potential Scenarios

- Sudden illnesses (e.g., heart attacks, strokes).
- Severe allergic reactions.
- Heatstroke or dehydration.
- Snake bites or insect stings.

10.10.2 Prevention Measures

- **Health Assessments:** Conduct regular health check-ups for miners.
- **Awareness:** Educate personnel on recognizing signs of common medical emergencies.
- **Hydration and Rest:** Ensure access to clean drinking water and adequate rest periods.
- **Environment Safety:** Keep work areas clear of hazards and monitor for dangerous wildlife.

10.10.3 Response Procedure

Immediate Actions:

- i. **Assess the Situation:**
 - Determine the nature and severity of the medical emergency.
 - Check responsiveness and vital signs (breathing, pulse).
- ii. **Provide First Aid:**
 - Administer appropriate first aid based on the condition.
 - Use CPR if necessary and trained to do so.
- iii. **Call for Help:**
 - Contact local medical services immediately, providing clear information about the patient's condition.
- iv. **Comfort and Monitor:**
 - Keep the patient comfortable and monitor their condition until help arrives.
 - Avoid giving food or drink if not appropriate for the condition.
- v. **Prepare for Transport:**
 - Arrange safe and prompt transport to a medical facility if required.
- vi. **Document the Incident:**
 - Record details of the incident, response actions, and outcomes for future reference and improvement.

10.10.4 Equipment and Resources

- **Comprehensive First Aid Kits:** Including supplies for various medical situations.
- **Emergency Contact List:** Up-to-date numbers for local clinics, hospitals, and emergency services.
- **Transportation Means:** Reliable vehicles available for quick transport to medical facilities.
- **Trained First Aiders:** Personnel trained in basic and advanced first aid techniques.

10.11 COMMUNICATION PLAN

Effective communication is vital during emergencies to ensure timely and coordinated responses.

10.11.1 Internal Communication

i. **Methods:**

- **Verbal Alerts:** Shouting specific alarms (e.g., "FIRE!", "EVACUATE!") for immediate attention.
- **Whistles/Horns:** Using distinctive sounds to signal different types of emergencies.
- **Mobile Phones/Two-Way Radios:** For detailed communication among ERT members and personnel.

vii. **Procedures:**

- Emergency Coordinator disseminates information and instructions during emergencies.
- The Communication Officer maintains open lines and updates all relevant parties.

10.11.2 External Communication

- **Emergency Services**
 - Fire Department: (Phone numbers to be included)
 - Medical Services: (Phone numbers to be included)
 - Police/Security: (Phone numbers to be included)
- **Local Community Leaders:**
 - Inform nearby communities when emergencies may impact them.
- **Media and Public Relations:**
 - Designate a spokesperson to handle inquiries and provide accurate information.

10.11.3 Communication Equipment

- **Mobile Phones:** Ensure all ERT members have charged and functional phones.
- **Two-Way Radios:** Available for reliable on-site communication where mobile coverage is poor.
- **Emergency Contact Lists:** Posted prominently and carried by key personnel.

10.12 TRAINING AND DRILLS

Regular training and drills are essential to ensure preparedness and effective response during actual emergencies.

10.12.1 Training Programs

Frequency: Conduct training sessions at least twice a year.

Content:

- **Emergency Procedures:** Detailed walkthroughs of response steps for various scenarios.
- **Use of Equipment:** Hands-on training on firefighting equipment, first aid kits, and communication devices.
- **Hazard Recognition:** Identifying and mitigating potential risks in daily operations.
- **Health and Safety Practices:** Proper use of PPE and safe working procedures.

10.12.2 Emergency Drills

- **Types of Drills:**
 - Fire Evacuation Drills: Practicing swift and orderly evacuation.
 - Rescue Drills: Simulating responses to pit collapses and machinery accidents.
 - Medical Emergency Drills: Responding to sudden health incidents and injuries.
- **Evaluation:**
 - **Post-Drill Reviews:** Assess performance, identify gaps, and discuss improvements.
 - **Feedback Collection:** Encourage participants to share experiences and suggestions.
 - **Action Plans:** Implement changes based on drill outcomes to enhance preparedness.
- **Record Keeping**
 - Maintain records of all training sessions and drills, including attendance, content covered, and evaluation results.

10.13 RESOURCE MANAGEMENT

Effective emergency response relies on the availability and proper maintenance of necessary resources.

10.13.1 Equipment Maintenance

- **Regular Inspections:** Check all emergency equipment monthly to ensure functionality.
- **Servicing and Repairs:** Address any faults or damages promptly.
- **Inventory Management:** Keep an updated list of all equipment and supplies; replenish as needed.

10.13.2 8.2. Resource Accessibility

- **Strategic Placement:** Position equipment and supplies in easily accessible and clearly marked locations.
- **Visibility:** Use signs and labels to indicate the location of emergency resources.

10.14 POST-EMERGENCY ACTIONS

Proper steps after an emergency are crucial for recovery and future preparedness.

10.14.1 Incident Assessment

- **Investigation:** Conduct thorough investigations to determine causes and evaluate response effectiveness.
- **Reporting:** Prepare detailed reports documenting the incident, responses, and outcomes.

10.14.2 Recovery and Restoration

- **Damage Assessment:** Evaluate and document damages to property and environment.
- **Restoration Plans:** Develop and implement plans to repair and restore affected areas and resume normal operations.

- Support for Affected Individuals: Provide medical, psychological, and financial support as needed.

10.14.3 Plan Review and Update

- Learning from Experience: Use insights from the incident to update and improve the EPRP.
- Stakeholder Involvement: Engage all relevant parties in reviewing and revising emergency procedures.
- Regular Updates: Review and revise the EPRP annually or after any significant incident.

10.15 CONCLUSION

This Emergency Preparedness and Response Plan provides a framework tailored to the specific needs and conditions of Artisanal Small-Scale Gold Mining operations. Effective implementation requires commitment from all personnel, regular training, and continuous improvement to ensure safety and resilience in the face of emergencies.

11 CHAPTER ELEVEN: COST-BENEFIT ANALYSIS

11.1 INTRODUCTION

Cost Benefit Analysis serves as a tool for either ranking projects or selecting the most suitable option, relying on anticipated economic costs and benefits. The guiding principle is that a project should proceed if its expected lifetime benefits, encompassing environmental and social aspects, outweigh all anticipated environmental and social costs. Environmental and Social Cost Benefit Analysis (ESCBA) aims to present the lifetime costs and benefits of a project as a single figure, which can be compared against prevailing interest rates or the costs and benefits associated with the environment. Conducting an environmental cost benefit analysis involves:

- Description of the project and corresponding capital costs.
- Identification of the project consequences in time frame order and obtain their monetary values.
- Determination of the type of Environmental and Social Cost Benefit Analysis

11.2 PROJECT COSTS

As outlined in chapter 6, the adverse effects of the gold ore processing and washing facilities project during construction and operation will encompass various aspects such as air quality degradation due to dust and emissions, impacts on water resources, public health concerns, soil contamination, disruption of flora and fauna habitats during construction, generation of solid and liquid waste, noise and vibration pollution, increased risks of HIV/AIDS transmission, safety hazards from site operations, traffic management challenges, water contamination from oil and grease leaks, infrastructure disruptions (e.g., electrical facilities), and socio-economic and cultural disturbances resulting from migration influx.

Assigning a monetary value to each of these negative impacts based on current market rates, employing a combination of market value and payment methods for damages or impacts incurred, or using the cost of remedies such as dust control measures or provision of personal protective equipment (PPE), the total value of these impacts, including management and monitoring costs estimated in Chapter 8 and 9, amounts to approximately One hundred six million Tanzanian shillings (106,000,000TZS). Determining the market prices or monetary values of environmental negative impacts poses considerable challenges, unlike project costs, as they cannot be readily quantified. Estimates of environmental costs are based on the assumption that these costs are equivalent to the expenses incurred for prevention or remedy measures, such as providing PPE or health insurance, following common industry practices.

11.3 PROJECT BENEFITS

As included in the project rationale in section 1.2, this project will contribute to the increase in gold production operations while reducing environmental and health risks to the surrounding community if the project ceases and all related benefits which are included in Table 11-1 below will not be reaped.

Table 11-1: Benefits of Implementing the Project

Item	Amount	Details
Government investment for ASGM to facilitate gold production	25,000 USD	The government introduced Gold Ore Processing and Washing Facilities as alternative technologies to mercury for

Item	Amount	Details
		gold recovery in the ASGM in the year 2020/which 2021 contributed 30% of total gold production (42 tonnes)
Taxes	Include taxes paid over the last financial year	Artisanal and Small-scale Gold Mining (ASGM) significantly contributes to the growth of the national GDP, with many ASGM operations in Kahama District paying taxes to the Government.
Fees and regulatory charges	Add different fees	Annual fees for OSHA, NEMC, Water
Employment	Insert total number of employees at Umoja wa wenye mashamba Ilindi Site including temporary laborers with % of those coming from the surrounding communities	ASGM in Tanzania contributed about 90% of the total employment in the mining sector and much of this mining is a way of life supporting a variety of livelihoods

11.4 ANALYSIS

By comparing both the tangible and intangible expenses associated with the project, it becomes evident that it will create numerous opportunities for the village, ward, districts, and neighbouring areas, benefiting the entire region and nation as a whole. The project will stimulate increased mining activities, leading to a rapid economic upliftment in the local communities and yielding various advantages. Additionally, the project's operations will generate short-term employment opportunities for the local population, including roles such as construction workers, security personnel, contractors, engineers, and Environmental Impact Assessment teams.

Moreover, the project will result in additional benefits, including tax revenues from construction materials. Hence, the project promises significant economic and environmental advantages compared to the current state of the village and ward. Thus, the benefits expected from the project outweigh the anticipated environmental and social costs over its lifespan.

12 CHAPTER TWELVE: CONCEPTUAL DECOMMISSIONING PLAN

The Gold Ore Processing and Washing Facilities is considered as a long-term project aimed at generating economic benefits for the region and country by employing best practices aligned with national and international standards and legislation. This technology is geared towards enhancing production of gold, thereby minimizing environmental and social impacts and facilitating the rehabilitation process throughout its operational lifespan.

In anticipation of potential decommissioning requirements, this Study considered potential decommissioning impacts that may arise upon the facility's demolition and cessation of operations. Upon completion of the project, NEMC will develop a detailed decommissioning plan outlining the necessary activities for the Gold Ore Processing and Washing Facilities that will be involved in the decommission process. Additionally, an environmental study will be conducted to assess potential impacts and propose mitigation measures during the decommission phase, which will be submitted for approval by NEMC and other regulatory bodies. Upon successful completion of the decommissioning activities outlined in the plan, NEMC will issue a certificate of surrender in accordance with Section 37(1) of the EIA and EA Regulations of 2005.

13 CHAPTER THIRTEEN: SUMMARY AND CONCLUSION

Management plans have been developed to address potential impacts associated with the project's activities. Detailed baseline studies on the physical, biological, and socio-economic environments have been conducted to ensure all potential project-related impacts are identified and mitigated. The project is set to bring significant socio-economic benefits to the local area, surrounding communities, the Shinyanga Region, and Tanzania as a whole. Aside from the ongoing mining operations, the project is not expected to produce any significant adverse environmental or social impacts in the area.

The identified impacts are manageable through the proposed Environmental and Social Management Plan (ESMP) and the accompanying Monitoring Plan. NEMC is committed to executing the project in an environmentally sustainable manner, as evidenced by the activities already undertaken on-site. The proposed environmental management plans are designed to ensure that project activities comply with national environmental regulations and internationally recognized best practices.

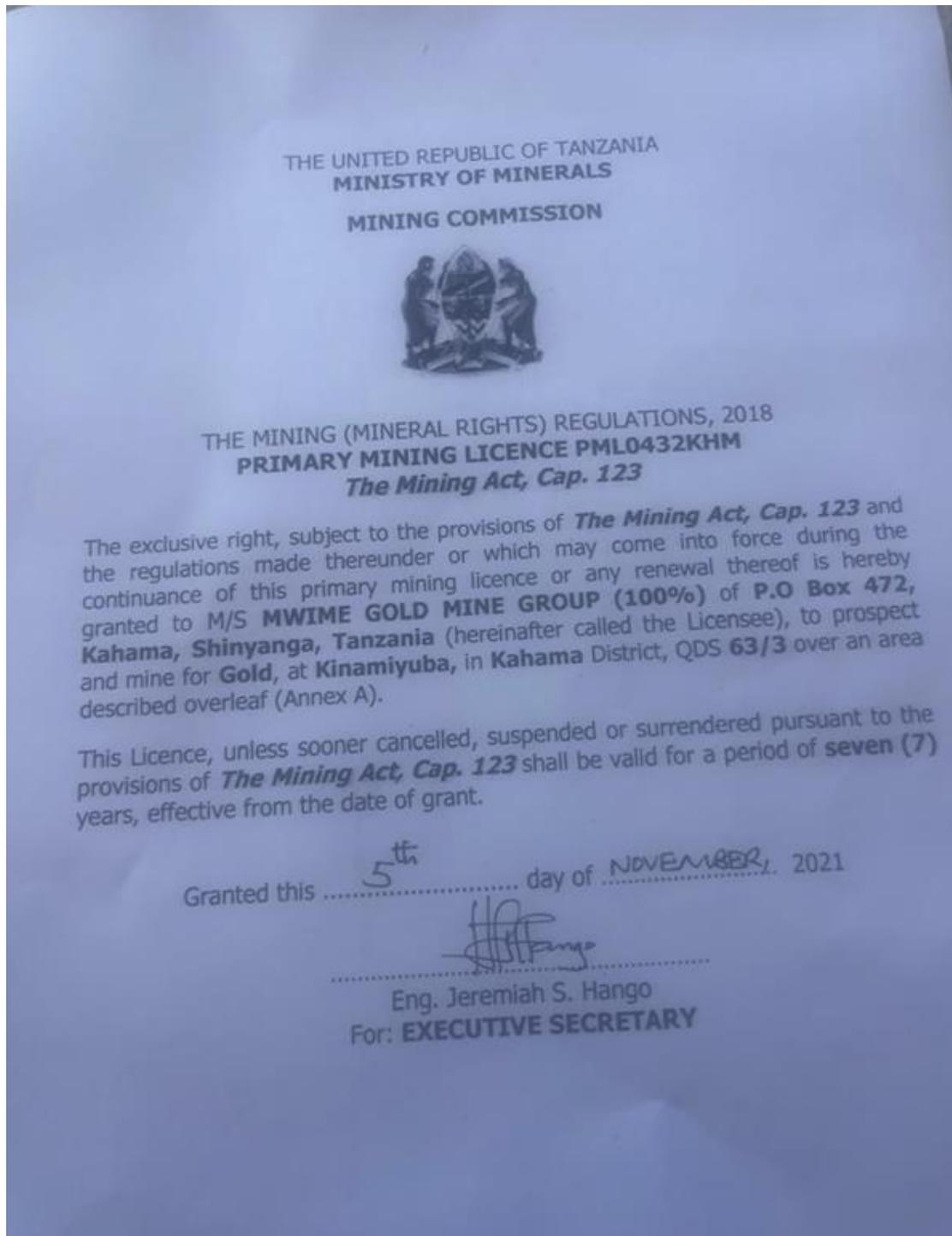
In conclusion, the project should proceed as planned, as the identified impacts will be effectively managed through the implementation of the proposed EMP and Monitoring Plan, ensuring that the project's benefits are realized.

REFERENCES

- National Land Policy, 1997
- The National Occupational Health and Safety Act (No. 5), 2003
- The National Environmental Policy (NEP), 1997
- The Mineral Policy of Tanzania, 2009
- The National Health Policy, 2003
- The National Water Policy 2002
- The National Policy on HIV/AIDS Policy, 20
- The National Construction Industry Policy, 2003
- The Tanzania Extractive Industries (Transparency and Accountability) Act No. 21 of 2015
- Tanzania Explosives Act, 1963
- The Environmental Management Act, 2004.
- Tanzanian Environmental Impact Assessment and Environmental Audit Regulation of 2005 and its Amendment, 2018.
- Water Resources Management Act, (No 11), 2009
- The Mining Act RE 2019
- Mining (Safety, Occupational Health and Environmental Protection) Regulations 2010
- Mining (Environmental Protection for Small Scale Miners) Regulations of 2010
- Employment and Labour Relations Act, 2004
- Industrial and Consumer Chemicals (Management and Control) Regulations, 2020
- Industrial and Consumer Chemicals (management and control) Act 2003
- International Conference on the Great Lakes Regions (ICGLR) Model Law 2012
- World Bank Environmental and Social Standards (ESS) 2018

APPENDICES

APPENDIX I: PRIMARY MINING LICENCE

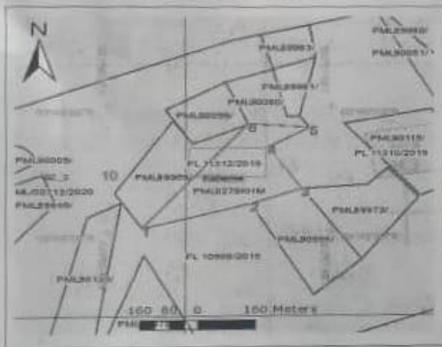


ANNEX A

DESCRIPTION OF THE PRIMARY MINING LICENCE AREA

The Primary Mining Licence is at **Mwabomba** area in **Kahama** District, QDS **62/3** defined by the following corner co-ordinates (Arc. 1960):

Corner	Latitude	Longitude
1	- 03 deg 49 min 19.50 sec	32 deg 06 min 42.90 sec
2	- 03 deg 49 min 16.60 sec	32 deg 06 min 52.60 sec
3	- 03 deg 49 min 14.80 sec	32 deg 06 min 57.20 sec
4	- 03 deg 49 min 9.80 sec	32 deg 06 min 54.20 sec
5	- 03 deg 49 min 7.40 sec	32 deg 06 min 56.00 sec
6	- 03 deg 49 min 7.00 sec	32 deg 06 min 52.40 sec



Legend	
Licensed area	
License Number	PML0278KHM
District	Kahama
Direction	

An area of approximately 7.28 Hectares.

ANNUAL RENT PAYMENTS

Year	ERV	Amount (TShs.)	Date	Signature & Stamp
2021/2022	921100041863209	655,200/=	10/04/2021	
2.
3.
4.
5.
6.
7.

APPENDIX II: MEETING MINUTES

HALMA SHAURI YA MANISPAA YA
KAHAMA.

MUHTASARI WA KIKAO CHA KOMAII YA
MAENDELEO YA MTAJI ILINDI KATA YA
ZONGOMERA KILICHOFANNIKA LEO TAREHE
20/02/2025 KATIKA OFISI YA MTAJI ILINDI

AGENDA-

1. KUFUNGUWA KIKAO
2. KUJADILI MATUMIZI YA ARDHI NA UMILIKI WA ENEO LA UMOJA WA WENYE MASHAMBA KABELA UNAOJENGWANA NA NEMK.
3. MENGINEYO
4. KUFUNGUWA KIKAO.

1. KUFUNGUWA KIKAO.

Katibu amemkaribisha mwenyekiti kufungua kikao, naye mwenyekiti amefungua kikao saa 3.00 asubuhi huku akinasisitiza wajumbe kuwa wakivu muda wote wa kikao na wachangie agenda pasipo kurudirudika hoja zitakazokuwa zimeshele kwa na wajumbe wengine

2. KUJADILI MATUMIZI YA ARDHI NA UMILIKI WA ENEO LA UMOJA WA WENYE MASHAMBA KABELA UNAOJENGWANA NA NEMK

Mwenyekiti amewakaribisha wajumbe kueleza uthabali wa umiliki wa ardhi wa eneo la umoja wa wenye mashamba kabela.

Kijumbe wameeleza kuwa wanatambua kwamba eneo linalobanda kujengwa mwalo wa mfano limetengwa kwa ajili ya uchumbaji na uchenjwaji wa madini. Kikundi cha umoja wa wenye mashamba kabela ndicho kinachomiliki na kutumia eneo hilo kwa makubaliano na wanakijiji. Kijiji kinafahamu kuwa kuna uchakote wa kujenga mwalo wa mfano ili kuwasaidia matawizi mazuri ya Zebaki kwenye uchenjwaji wa wanaokubali miradi huu kwani utasaidia kulinda afya za watu na mazingira.

3. MENGINEYO.

Mwenyekiti ameshauriana na wajumbe kurudi kupokea miradi inayoleta katika mataji bila kubathiri taratibu na sheria za nchi kwani miradi inayoleta jamii ya Ilindi ndio wanufaike wa kwanza

kwasababu inasaidia kuchangia maendeleo ya mtaa na kutoa fursa za ajira kwa wanamtaa

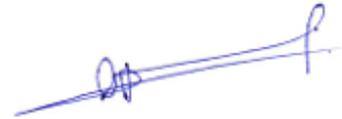
4.4. KUFUNGA KIKAO.

Mwenyekiti amefunga kikao saa 6:15 mchana huku mwenyekiti akiwashukumu wajumbe kwa ushirikiano mzuri waliononeshe muda wote wa kikao.



SATHI YA KATIBU

OFFICE YA SITENDAJI MTAJI
MTAA YA ZONGO MERA
KARANA



SATHI YA M/KITI

MWENYEKITI
MTAA WA ALI MTAJI
MTAA YA ZONGO MERA
S.L.P. 072 222000

MATIBUKU YA PULCOA CHA ICAMATI YA MABENDEBO
MUDA WA ILINDI ICICAO CHA TARIFE 20/02/2025.

No	JINA / COME	CHAO	Simu Namba	SHATI
01.	DOLU MHEZIWA MUSAFA	M/KICATI-MBO	0762966330	
02	STANLEY L. / COFO	MFO	0687102283	
03	KACOMA NALINI	BALOCI	0764956352	
04.	Buleyekei D-y	H/M-KARUA	0759987208	
05	SHISA ALI GUXHA	UWIBU SUNGA	0714358700	
06	ANTHONY KALIBA	MUWALE	0782118409	
07	SEBA GUMHA	SHISA	0767588	588
08	Bernadetha Lemiri	M/KAKUMU	0756804200	Bemiri
09	KASHIMBE MHEZIWA	K. SUNGA	0782022456	
10	MAYILA			
11	MAKENU JUMANNI	BALOCI	0699233543	
12.	MADATA	M/S/MIAN	0755753377	
12.	STEVEN PEICR	KATIBI/TANI	0759236786	
13	JUMA MABELI	BALOCI	0762628502	
14	ABEID M. MEZA	M/KAKUMU	0755440230	

NETIKA WTERDAJILINDI
JINA YA KONGOMERA
KINAMA

APPENDIX III: CERTIFICATE OF INCOOPERATION

JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA RAIS – TAWALA ZA MIKOA NA SERIKALI ZA MITAA


HALMASHAURI YA MJI KAHAMA


HATI YA USAJILI WA KIKUNDI

Hati hii inathibitisha kuwa Kikundi cha **UWEMI** kilichopo katika Kijiji/Mtaa wa **ILINDI** Kata ya **ZONGOMERA** kimesajiliwa leo tarehe **19/02/2018** kwa namba ya usajili **KHM/HM/CBO/ 1924** kama kikundi halali kwa shughuli zake.

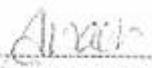
Kikundi kinaendesha shughuli zifuatazo:-

- Uchimbaji mdogo na utafiti wa madini aina ya dhahabu.
- Kilimo cha mpunga, mahindi na bustani ya nyanya na vitunguu.
- Kuweka na kukopa.
- Kushirikiana katika shida na raha.

Hati hii itatumika kwa kuzingatia yafuatayo:-

- Kwamba kikundi kitaendesha shughuli zilizotajwa kwa mujibu wa katiba yake
- Kwamba kikundi kinaruhusiwa kuendesha shughuli zake ndani ya Halmashauri ya Mji wa Kahama bila Kuvunja sheria za nchi na taratibu zilizowekwa na serikali.

Imetolewa leo tarehe **21/02/2018**.

 ROBERT KWELA AFISA MAENDELEO YA JAMII HALMASHAURI YA MJI KAHAMA	 ANDERSON D. MSUMBA MKURUGENZI HALMASHAURI YA MJI KAHAMA
---	--

AFISA MAENDELEO YA JAMII HALMASHAURI YA MJI KAHAMA

APPENDIX IV: CONSULTATION FORMS

	Stakeholder Consultation Form		
	Document Number	FRM 026	
Revision	1.0.0		

Proponent's Name National Environment Management Council
Type of Study Environmental and Social Impact Assessment for Gold Ores Processing Plants
Venue SHINYANGA
Date of Meeting 7th November, 2023.
Starting Time 08:49
End Time 13:24
Minutes by

S/N	Name	Position/Title	Location	Contact/ Phone	Signature
1.	Shinyi Siza Tumbwe	RAS	Shinyanga RS	0755326752	
2	Fabian Kamoga	PARC	Shinyanga RS	0756354619	
3	DR. YUBA NALINGILI	RWD	Shinyanga RS	0688978888	
4	NEMA SIMSON	RHO	Shinyanga RS	0754852585	
5	MUSA MAKUNGU	RDR/FHO	Shinyanga RS	0755715856	
6	MR. P. WATAWA	RPe	SHINYANGA	0655-174284	
7	DR. PHOELIS. NYANDA	AMULEERS	Shinyanga RS	0756252784	

SIGNED BY
Project Manager

Signature



Stakeholder Consultation Form

Document Number	FRM 026
Revision	1.0.0



PropONENT'S Name: National Environment Management Council
Type of Study: Environmental and Social Impact Assessment for Gold Ores Processing Plants
Venue: DHIMYANURA
Date of Meeting: 07th November, 2023
Starting Time: 13:38
End Time: 15:20
Minutes by:

S/N	Name	Position/Title	Location	Contact/ Phone	Signature
8	HARUNA R. MENDI	AFO	SANWENUSKA	0756-852396	
9	FRANAZELI SUMARI	BAI (TFS)	SHINMANGA	07555477495	
10	SE-TRAKTIN NYAMBERA	AFO	SANWENUSKA	0755302039	

SIGNED BY
Project Manager

Signature



Stakeholder Consultation Form

Document Number

FRM 026

Revision

1.0.0



Proponent's Name

National Environment Management Council

Type of Study

Environmental and Social Impact Assessment for Gold Ores Processing Plants

Venue

CELA, Murrumbidgee

Date of Meeting

6th Nov 2008

Starting Time

13:58

End Time

14:45

Minutes by

S/N	Name	Position/Title	Location	Contact/Phone	Signature
	BATA MUZZA	CHIEF	CELA - Murrumbidgee	0756767690	

SIGNED BY

Project Manager

Signature



Stakeholder Consultation Form

Document Number
Revision

FRM 026
1.0.0



Proponent's Name

National Environment Management Council

Type of Study

Environmental and Social Impact Assessment for Gold Ores Processing Plants

Venue

KATHUNA

Date of Meeting

08TH NOVEMBER, 2003.

Starting Time

09:10

End Time

11:33

Minutes by

S/N	Name	Position/Title	Location	Contact/Phone	Signature
01	YBADI. H. HIRTA	DC - KATHUNA	KATHUNA	125371490000	
2	EL-JAH. S. BARETHA	LT. GOB - KATHUNA	KATHUNA-SUB-OFF.	0759 313277	
03	DR. NYAGA - R. D	MAN - KATHUNA	KATHUNA INC	0787161174	

SIGNED BY

Project Manager

Signature



Stakeholder Consultation Form

Document Number

FRM 026

Revision

1.0.0



Proponent's Name

National Environment Management Council

Type of Study

Environmental and Social Impact Assessment for Gold Ores Processing Plants

Venue

KAHAMA

Date of Meeting

08TH NOVEMBER, 2022.

Starting Time

11: 53

End Time

16: 58

Minutes by

S/N	Name	Position/Title	Location	Contact/ Phone	Signature
1.	ANDERSON D MUSAHA	MAD	KATHAMA Mc	014 272727	
02	DOHANNES MWEBE	MEND	KATHAMA Mc	0755017196	
03	TOBBERI KUTELA	MCD	KATHAMA-MC	0767398906	
04	SWETA CECILIUS	SWC	KATHAMA MC	0707 24574 87	
05	ABRACHOMANI MUM	MSWD	KALOMBA MC	063153252	
06	NAAGERI MUSA	SWD	BATHANDA MC	0750028210	
07	TEREMIAH HANCO	AS-Env - KATHAMA	KATHAMA	0753298858	

SIGNED BY

Project Manager

Signature



Stakeholder Consultation Form

Document Number

FMM 026

Revision

1.0.0



PropONENT'S Name

National Environment Management Council

Type of Study

Environmental and Social Impact Assessment for Gold Ores Processing Plants

Venue

MWIRIWE OFFICES

Date of Meeting

16TH NOVEMBER, 2023

Starting Time

11: 23

End Time

13: 30

Minutes by

S/N	Name	Position/Title	Location	Contact/ Phone	Signature
1	MARTIN BUDALA	K/MENYA	LINDI - MWIRIWE	0756 877733	
2	JUMA-C. MACHWA	KOSIBU	LINDI - MWIRIWE	0758202977	
3	DOLLO MACHWA	MKWILIMBE	LINDI - MWIRIWE	0762966832	
4	JUMA MACHWA	MKWILIMBE	LINDI - MWIRIWE	-	
5	MACHWA GUMHA	-/-	-/-	0767809366	
6	MACHWA KAREGI	MKWILIMBE	LINDI	0750 801032	
7	STANISLAUS MACHWA	MKWILIMBE	-/-	0764943403	

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Project Manager

Signature



Stakeholder Consultation Form

Document Number

FRM 026

Revision

1.0.0



Proponent's Name

National Environment Management Council

Type of Study

Environmental and Social Impact Assessment for Gold Ores Processing Plants

Venue

MWIME OFFICES

Date of Meeting

10TH NOVEMBER, 2023.

Starting Time

11: 23

End Time

13: 30

Minutes by

S/N	Name	Position/Title	Location	Contact/ Phone	Signature
08	Arthur M. Kuma	Chief of Police	Mwime Police Post	071564 8592	

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Project Manager

Signature



Stakeholder Consultation Form

Document Number
Revision

FRM 026
1.0.0



Proponent's Name

National Environment Management Council

Type of Study

Environmental and Social Impact Assessment for Gold Ores Processing Plants

Venue

ZONDRONERA OFFICES

Date of Meeting

10th NOVEMBER, 2013

Starting Time

14:12

End Time

17:00

Minutes by

S/N	Name	Position/Title	Location	Contact/Phone	Signature
02	STANISLAUS ICAFU	MEMO-ILINDI	ILINDI	0629370358	
02	JOSEPH MUSITA	LFO-ZONDRONERA	ZONDRONERA	078555586	
03	CHARLES K S	M/M KUYI	ILINDI spm	0752236200	
04	PASCHEM-NURUBU	KAT. RC	KINAMUBA (A)	0688713290	
05	MATONELO MWKALA	AEK-ZONDRONERA	ZONDRONERA	0755496988	
06	JUMA MAFIBU	M/KINAMUBA MISA ZONDRONERA	ZONDRONERA	0742515365	

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Project Manager

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Proponent's Name

National Environment Management Council

Type of Study

Environmental and Social Impact Assessment for Gold Ores Processing Plants

Venue

ZOBOMWENA OFFICES

Date of Meeting

10TH NOVEMBER, 2023

Starting Time

14:12

End Time

17:00

Minutes by

S/N	Name	Position/Title	Location	Contact/Phone	Signature
1.	M Ressa - F.P	WED	ZOBOMWENA	0764489919	
2	GRACE J. MUKEX	MUKI, MINA SEEYE	ZOHGO WENA	0754407372	
3.	PETER J. KADIMOTO	MEO-INTEN	ZANZIBAR	0689328660	
4	THEBICE P. ISDOBY	MHEU (MUD)	ZANZIBAR	0752521120	
5.	SILVESTER MASHUWA	MHEU/MANHEU	ZANZIBAR	0759421985	
6	JOCELYNE KASSANO	WHEU	ZANZIBAR	0759456188	
7	SUZAN JOHN	MHEU/MANHEU	ZANZIBAR	0765336539	

SIGNED BY

Project Manager

Signature

